Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Final Implementation Report, Fiscal Year 2016 Work Plan and Budget, Fiscal Year 2014 Accomplishment Report

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

June 2015

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
Basic Water Company

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.
The Nature Conservancy

Lower Colorado River Multi-Species Conservation Program

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

June 2015

ACRONYMS AND ABBREVIATIONS

AGFD	Arizona Game and Fish Department
AJ	Arizona Juvenile backwater
AMM	Avoidance and Minimization Measure
AMP	Adaptive Management Program
BBCA	Big Bend Conservation Area
BEVI	Arizona Bell's vireo
BLCA	Beal Lake Conservation Area
BLM	Bureau of Land Management
BLRA	California black rail
BO	Biological and Conference Opinion
BONY	bonytail
CAP	Central Arizona Project
CDFW	California Department of Fish and Wildlife
CEM	conceptual ecological model
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
cfs	cubic feet per second
CI	confidence interval
Cibola NWR	Cibola National Wildlife Refuge
Cibola NWR Unit #1	Cibola National Wildlife Refuge Unit #1
CLNB	California leaf-nosed bat
CLRA	Yuma clapper rail
CMM	Conservation Area Management Measure
CPUE	catch per unit effort
CRAB	Colorado River Aquatic Biologists
CRCR	Colorado River cotton rat
CRIT	Colorado River Indian Tribe
CRTO	Colorado River toad
CRTR	Colorado River Terrestrial and Riparian
CVCA	Cibola Valley Conservation Area
DETO	desert tortoise
DO	dissolved oxygen
DPMO	desert pocket mouse
ELOW	elf owl
ESA	Endangered Species Act
FLSU	flannelmouth sucker
FMA	Funding and Management Agreement
FTHL	flat-tailed horned lizard
FY	fiscal year
GIFL	gilded flicker
GIS	Geographic Information System
GIWO	Gila woodpecker
GPS	Global Positioning System

Havasu NWR	Havasu National Wildlife Refuge
HCP	Habitat Conservation Plan
HMF	Habitat Maintenance Fund
HUCH	humpback chub
Imperial NWR	Imperial National Wildlife Refuge
IPCA	Imperial Ponds Conservation Area
ISC	interim surplus criteria
kHz	kilohertz
LCR	lower Colorado River
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
LDCA	Laguna Division Conservation Area
LEBI	western least bittern
LiDAR	light detection and ranging
LLFR	lowland leopard frog
m	meter(s)
m^2	square meter(s)
MAPS	Monitoring Avian Productivity and Survivorship
MEFF	Mobile Electronic Field Form
mg/L	milligrams per liter
mm	millimeter(s)
MNSW	MacNeill's sootywing skipper
MRM	Monitoring and Research Measure
MVCA	Mohave Valley Conservation Area
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NFH	National Fish Hatchery
NPS	National Park Service
Overton WMA	Overton Wildlife Management Area
Pahranagat NWR	Pahranagat National Wildlife Refuge
PCR	polymerase chain reaction
PIT	passive integrated transponder
PTBB	Pale Townsend's big-eared bat
PVC	polyvinyl chloride
PVER	Palo Verde Ecological Reserve
PVID	Palo Verde Irrigation District
PWCA	Pretty Water Conservation Area
RASU	razorback sucker
Reclamation	Bureau of Reclamation
RLFR	relict leopard frog
RMF	Remedial Measures Fund
SDCWA	San Diego County Water Authority
SNARRC	Southwestern Native Aquatic Resources & Recovery Center

SNWA	Southern Nevada Water Authority
SQL	Structured Query Language
STBU	sticky buckwheat
SUR	submersible ultrasonic receiver
SUTA	summer tanager
SWA	State Wildlife Area
SWFL	southwestern willow flycatcher
THMI	threecorner milkvetch
TL	total length
USFWS	U.S. Fish and Wildlife Service
VEFL	vermilion flycatcher
WIFL	willow flycatcher
Willow Beach NFH	Willow Beach National Fish Hatchery
WRBA	western red bat
WYBA	western yellow bat
YBCU	yellow-billed cuckoo
YCNHA	Yuma Crossing National Heritage Area
YHCR	Yuma hispid cotton rat
YWAR	yellow warbler

Symbols

°C	degrees Celsius
>	greater than
≥	greater than or equal to
<	less than
µS/cm	microsiemens per centimeter
%	percent

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PROGRAM OVERVIEW

The Lower Colorado River Multi-Species Conservation Program (LCR MSCP) is a partnership of Federal and non-Federal stakeholders that was created to respond 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 (ESA). 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 implementation of a Habitat Conservation Plan (HCP).

Under this long-term program, current water diversions and power production will be accommodated, and opportunities for future water and power development will be optimized to the extent consistent with the law. The comprehensive program addresses future Federal agency consultation needs under Section 7 of the ESA and non-Federal agency needs for endangered species incidental take authorization under Section 10 of the ESA. The program also allows California agencies to meet their obligations under California State law for the California Endangered Species Act (CESA).

Twenty-six Federal or State-listed candidate and sensitive species and their associated habitats, ranging from aquatic and wetland habitats to riparian and upland areas, are covered under the LCR MSCP. Of the 26 covered species, 7 are currently listed under the Federal ESA. The program addresses the biological needs of mammals, such as birds, fish, amphibians, and reptiles, as well as invertebrates and plants.

Implementing the LCR MSCP will create at least 8,132 acres of new habitat (5,940 acres of cottonwood-willow, 1,320 acres of honey mesquite, 512 acres of marsh, and 360 acres of backwater) and produce 660,000 subadult razorback suckers and 620,000 bonytail to augment the existing populations of these fish in the LCR. LCR MSCP staff may also participate in the recovery programs for these fish by funding other appropriate activities in lieu of stocking. In addition, there is a substantial research and monitoring component to the program. Under the program, a $25 million fund was established to support projects implemented by land use managers to protect and maintain existing habitat for covered species.

The estimated cost of the program in 2003 dollars is about $626 million, and it will be adjusted annually for inflation. The Bureau of Reclamation (Reclamation) will pay 50 percent (%) of the LCR MSCP cost. The States of California, Nevada, and Arizona will pay the remaining 50%, with California paying one-half of the State total and Nevada and Arizona each paying one-quarter of the State total.

Program Implementation

On April 2 and 4, 2005, the Secretary of the Interior; representatives from Arizona, California, and Nevada; and water and power organizations in these States signed the program documents required to implement the LCR MSCP. The documents for the LCR MSCP include an environmental impact statement/environmental impact report, a biological assessment, a 2005 Biological and Conference Opinion (BO), a HCP, a Record of Decision, a Funding and Management Agreement (FMA), an Implementation Agreement, and a Section 10 Permit. These documents can be found on the LCR MSCP Web site.

Implementation of the LCR MSCP also provides compliance for two other actions:

1. In December 2001, the U.S. Fish and Wildlife Service (USFWS) issued to Reclamation the *Biological Opinion for Interim Surplus Criteria, Secretarial Implementation Agreements, and Conservation Measures on the Lower Colorado River, Lake Mead to the Southerly International Boundary, Arizona, California and Nevada* (2001 BO). Although this is a separate compliance action, the requirements listed in the 2001 BO were integrated into the LCR MSCP and were implemented by Reclamation in conjunction with the LCR MSCP. Section 8.6 of the FMA states that implementation of the 2001 BO conservation and mitigation measures shall be credited against the requirements of the LCR MSCP in accordance with the HCP.

2. On April 4, 2005, Reclamation entered into a Memorandum of Agreement with the California partners to implement the LCR MSCP in a coordinated manner to help meet the requirements of the CESA permit issued by the California Department of Fish and Wildlife (CDFW). The requirements of that CESA permit are generally consistent with the LCR MSCP HCP. A copy of the memorandum and the CESA permit are available from the California partners upon request.

As agreed to in the FMA, Reclamation is the entity responsible for implementing the LCR MSCP over the 50-year term of the program. The FMA also calls for the establishment of a Steering Committee, currently consisting of 57 entities, to provide input and oversight functions in support of LCR MSCP implementation. The Steering Committee includes Federal and non-Federal entities, which are receiving ESA coverage through the LCR MSCP, or stakeholders interested in the environment of the LCR. A complete list of Steering Committee members can be viewed on the LCR MSCP Web site. During fiscal year (FY) 2014, Chris Harris, Colorado River Board of California, served as Chair of the Steering Committee, and Perri Benemelis, Central Arizona Groundwater Replenishment District, served as Vice Chair.

Section 7.4.1 of the FMA requires Reclamation to submit an implementation report, work plan and budget (annual report) to the Steering Committee each year, consistent with the program documents. The current annual report contains a description of conservation activities accomplished during FY14, a summary of work underway during FY15, and proposed work to be performed during FY16. It also documents research and monitoring activities undertaken in support of the LCR MSCP and incidental take for covered actions implemented during FY14. This annual report fully meets the reporting requirements outlined in Section 7.4.1 of the FMA.

LCR MSCP Funding

As outlined in the FMA, the total program cost in 2003 dollars is $626,180,000, which is split in a 50-50 cost share among Federal and non-Federal entities. Table 7-1 of the HCP outlines the annual minimum funding level before inflation. Each year, the annual program cost is adjusted for inflation based on a formula outlined in Section 8.1.1 of the FMA. Table 1-1 provides the annual contribution before inflation, a composite inflation index, and indexed annual program (Federal and non-Federal) contributions. Indexed annual program costs are calculated using the composite inflation index from 2 years prior as outlined in the FMA. A summary of required contributions received to date is provided in attachment D-1.

Table 1-1.—Federal/Non-Federal Funding Requirements for the LCR MSCP

Fiscal Year	Annual Contribution Before Inflation	Composite Inflation Index	Composite Calculation Year	Indexed Annual Program	Indexed Annual Federal	Indexed Annual Non-Federal
2006	$11,214,000	1.083	2004	$12,144,762	$6,072,381	$6,072,381
2007	$11,214,000	1.122	2005	$12,582,108	$6,291,054	$6,291,054
2008	$11,214,000	1.187	2006	$13,311,018	$6,655,509	$6,655,509
2009	$11,214,000	1.210	2007	$13,568,940	$6,784,470	$6,784,470
2010	$11,214,000	1.294	2008	$14,510,916	$7,255,458	$7,255,458
2011	$27,540,000	1.191*	2009	$32,800,140	$16,400,070	$16,400,070
2012	$27,540,000	1.210*	2010	$33,323,400	$16,661,700	$16,661,700
2013	$27,540,000	1.251*	2011	$34,452,540	$17,226,270	$17,226,270
2014	$27,540,000	1.276*	2012	$35,141,040	$17,570,520	$17,570,520
2015	$27,540,000	1.358	2013	$37,399,320	$18,699,660	$18,699,660
2011 – 2014	Underfunding makeup			$7,601,040	$3,800,520	$3,800,520
2016	$22,164,000	1.387	2014	$30,741,468	$15,370,734	$15,370,734

* Original inflation index. Difference between original inflation index and revised inflation index is shown as underfunding makeup.

Underfunding

In a letter dated February 14, 2014, the Central Arizona Water Conservation District informed the LCR MSCP parties of an inadvertent error in the calculation of the inflation index for program years 6– 9 (FY11–14). Due to a change in the base year of one of the two indices used to calculate the inflation index, the inflation rate was understated and consequently too low. This resulted in an underpayment by the parties for those years. On October 22, 2014, the Steering Committee passed Resolution 15-001, approving the makeup of $7,601,040 in underfunding for program years FY11–14; the non-Federal amount of $3,800,520 should be used to make up the underfunding in the Habitat Maintenance Fund (HMF), the Remedial Measures Fund (RMF), and to prepay the RMF. Table 1-1a shows the required makeup funding and the distribution between the funds. Because California used funding credits in FY11–14 toward their required contribution and those credits would be worth more using the revised inflation rate, their credits were recalculated, and the incremental difference was used to reduce the amount they owed in the RMF. Detailed calculations are provided in attachment D-1a. In a letter dated December 19, 2014, the USFWS provided concurrence that the payment amounts and schedule met each funding party's commitments under the program documents, including Sections 6.4, 12, and 15.10 of the Implementation Agreement (attachment C).

Table 1-1a.—Federal/Non-Federal Makeup Funding Requirements for the LCR MSCP

	Total	Credit	HMF	RMF
Federal	$3,800,520.00			
Non-Federal	$3,800,520.00			
California	*$2,090,286.00*	*$196,836.62*	*$654,015.00*	*$1,239,434.38*
Arizona	*$570,078.00*		*$327,007.50*	*$243,070.50*
Nevada	*$1,140,156.00*		*$327,007.50*	*$813,148.50*
Total	**$7,601,040.00**	**$196,836.62**	**$1,308,030.00**	**$2,295,653.38**

Funding Credits/Debits

Section 8.1.2 of the FMA states that funds provided by either a Federal party or a State permittee that are in excess of the funding obligation for a specific year shall be treated as a credit against future funding obligations. Any shortage of funds provided by either a Federal party or a State permittee will be treated as a deficit to future funding obligations. In a letter dated June 5, 2014, the Central Arizona Water Conservation District indicated that Arizona had paid $590,297.36 in underfunding. Since their required underfunding amount was $570,078.00, they received a funding credit of $20,219.36 in 2014 dollars. In a letter dated July 17, 2014, the Colorado River Commission of Nevada indicated that Nevada had paid $1,180,594.72 in underfunding. Since Nevada owed $1,140,156.00, they received

a funding credit of $40,438.72 in 2014 dollars. Both Arizona and Nevada are using their funding credits in FY15. Reclamation made up its underfunding in FY14 using $3,800,520 of funding credits. The California parties are paying their underfunding makeup as part of their FY15 contribution and therefore will not receive a credit. Attachment D-2 provides a summary of funding credits earned and funding credits used.

FY16 Contributions and Adjustments

As outlined in table 1-1, the annual funding commitment for FY16 is $22,164,000, based on the 2003 estimate, and $30,719,304 after the preliminary composite inflation index of 1.386 is applied. In accordance with Section 8.3 of the FMA, the Federal share of the cost for FY16 and the non-Federal share of the cost by State are shown in table 1-2. Section 8.3 of the FMA allows for adjusted non-Federal funding during the first 30 years of the program. The FY16 adjusted funding amounts for the three States are shown in table 1-2 (amounts based on direction from the Central Arizona Water Conservation District (see attachment A).

Table 1-2.—FY16 Contribution Schedule

Funding Entity	FY16 Contributions	FY16 Adjusted Contributions
Federal	$15,370,734.00	$15,370,734.00
Non-Federal	$15,370,734.00	$15,370,734.00
California	*$7,685,367.00*	*$7,320,254.85*
Arizona	*$3,842,683.50*	*$4,572,907.80*
Nevada	*$3,842,683.50*	*$3,477,571.35*
Total	**$30,741,468.00**	**$30,741,468.00**

2001 Biological Opinion Account

A total of $6 million, plus interest, was available to Reclamation through the 2001 BO funding agreement. This funding is part of LCR MSCP contributions from the San Diego County Water Authority (SDCWA) and The Metropolitan Water District of Southern California and was used to meet the financial commitments for these entities. The mitigation requirements outlined in the 2001 BO needed to be implemented on the front end of the LCR MSCP; therefore, funding in excess of the entities' LCR MSCP annual required contribution was requested by Reclamation and resulted in funding credits in the early years of the program. In FY08, requirements under the 2001 BO specifically related to the Secretarial Implementation Agreement were completed, and all remaining funds were withdrawn. In FY09, the SDCWA started using their funding credits to meet

their LCR MSCP annual contribution, and they will continue to use these credits to meet their annual obligations until they are exhausted. The Metropolitan Water District of Southern California used their remaining credits in FY13.

Habitat Maintenance Fund

As outlined in Section 8.4.2 of the FMA, a $25 million (2003 dollars) HMF is being developed during the first 10 years of LCR MSCP implementation to restore covered species habitats that have been degraded; a share of each State's contribution will be set aside in interest-bearing accounts referred to as Existing Habitat Maintenance Fund accounts. While each State is maintaining its own account, interest earned on these accounts will be added to the accounts for the benefit of implementing the LCR MSCP. Table 1-3a provides FY14 contributions, total funds contributed through FY14 with interest, the underfunding makeup amount, and FY15 contributions. The FY14 approved amount for the HMF was $6,928,680, which consisted of $5,742,000 of required funding and $1,186,680 of additional funding. Funding for FY15 is $4,848,060, which is the remaining funding amount required for the HMF (table 1-3a). Table 1-3b provides information on how the underfunding amounts are being contributed and the resulting changes in the FY15 contributions. Because Arizona and Nevada provided more than their required underfunding makeup amount in FY14, they received a funding credit. Both are using a portion of their funding credit toward their FY15 contribution. California is paying their underfunding makeup amount in FY15 (table 1-3b). A detailed accounting of the HMF is included in attachment D-3. No funds have been withdrawn from any of the accounts to date.

Table 1-3a.—Existing HMF Required

Funding Partner	FY14 Contribution	Cumulative through FY14	Underfunding Makeup	FY15 Contribution
California	$3,464,340	$14,455,729.05	$654,015.00	$2,424,030
Arizona	$1,732,170	$6,936,580.16	$327,007.50	$1,212,015
Nevada	$1,732,170	$8,183,191.02	$327,007.50	$1,212,015
Total	**$6,928,680**	**$29,575,500.23**	**$1,308,030.00**	**$4,848,060**

Table 1-3b.—Existing HMF Actual

Funding Partner	FY14 Contribution	Underfunding Makeup FY14	Underfunding Makeup FY15	FY15 Contribution
California	$3,464,340	$0	$654,015.00	$2,424,030
Arizona	$1,732,170	$338,020.32	$0	$1,201,002.18
Nevada	$1,732,170	$338,020.32	$0	$1,201,002.18
Total	**$6,928,680**	**$676,040.64**	**$654,015.00**	**$4,826,034.36**

Remedial Measures Fund

The HCP requires that contingency funds be set aside to pay for implementing remedial measures in the event that changed circumstances affect program conservation measures (HCP, Section 5.12.13). The amount of funding is set forth in Table 7-1 of the HCP, totaling $13,270,000 (2003 dollars) to be paid from year 6 through year 25 of the program. On April 25, 2012, the Steering Committee passed Program Decision Document 12-001, which approved establishment of State interest-bearing RMFs. Table 1-4a provides FY14 contributions, total funds contributed through FY14 with interest, the underfunding makeup amount, and FY15 and FY16 contributions. Table 1-4b provides information on how the underfunding amounts are being contributed and the resulting changes in the FY15 contributions. Because Arizona and Nevada provided more than their required underfunding makeup amount in FY14, they received a funding credit. Both are using a portion of their funding credit toward their FY15 contribution. California is paying their underfunding makeup amount in FY15. No funds have been withdrawn from any of the accounts to date.

Table 1-4a.—RMF Required

Funding Partner	FY14 Contribution	Cumulative through FY14	Underfunding Makeup	FY15 Contribution	F16 Projected Contribution
California	$169,708.00	$1,032,833.80	$1,239,434.38	$180,614.00	$552,026.00
Arizona	$84,854.00	$586,705.56	$243,070.50	$90,307.00	$276,013.00
Nevada	$84,854.00	$335,467.95	$813,148.50	$90,307.00	$276,013.00
Total	**$339,416.00**	**$1,955,007.31**	**$2,295,653.38**	**$361,228.00**	**$1,104,052.00**

Table 1-4b.—RMF Actual

Funding Partner	FY14 Contribution	Underfunding Makeup FY14	Underfunding Makeup FY15	FY15 Contribution	F16 Projected Contribution
California	$169,708.00	$0	$1,239,434.38	$180,614.00	$552,026.00
Arizona	$84,854.00	$252,277.04	$0	$81,100.46	$276,013.00
Nevada	$84,854.00	$842,574.40	$0	$60,881.10	$276,013.00
Total	**$339,416.00**	**$1,094,851.44**	**$1,239,434.38**	**$322,595.56**	**$1,104,052.00**

Land and Water Fund

A Land and Water Fund has been established by Reclamation to set aside funds for acquisition of land and water resources to implement conservation measures described in the HCP. Through guidelines developed under Work Task E16, Reclamation works with interested parties to secure land and water resources. Once potential sites have been evaluated, including determining financial value

through the Federal appraisal process using the U.S. Department of the Interior's designated Appraisal Services Office, land and water resources nominated by Reclamation for acquisition must be approved by the Steering Committee through a Land and Water Resolution. The entire site selection process may extend over multiple years; therefore, this fund has been established to ensure funding will be available to complete these acquisitions. The Land and Water Fund will be limited to the amount of funding identified in Table 7-1 of the HCP, indexed for inflation. Once land and water resources have been approved for acquisition, funds will be withdrawn from the Land and Water Fund and a work task developed. If funds set aside in the Land and Water Fund are no longer required for land or water acquisition, they may be used to implement other actions necessary for conservation measure accomplishment. Table 1-5 lists the funds set aside in the Land and Water Fund through FY14. An additional $6,100,000 is being contributed in FY15, and an additional $4,100,000 is being contributed in FY16.

Table 1-5.—Land and Water Fund

Funding Partner	FY14 Contribution	Cumulative through FY14	FY15 Contribution	F16 Projected Contribution
Reclamation	$0	$13,500,000	$6,100,000	$4,100,000

In-Kind Contributions

Section 8.7.4 of the FMA provides that in-kind goods or services shall be credited based on approval by the Program Manager and the Steering Committee. In October 2007, the Steering Committee passed Program Decision Document 08-001, *In-Kind Credit for Goods and Services*, which provides specific guidelines for the calculation of in-kind credit, for goods and services. No in-kind contributions were provided in FY14.

California Endangered Species Act Permit

As discussed in the "Program Implementation" section of this annual report, the California partners are responsible for meeting the terms of the CESA permit. While Reclamation and non-Federal entities located in Nevada and Arizona have no legal requirement to comply with a CESA permit with respect to the LCR MSCP, Reclamation is working with the California partners in meeting their requirements.

An aspect of the Memorandum of Agreement among Reclamation and the California partners regarding LCR MSCP conservation actions for the CESA permit discusses Reclamation's commitment to implement the conservation plan in a manner that facilitates CESA compliance requirements. In exchange, the California partners have made land and water available at no cost in the

Palo Verde Irrigation District (PVID) for program purposes. Given this exchange and the overall commonality between the CESA permit and the HCP, these California-specific actions are not expected to result in additional program costs.

Proposed FY16 Program Activities and FY14 Accomplishments

The minimum funding required in the LCR MSCP documents for FY16 is $30,741,468: $15,370,734 Federal and $15,370,734 non-Federal. Reclamation is proposing an annual program budget of $39,080,018, which consists of $34,980,018 in work tasks and a $4,100,000 contribution to the Land and Water Fund. The $34,980,018 includes $8,300,000 approved by the Steering Committee for the acquisition of the lease for Planet Ranch (table 1-6).

Table 1-6.—FY16 Proposed Program Funding

Program Area	FY16 Funding
Program Administration	$1,411,966
Fish Augmentation	$2,050,000
Species Research	$3,413,000
System Monitoring	$3,330,000
Conservation Area Development and Management	$20,386,000
Post-Development Monitoring	$1,245,000
Adaptive Management Program	$1,940,000
Funding Account – Remedial Measures	$1,104,052
Public Outreach	$100,000
Subtotal	**$34,980,018**
Land and Water Fund Contribution	$4,100,000
Total	**$39,080,018**

Table 1-7 shows the following by work task: FY14 estimates and actual accomplishment, cumulative program expenditures (FY04–14), FY15 approved program funding, FY16 proposed program funding, and out-year funding for FY17 and FY18. Out-year funding estimates are not adjusted for future inflation. In table 1-7, current year accomplishment is shown as obligations (money that is set aside during the year for program expenses). Cumulative accomplishment is shown as expenditures (actual funding expended).

Table 1-7.—Annual Funding Matrix

Work Task	Name	FY14 Approved Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Projected Estimate[1]	FY18 Projected Estimate[1]
A	**Program Administration**							
A1	Program Administration	$1,298,968.00	$985,556.40	$9,890,616.58	$1,382,444.00	$1,411,966.00	$1,411,966.00	$1,411,966.00
Closed[2]	Work Tasks Pre-FY14			$130,535.22				
		$1,298,968.00	**$985,556.40**	**$10,021,151.80**	**$1,382,444.00**	**$1,411,966.00**	**$1,411,966.00**	**$1,411,966.00**
B	**Fish Augmentation**							
B1	Lake Mohave Razorback Sucker Larvae Collections	$200,000.00	$193,518.74	$1,952,354.80	$200,000.00	$200,000.00	$215,000.00	$215,000.00
B2	Willow Beach National Fish Hatchery	$300,000.00	$305,132.56	$2,854,125.46	$325,000.00	$325,000.00	$325,000.00	$325,000.00
B3	Achii Hanyo Native Fish Rearing Facility	$150,000.00	$183,710.01	$1,035,574.15	$160,000.00	$275,000.00	$50,000.00	$160,000.00
B4	Southwestern Native Aquatic Resources & Recovery Center at Dexter	$250,000.00	$606,288.45	$1,989,502.32	$250,000.00	$260,000.00	$260,000.00	$260,000.00
B5	Bubbling Ponds Fish Hatchery	$300,000.00	$300,297.40	$2,410,139.24	$960,000.00	$315,000.00	$315,000.00	$315,000.00
B6	Lake Mead Fish Hatchery	$125,000.00	$135,579.70	$579,513.29	$255,000.00	$240,000.00	$200,000.00	$200,000.00
B7	Lake-Side Rearing Ponds	$200,000.00	$223,986.77	$1,878,570.64	$200,000.00	$200,000.00	$200,000.00	$200,000.00
B8	Fish Tagging Equipment	$100,000.00	$102,290.33	$767,737.85	$125,000.00	$135,000.00	$135,000.00	$135,000.00
B11	Overton Wildlife Management Area	$50,000.00	$50,000.00	$400,290.37	$50,000.00	$50,000.00	$20,000.00	$20,000.00
B12	Maintenance of Alternate Bonytail Broodstock	$0.00	$0.00	$0.00	$0.00	$50,000.00	$50,000.00	$50,000.00
Closed[2]	Work Tasks Pre-FY14		$0.00	$558,428.94	$0.00			
		$1,675,000.00	**$2,100,803.96**	**$14,426,237.06**	**$2,525,000.00**	**$2,050,000.00**	**$1,770,000.00**	**$1,880,000.00**
C	**Species Research**							
C2	Sticky Buckwheat and Threecorner Milkvetch Conservation	$11,000.00	$21,811.11	$105,177.69	$11,000.00	$11,000.00	$11,000.00	$11,000.00

Table 1-7.—Annual Funding Matrix

Work Task	Name	FY14 Approved Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Projected Estimate[1]	FY18 Projected Estimate[1]
C3	Lower Colorado River Multi-Species Conservation Program Covered Species Profile Development	$15,000.00	$9,297.76	$278,197.59	$10,000.00	$0.00	$0.00	$0.00
C4	Relict Leopard Frog	$11,000.00	$10,846.42	$99,300.80	$11,000.00	$0.00	$0.00	$0.00
C6	Insectivore Prey Base Abundance and Diversity in Conservation Areas	$265,000.00	$0.00	$101,441.68	$0.00	$0.00	$0.00	$0.00
C10	Razorback Sucker Rearing Studies	$125,000.00	$133,266.56	$1,000,660.01	$0.00	$0.00	$0.00	$0.00
C11	Bonytail Rearing Studies	$150,000.00	$153,129.68	$1,010,411.59	$0.00	$0.00	$0.00	$0.00
C13	Lake Mead Razorback Sucker Study	$135,000.00	$135,247.93	$1,666,002.31	$135,000.00	$0.00	$0.00	$0.00
C14	Humpback Chub Program Support	$57,000.00	$1,949.93	$287,899.90	$57,000.00	$57,000.00	$57,000.00	$57,000.00
C24	Avian Species Habitat Requirements	$300,000.00	$414,350.46	$1,367,449.53	$310,000.00	$270,000.00	$270,000.00	$270,000.00
C25	Imperial Ponds Native Fish Research	$250,000.00	$179,807.87	$1,465,017.91	$200,000.00	$200,000.00	$200,000.00	$200,000.00
C27	Small Mammal Population Studies	$50,000.00	$39,890.93	$391,012.43	$50,000.00	$40,000.00	$0.00	$0.00
C31	Razorback Sucker Genetic Diversity Assessment	$130,000.00	$134,780.01	$576,957.51	$140,000.00	$160,000.00	$160,000.00	$160,000.00
C32	Determination of Salinity, Temperature, pH, and Oxygen Limits for Bonytail and Razorback Sucker	$115,000.00	$104,611.98	$594,603.61	$115,000.00	$110,000.00	$100,000.00	$0,00
C35	Western Red Bat and Western Yellow Bat Roosting Characteristics Study	$25,000.00	$28,887.66	$523,627.57	$0.00	$0.00	$0.00	$0.00
C39	Post-Stocking Distribution and Survival of Bonytail in Reach 3	$250,000.00	$212,290.69	$1,135,094.18	$0.00	$0.00	$0.00	$0.00

Table 1-7.—Annual Funding Matrix

Work Task	Name	FY14 Approved Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Projected Estimate[1]	FY18 Projected Estimate[1]
C40	Genetic and Demographic Studies to Guide Conservation Management of Razorback Sucker and Bonytail in Off-Channel Habitats	$180,000.00	$180,030.92	$509,383.69	$190,000.00	$275,000.00	$275,000.00	$275,000.00
C41	Role of Artificial Habitat in Survival of Razorback Sucker and Bonytail	$65,000.00	$59,605.33	$186,171.39	$0.00	$0.00	$0.00	$0.00
C42	Experiments and Demonstration of Soil Amendments for Use in Restoration Sites	$200,000.00	$6,542.58	$458,429.71	$0.00	$0.00	$0.00	$0.00
C43	Population Demographics and Habitat Use of the California Leaf-Nosed Bat, a Genetic Evaluation	$50,000.00	$57,873.82	$83,294.29	$25,000.00	$40,000.00	$0.00	$0.00
C45	Ecology and Habitat Use of Stocked Razorback Sucker in Reach 3	$200,000.00	$145,520.50	$698,298.83	$0.00	$0.00	$0.00	$0.00
C47	Genetic Monitoring and Management of Recruitment in Bonytail Rearing Ponds	$250,000.00	$236,065.29	$379,526.73	$0.00	$0.00	$0.00	$0.00
C49	Investigations of Razorback Sucker and Bonytail Movements and Habitat Use Downstream from Parker Dam	$150,000.00	$111,069.75	$224,143.99	$0.00	$0.00	$0.00	$0.00
C51	Vermilion Flycatcher Detectability and Distribution Study	$150,000.00	$0.00	$42,560.10	$0.00	$0.00	$0.00	$0.00
C52	Gilded Flicker Riparian Habitat Use and Seasonal Movement Research	$300,000.00	$290,368.44	$333,727.06	$160,000.00	$300,000.00	$300,000.00	$0.00

Table 1-7.—Annual Funding Matrix

Work Task	Name	FY14 Approved Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Projected Estimate[1]	FY18 Projected Estimate[1]
C53	Sonic Telemetry of Juvenile Flannelmouth Sucker in Reach 3	$120,000.00	$117,501.56	$249,405.81	$120,000.00	$120,000.00	$100,000.00	$100,000.00
C54	Techniques to Establish Native Grasses and Forbs	$200,000.00	$0.00	$9,110.44	$0.00	$0.00	$0.00	$0.00
C55	Techniques to Increase Leaf Litter Decomposition Rates	$75,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C56	Characterization of Lake Mohave Backwaters to Evaluate Factors Influencing Spawning Success	$100,000.00	$0.00	$22,208.29	$0.00	$0.00	$0.00	$0.00
C57	Sonic Telemetry of Lake Mead Juvenile Razorback Sucker	$250,000.00	$229,689.31	$312,391.65	$250,000.00	$0.00	$0.00	$0.00
C58	Investigating Shoreline Habitat Cover for Bonytail	$60,000.00	$0.00	$30,179.14	$0.00	$0.00	$0.00	$0.00
C59	Selenium Monitoring in Created Backwater and Marsh Habitat	$250,000.00	$23,637.54	$45,168.21	$250,000.00	$200,000.00	$200,000.00	$200,000.00
C60	Habitat Manipulation	$100,000.00	$64,680.00	$71,952.56	$100,000.00	$225,000.00	$100,000.00	$200,000.00
C61	Evaluation of Alternative Stocking Methods for Fish Augmentation	$150,000.00	$118,472.41	$15,602.82	$425,000.00	$200,000.00	$200,000.00	$200,000.00
C62	Lowland Leopard Frog and Colorado River Toad Habitat and Ecology Study	$200,000.00	$192,514.27	$40,205.32	$180,000.00	$150,000.00	$25,000.00	$0.00
C63	Evaluation of Habitat Features that May Influence Success of Razorback Sucker and Bonytail in Backwater Environments	$0.00	$0.00	$0.00	$125,000.00	$135,000.00	$150,000.00	$100,000.00

Table 1-7.—Annual Funding Matrix

Work Task	Name	FY14 Approved Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Projected Estimate[1]	FY18 Projected Estimate[1]
C64	Post-Stocking Movement, Distribution, and Habitat Use of Razorback Sucker and Bonytail	$0.00	$0.00	$0.00	$700,000.00	$700,000.00	$700,000.00	$700,000.00
C65	Evaluation of Immediate Post-Stocking Survival of Razorback Sucker and Bonytail	$0.00	$0.00	$0.00	$60,000.00	$120,000.00	$120,000.00	$120,000.00
C66	Marsh Bird Water Depth Analysis	$0.00	$0.00	$0.00	$0.00	$100,000.00	$300,000.00	$300,000.00
Closed[2]	Work Tasks Pre-FY14		$26,032.66	$6,711,789.68				
		$4,939,000.00	**$3,439,773.37**	**$21,026,404.02**	**$3,624,000.00**	**$3,413,000.00**	**$3,268,000.00**	**$2,893,000.00**
D	**System Monitoring**							
D1	Marsh Bird Surveys	$25,000.00	$35,186.60	$252,070.08	$25,000.00	$40,000.00	$40,000.00	$40,000.00
D2	Southwestern Willow Flycatcher Presence/Absence Surveys	$675,000.00	$717,918.05	$6,865,713.55	$675,000.00	$750,000.00	$750,000.00	$750,000.00
D5	Monitoring Avian Productivity and Survivorship	$250,000.00	$290,972.22	$2,550,936.08	$250,000.00	$250,000.00	$250,000.00	$250,000.00
D6	System Monitoring for Riparian Obligate Avian Species	$400,000.00	$366,627.83	$2,058,551.10	$480,000.00	$150,000.00	$480,000.00	$480,000.00
D7	Yellow-billed Cuckoo Presence/Absence Surveys	$650,000.00	$756,988.58	$4,633,892.52	$750,000.00	$750,000.00	$750,000.00	$750,000.00
D8	Razorback Sucker and Bonytail Stock Assessment	$675,000.00	$802,447.87	$4,821,864.39	$850,000.00	$925,000.00	$925,000.00	$925,000.00
D9	System Monitoring and Research of Covered Bat Species	$375,000.00	$387,326.01	$1,223,490.26	$380,000.00	$390,000.00	$390,000.00	$390,000.00
D10	System Monitoring of Rodent Populations	$40,000.00	$40,251.89	$174,521.98	$40,000.00	$40,000.00	$40,000.00	$40,000.00

Table 1-7.—Annual Funding Matrix

Work Task	Name	FY14 Approved Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Projected Estimate[1]	FY18 Projected Estimate[1]
D12	Lowland Leopard Frog and Colorado River Toad Surveys	$25,000.00	$29,627.44	$402,792.37	$25,000.00	$35,000.00	$35,000.00	$35,000.00
Closed[2]	Work Tasks Pre-FY14	$150,000.00[3]	($1,512.28)	$1,298,090.77				
		$3,265,000.00	**$3,425,834.21**	**$24,281,923.10**	**$3,475,000.00**	**$3,330,000.00**	**$3,660,000.00**	**$3,660,000.00**
E	**Conservation Area Development and Management**							
E1	Beal Lake Conservation Area	$300,000.00	$130,785.45	$3,714,737.03	$300,000.00	$400,000.00	$200,000.00	$200,000.00
E4	Palo Verde Ecological Reserve	$725,000.00	$487,583.25	$8,524,176.15	$500,000.00	$500,000.00	$500,000.00	$500,000.00
E5	Cibola Valley Conservation Area	$550,000.00	$505,920.13	$10,779,643.89	$700,000.00	$750,000.00	$800,000.00	$850,000.00
E9	Hart Mine Marsh	$250,000.00	$229,824.73	$6,559,043.30	$250,000.00	$250,000.00	$250,000.00	$250,000.00
E14	Imperial Ponds Conservation Area	$600,000.00	$693,768.00	$9,211,702.14	$800,000.00	$1,500,000.00	$450,000.00	$450,000.00
E16	Conservation Area Site Selection	$600,000.00	$701,608.57	$2,451,472.03	$500,000.00	$1,300,000.00	$700,000.00	$700,000.00
E17	Topock Marsh Pumping	$1,000.00	$29,544.13	$1,134,907.04	$1,000.00	$1,000.00	$1,000.00	$1,000.00
E18	Law Enforcement and Fire Suppression	$250,000.00	$268,053.92	$1,438,886.27	$200,000.00	$250,000.00	$250,000.00	$250,000.00
E21	Planet Ranch, Bill Williams River	$40,000.00	$45,033.35	$270,136.18	$40,000.00	$10,340,000[5]	$540,000.00	$540,000.00
E24	Cibola National Wildlife Refuge Unit #1	$500,000.00	$209,836.42	$4,191,076.31	$1,000,000.00	$700,000.00	$750,000.00	$750,000.00
E25	Big Bend Conservation Area	$30,000.00	$30,349.86	$1,164,390.11	$30,000.00	$30,000.00	$30,000.00	$30,000.00
E27	Laguna Division Conservation Area	$8,600,000.00	$6,081,471.60	$22,825,960.27	$3,000,000.00	$900,000.00	$650,000.00	$650,000.00
E28	Yuma East Wetlands	$450,000.00	$492,318.96	$1,231,981.21	$600,000.00	$1,200,000.00	$700,000.00	$700,000.00
E31	Hunters Hole	$75,000.00	$86,326.00	$344,044.72	$80,000.00	$65,000.00	$60,000.00	$60,000.00

Table 1-7.—Annual Funding Matrix

Work Task	Name	FY14 Approved Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Projected Estimate[1]	FY18 Projected Estimate[1]
E33	Pretty Water Conservation Area	$600,000.00	$344,159.32	$114,679.27	$700,000.00	$450,000.00	$150,000.00	$150,000.00
E34	Salinity and Soil Moisture Monitoring Network	$250,000.00	$49,616.14	$81,457.29	$150,000.00	$500,000.00	$300,000.00	$350,000.00
E35	Mohave Valley Conservation Area	$0.00	$0.00	$0.00	$500,000.00	$1,250,000.00	$6,000,000.00	$3,000,000.00
Closed[2]	Work Tasks Pre-FY14		$36,460.07	$5,402,128.75				
		$13,821,000.00	**$10,422,659.90**	**$79,440,421.96**	**$9,351,000.00**	**$20,386,000.00[5]**	**$12,331,000.00**	**$9,431,000.00**
F	**Post-Development Monitoring**							
F1	Habitat Monitoring at Conservation Areas	$650,000.00	$472,448.47	$3,696,603.91	$650,000.00	$450,000.00	$400,000.00	$400,000.00
F2	Avian Use of Conservation Areas	$220,000.00	$197,840.80	$1,398,308.36	$220,000.00	$220,000.00	$220,000.00	$220,000.00
F3	Small Mammal Colonization of Conservation Areas	$60,000.00	$56,766.91	$372,989.29	$55,000.00	$65,000.00	$65,000.00	$65,000.00
F4	Covered Bat Species Monitoring at Conservation Areas	$135,000.00	$165,161.31	$848,899.39	$135,000.00	$150,000.00	$150,000.00	$150,000.00
F5	Post-Development Monitoring of Fish at Conservation Areas	$250,000.00	$271,044.01	$1,286,639.20	$265,000.00	$250,000.00	$250,000.00	$350,000.00
F6	Post-Development Monitoring of MacNeill's Sootywing at Conservation Areas	$80,000.00	$71,134.99	$381,740.90	$80,000.00	$80,000.00	$80,000.00	$80,000.00
F7	Marsh Bird Monitoring at Conservation Areas	$30,000.00	$29,476.43	$49,275.05	$30,000.00	$30,000.00	$30,000.00	$30,000.00
		$1,425,000.00	**$1,263,872.92**	**$8,034,456.10**	**$1,435,000.00**	**$1,245,000.00**	**$1,195,000.00**	**$1,295,000.00**

Table 1-7.—Annual Funding Matrix

Work Task	Name	FY14 Approved Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Projected Estimate[1]	FY18 Projected Estimate[1]
G	**Adaptive Management Program**							
G1	Data Management	$800,000.00	$878,992.90	$3,745,078.72	$850,000.00	$1,000,000.00	$1,000,000.00	$1,000,000.00
G3	Adaptive Management Research Projects	$300,000.00	$260,667.43	$2,326,051.38	$300,000.00	$300,000.00	$300,000.00	$300,000.00
G4	Science/Adaptive Management Strategy	$250,000.00	$275,414.62	$918,791.70	$400,000.00	$600,000.00	$600,000.00	$600,000.00
G5	Conceptual Ecological Models	$0.00	$0.00	$0.00	$0.00	$40,000.00	$10,000.00	$10,000.00
		$1,350,000.00	**$1,415,074.95**	**$6,989,921.80**	**$1,550,000.00**	**$1,940,000.00**	**$1,910,000.00**	**$1,910,000.00**
H	**Funding Accounts**							
H1[4]	Existing Habitat Maintenance	$6,928,680.00	$7,604,720.64	$26,986,720.64	$4,848,060.00	$0.00	$0.00	$0.00
H2[4]	Remedial Measures Fund	$339,416.00	$1,434,267.44	$2,432,565.44	$361,228.00	$1,104,052.00	$1,104,052.00	$1,104,052.00
		$7,268,096.00	**$9,038,988.08**	**$29,419,286.08**	**$5,209,288.00**	**$1,104,052.00**	**$1,104,052.00**	**$1,104,052.00**
I	**Public Outreach**							
I1	Public Outreach	$100,000.00	$104,431.22	$410,400.36	$100,000.00	$100,000.00	$100,000.00	$100,000.00
Closed	Work Tasks Pre-FY14			$61,059.68				
		$100,000.00	**$104,431.22**	**$471,460.04**	**$100,000.00**	**$100,000.00**	**$100,000.00**	**$100,000.00**
	Program Total:	**$35,142,064.00**	**$32,196,995.01**	**$194,111,261.96**	**$28,651,732.00**	**$34,980,018.00[5]**	**$26,750,018.00**	**$23,685,018.00**

[1] FY17 and FY18 numbers are not adjusted for inflation.
[2] Closed work tasks are shown in attachment D-4.
[3] Closed in previous years with no additional accomplishment; therefore, a work task was not included.
[4] Cumulative habitat maintenance and remedial measures amounts do not include interest.
[5] Includes $8,300,000 for acquisition of lease at Planet Ranch

In accordance with the FMA, a description of the work is being presented to the Steering Committee to ensure that no disputes exist and that the description will subsequently be presented to the USFWS to ensure that work is consistent with the HCP.

Reclamation's goal is to fully implement the LCR MSCP in a biologically effective, cost-efficient, and transparent manner. During FY16, should Reclamation determine that a specific work task cannot be undertaken, funds identified for that specific work task will be redirected and used for the following purposes: (1) funding another work task approved through this document, (2) increasing the funding for a work task that is expected to require funding in FY17 or FY18, (3) providing more than the minimum funding required to the RMF, or (4) beginning activities associated with any changed circumstances as defined in Section 5.12.3 of the HCP, should any occur.

In FY14, Reclamation estimated work tasks totaling $35,142,064.00. Actual LCR MSCP accomplishment for FY14 was $30,451,662.47. Actual accomplishment was less than the minimum accomplishment due to pre-obligation of funds for FY14 work in FY13, reduced operation and maintenance costs at conservation areas, and an evaluation of research and monitoring programs. In accordance with the FMA, Reclamation incurred a funding debit of $1,054,326.44 for FY14 (attachment D-2). Cumulative program accomplishment through FY14 is $194,111,261.96 (attachment D-4).

Compliance Reporting

LCR MSCP

As required in the FMA, the following information is included in this annual report:

1. *A running tabulation of habitat created or restored under the LCR MSCP*

   To meet species habitat creation requirements, goals are provided in the HCP for habitat creation based on land cover types. These land cover types are described using the Anderson and Ohmart vegetation classification system. In total, 8,132 acres of cottonwood-willow, mesquite, marsh, and backwater land cover types are directed to be designed and created under the LCR MSCP. This is the minimum amount of land cover type to be created to meet species habitat requirements. Table 1-8 shows how much land cover by type has been created at each conservation area. Total land cover established through FY14 is 2,939 acres. Land cover established at the Laguna Division Conservation Area (LDCA) will be included once planting is complete in FY15.

Table 1-8.—Conservation Area Land Cover Type

Land Cover Type	Management Unit	Established Acres FY14	Established Acres Total[1]
Cottonwood-willow	E1 Beal Lake (Arizona)	0	107
	E4 PVER (California)	0	945
	E5 CVCA (Arizona)	0	265
	E24 Cibola NWR Unit #1 (Arizona)	74	344
	E28 Yuma East Wetlands (Arizona)	183	183
	E31 Hunters Hole (Arizona)	0	44
TOTAL		**257**	**1,888**
Mesquite	E4 PVER (California)	38	78
	E5 CVCA (Arizona)	0	405
	E28 Yuma East Wetlands (Arizona)	131	131
TOTAL		**169**	**614**
Marsh	E1 Beal Lake (Arizona)	0	9
	E9 Hart Mine Marsh (Arizona)	0	255
	E14 Imperial Ponds (Arizona)	0	12
	E28 Yuma East Wetlands (Arizona)	66	66
TOTAL		**66**	**342**
Backwater	E14 Imperial Ponds (Arizona)	0	80
	E25 Big Bend (Nevada)	0	15
TOTAL		**0**	**95**
TOTAL		**492**	**2,939**

[1] Does not include upland buffer.

The HCP specifies that created land cover types will be designed in an integrated mosaic and managed for more than one covered species, including habitat elements for each species. The HCP contains habitat creation conservation measures for 20 of the 26 species. Table 1-9 shows the total creditable acres for each species habitat creation conservation measure by conservation area.

The creditable acres established exceed species habitat creation conservation measures requirements for WRBA2, WYBA3, CRCR2, YHCR2, ELOW1, GIWO1, SUTA1, and MNSW2.

Table 1-9.—Conservation Area by Species Habitat Creation Conservation Measures

Species Habitat Creation Conservation Measures (Required Acres)	Management Unit	Creditable Acres FY14	Creditable Acres Total	Percent of Acres Creditable by Species Conservation Measure
CLRA1 (512 acres)	E9 Hart Mine Marsh	0	255	
	E14 Imperial Ponds	0	12	
	E28 YEW	66	66	
Total		**66**	**333**	**65%**
WIFL1 (4,050 acres)	E1 Beal Lake	0	0	
	E4 PVER	0	0	
	E5 CVCA	0	0	
	E24 Cibola NWR Unit #1	0	0	
Total		**0**[1]	**0**	**0%**
BONY2 (360 acres)	E14 Imperial Ponds	0[2]	0	
	E25 Big Bend	0	15	
Total		**0**	**15**	**4%**
RASU2 (360 acres)	E14 Imperial Ponds	0[2]	0	
	E25 Big Bend	0	15	
Total		**0**	**15**	**4%**
WRBA2 (765 acres)	E1 Beal Lake	0	116	
	E4 PVER	220	719	
	E5 CVCA	405	670	
	E24 Cibola NWR Unit #1	0	270	
Total		**625**	**1,775**[3]	**> 100%**
WYBA3 (765 acres)	E1 Beal Lake	116	116	
	E4 PVER	719	719	
	E5 CVCA	670	670	
	E24 Cibola NWR Unit #1	270	270	
Total		**1,775**	**1,775**[3]	**> 100%**
CRCR2 (125 acres)	E1 Beal Lake	116	116	
	E4 PVER	1,023	1,023	
	E5 CVCA	670	670	
	E9 Hart Mine Marsh	255	255	
	E24 Cibola NWR Unit #1	270	270	
Total		**2,334**	**2,334**[3]	**> 100%**
YHCR2 (76 acres)	E28 YEW	183	183	
Total		**183**	**183**[3]	**> 100%**

Table 1-9.—Conservation Area by Species Habitat Creation Conservation Measures

Species Habitat Creation Conservation Measures (Required Acres)	Management Unit	Creditable Acres FY14	Creditable Acres Total	Percent of Acres Creditable by Species Conservation Measure
LEBI1 (512 acres)	E9 Hart Mine Marsh	0	255	
	E14 Imperial Ponds	0	12	
	E28 YEW	66	66	
Total		**66**	**333**	**65%**
BLRA1 (130 acres)	E9 Hart Mine Marsh	0[4]	0	
	E14 Imperial Pond	0	12	
	E28 YEW	66	66	
Total		**66**	**78**	**60%**
YBCU1 (4,050 acres)	E1 Beal Lake	0	116	
	E4 PVER	446	945	
	E5 CVCA	0	265	
	E24 Cibola NWR Unit #1	0	270	
	E38 YEW	183	183	
Total		**629**	**1,779**	**44%**
ELOW1 (1,784 acres)	E1 Beal Lake	0	116	
	E4 PVER	298	797	
	E5 CVCA	0	670	
	E24 Cibola NWR Unit #1	0	270	
	E28 YEW	314	314	
Total		**612**	**2,167[3]**	**> 100%**
GIFL1 (4,050 acres)	E1 Beal Lake	0	116	
	E4 PVER	220	719	
	E5 CVCA	0	265	
	E24 Cibola NWR Unit #1	0	270	
	E28 YEW	183	183	
Total		**403**	**1,553**	**38%**
GIWO1 (1,702 acres)	E1 Beal Lake	0	116	
	E4 PVER	10	945	
	E5 CVCA	0	265	
	E24 Cibola NWR Unit #1	0	344	
	E28 YEW	183	183	
Total		**193**	**1,853[3]**	**> 100%**
VEFL1 (5,208 acres)	E1 Beal Lake	0	116	
	E4 PVER	88	1,023	
	E5 CVCA	0	670	
	E24 Cibola NWR Unit #1	0	344	
	E28 YEW	314	314	
Total		**402**	**2,467**	**47%**

Table 1-9.—Conservation Area by Species Habitat Creation Conservation Measures

Species Habitat Creation Conservation Measures (Required Acres)	Management Unit	Creditable Acres FY14	Creditable Acres Total	Percent of Acres Creditable by Species Conservation Measure
BEVI1 (2,983 acres)	E1 Beal Lake	116	116	
	E4 PVER	547	1,023	
	E5 CVCA	0	405	
	E24 Cibola NWR Unit #1	0	190	
	E28 YEW	314	314	
Total		**977**	**2,048**	**69%**
YWAR1 (4,050 acres)	E1 Beal Lake	0	116	
	E4 PVER	0	945	
	E5 CVCA	0	265	
	E24 Cibola NWR Unit #1	0	344	
	E28 YEW	183	183	
Total		**183**	**1,853**	**46%**
SUTA1 (602 acres)	E1 Beal Lake	0	116	
	E4 PVER	0	499	
	E5 CVCA	0	265	
	E24 Cibola NWR Unit #1	0	270	
	E28 YEW	183	183	
Total		**183**	**1,333**[3]	**> 100%**
FLSU1 (85 acres)	E25 Big Bend	0	15	
Total		**0**	**15**	
MNSW2 (222 acres)	E4 PVER	0	40	
	E5 CVCA	0	405	
Total		**0**	**445**[3]	**> 100%**

[1] WIFL1 – Although the conservation areas provide the appropriate structure type (cottonwood-willow I–IV) as defined in WIFL1, Reclamation is in the process of gathering the appropriate hydrologic data to determine saturated soils, moist soils, or slow-moving water at each of those conservation areas. Once this has been determined, the conservation areas will be evaluated.

[2] BONY2 and RASU2 – Reclamation and the USFWS have completed a 5-year management strategy, which calls for stocking native fish in FY17. Acres will be considered creditable at that time.

[3] The total for creditable acres established exceeds the species habitat creation conservation measure requirements. For many species, creditable acres established beyond conservation measure requirements is due to habitat creation efforts for other species.

[4] BLRA1 – Reclamation is in the process of determining the land and water interface and the method for delineating California blackrail marsh habitat at <1 inch. Once this has been determined, Hart Mine Marsh will be evaluated.

2. *A running tabulation and description of all conservation measures that have been completed from the commencement of the LCR MSCP to the date of the report*

   Tables 1-10a–c provide a summary of fish repatriation. Table 1-11 provides a matrix showing the work tasks and their related conservation measures. Attachment E lists technical reports that were published in FY14.

3. *A description of any take known to have occurred during the previous budget period*

   In accordance with FMA Section 7.4.1(F), any incidental take known to have occurred during LCR MSCP implementation in FY14 is reported in attachment B. The USFWS Section 10 Permit and the 2005 BO authorize incidental take resulting from conduct of Federal covered actions and non-Federal covered activities, and Reclamation's implementation of the HCP, as long as conservation measures and avoidance and minimization measures are in place. Due to the wide range and scope of the program, surrogate measures were used in the program compliance documents to quantify impacts. These same surrogates are used to determine the types and levels of any incidental take known to have occurred in FY14. As described in the 2005 BO, the surrogate measures for incidental take are:

   Flow-Related

   Total loss of suitable habitat for covered species that utilize cottonwood-willow, marsh, and backwaters resulting from the changes in points of diversions, extension of the interim surplus guidelines, and implementation of the shortage criteria.

   As total habitat loss is calculated for all of these actions, take is being documented as the amount and type of covered actions and activities being implemented.

   Non-Flow-Related

   Acreage or miles of habitats affected by non-flow-related actions.

   Other Non-Flow-Related (Continuing Actions)

   Acreage or miles of facilities affected by maintenance actions.

Creation of Restoration Sites

Affected habitat acreage for the covered species with the understanding that during creation of higher value habitat there may be harassment of individuals.

Attachment B summarizes the surrogate measures for incidental take for Federal flow-related actions, Federal non-flow-related actions, and non-Federal activities. Non-Federal flow-related activities are included as part of the Federal flow-related actions.

Table 1-10a.—Summary of Fish Augmentation Conservation Measure RASU5

Reach	Razorback Sucker FY14	Total Razorback Sucker
2	12,697	97,733
Total	12,697	97,733

Table 1-10b.—Summary of Fish Augmentation Conservation Measure RASU3

Reach	Razorback Sucker FY14	Total Razorback Sucker
3	6,005	66,670
4 and 5	5,939	75,297[1]
Total	11,944	141,967

Table 1-10c.—Summary of Fish Augmentation Conservation Measure BONY3

Reach	Bonytail FY14	Bonytail Program
2	0	0*
3	6,622	46,742
4 and 5	1,998	19,966[1]
Total	8,620	66,708

* Bonytail stocking into Reach 2 will commence in FY15 as part of a pilot stocking study.

[1] In FY14, historical numbers of razorback sucker and bonytail in Reaches 4 and 5 were adjusted to represent only fish that measured > 305 millimeters in order to be consistent with CESA requirements (> 12 inches = 304.8 millimeters) in these reaches. The resulting totals represent a reduction in razorback sucker and bonytail numbers of 401 and 265 fish, respectively.

Table 1-11.—Status of Conservation Measures

Species/Habitat/Action	Code	Description	FY14 Approved	FY15 Approved	FY16 Proposed
Yuma Clapper Rail	CLRA1	Create habitat, 512 acres	C3 E9 E14 E16 E21 E26 E27 E28 E34 F2 F7 G1 G4	C3 E9 E14 E16 E21 E26 E27 E28 E34 F2 F7 G1 G4	C3 E9 E14 E16 E21 E26 E27 E28 E34 F2 F7 G1 G4
	CLRA2	Maintain existing important habitat	C3 G1 G4 H1	C3 G1 G4 H1	C3 G1 G4 H1
	MRM1	Define habitat characteristics	C3 C24 D1 E21 F2 F7 G1 G4	C3 C24 D1 E21 F2 F7 G1 G4	C3 C24 C66 D1 E21 F2 F7 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 C59 D1 F1 F2 F7 G1 G4	C3 C24 C59 D1 F1 F2 F7 G1 G4	C3 C24 C59 C66 D1 F1 F2 F7 G1 G4
	MRM5	Monitor selenium levels in backwater	C59	C59	C59
	CMM1	Reduce risk of loss to wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4
Southwestern Willow Flycatcher	WIFL1	Create habitat, 4,050 acres	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E34 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E34 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E34 G1 G4
	WIFL2	Maintain existing important habitat	C3 D2 D3 D4 E21 F1 G1 G4 H1	C3 D2 D3 D4 E21 F1 G1 G4 H1	C3 D2 D4 E21 F1 G1 G4 H1
	MRM1	Define habitat characteristics	C3 C5 C24 C37 C42 D2 D3 D4 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 D2 D3 D4 D5 D6 E21 F2 G1 G4	C3 C24 C42 D2 D4 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C24 C55 C60 D2 D3 D4 D5 D6 F1 F2 G1 G4	C24 C55 C60 D2 D3 D4 D5 D6 F1 F2 G1 G4	C24 C55 C60 D2 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation	D2 G1 G4	D2 G1 G4	D2 G1 G4
	CMM1	Reduce risk of loss to wildfire	C55 E18 G1 G4	C55 E18 G1 G4	C55 E18 G1 G4
	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4
Desert Tortoise	**DETO1**	**Acquire, protect 230 acres — Completed**			
	DETO2	Avoid impacts on individuals and burrows	C3 G1 G4	C3 G1 G4	C3 G1 G4

Table 1-11.—Status of Conservation Measures

Species/Habitat/Action	Code	Description	FY14 Approved	FY15 Approved	FY16 Proposed
Bonytail	BONY1	Coordinate conservation efforts with the USFWS and recovery programs	A1	A1	A1
	BONY2	Create 360 acres of bonytail habitat	C3 C25 C30 C32 C40 E2 E14 E15 E16 E25 E26 E32 E34 G1 G4	C3 C25 C30 C32 C40 E2 E14 E15 E16 E25 E26 E32 E34 G1 G4	C3 C25 C32 C40 E2 E14 E15 E16 E25 E26 E32 E34 G1 G4
	BONY3	Rear/stock 620,000: 5,000 subadults/year for 40 years at Lake Mohave 4,000 subadults/year for 50 years at Lake Havasu 4,000 subadults/year – experimental augmentation at Parker-Imperial for 10 consecutive years 4,500 subadults/year at Parker-Imperial for 40 years	C11 C30 C32 C39 C41 C46 C47 C49 C56 C61 G1 G4	C30 C32 C41 C46 C47 C56 C61 C64 G1 G4	C32 C41 C47 C56 C61 C63 C64 C65 G1 G4
	BONY4	Develop (if necessary) additional rearing capacity	B2 B3 B4 B7 B8 C11 C30 C46 C47 C49 G1 G4	B2 B3 B4 B7 B8 C30 C46 C47 C49 C61 G1 G4	B2 B3 B4 B7 B8 C47 C49 C61 C64 C65 G1 G4
	BONY5	Monitor, research, and adaptively manage augmentations and created habitat	B7 B8 C11 C23 C30 C32 C39 C40 C41 C44 C46 C47 C49 C56 C58 C59 C61 D8 F5 G1 G4	B7 B8 C23 C30 C32 C40 C44 C46 C47 C56 C59 C61 C63 C64 D8 F5 G1 G4	B7 B8 C32 C40 C47 C56 C59 C61 C63 C64 C65 D8 F5 G1 G4
	MRM5	Monitor selenium levels in backwater	C59 G1 G4	C59 G1 G4	C59 G1 G4
Humpback Chub	HUCH1	$500,000 to existing programs	C14 G1	C14 G1	C14 G1

Table 1-11.—Status of Conservation Measures

Species/Habitat/Action	Code	Description	FY14 Approved	FY15 Approved	FY16 Proposed
Razorback Sucker	RASU1	Coordinate conservation efforts with the USFWS and recovery programs	A1	A1	A1
	RASU2	Create 360 acres of razorback sucker habitat	C3 C25 C30 C31 C32 C40 E2 E14 E15 E16 E25 E26 E32 E34 G1 G4	C3 C25 C30 C31 C32 C40 E2 E14 E15 E16 E25 E26 E32 E34 G1 G4	C3 C25 C31 C32 C40 E2 E14 E15 E16 E25 E26 E32 E34 G1 G4
	RASU3	Rear/stock 660,000: 12,000 subadults/year for 10 years at Parker, Mohave — see plan 6,750 subadults/year for 40 years at Lake Havasu 6,750 subadults/year for 40 years at Parker Dam	B1 B2 B3 B4 B5 B6 B7 B8 B11 C10 C26 C30 C31 C32 C33 C41 C46 C48 C49 C56 C61 G1 G4	B1 B2 B3 B4 B5 B6 B7 B8 B11 C26 C30 C31 C32 C33 C46 C48 C56 C61 C63 C64 G1 G4	B1 B2 B3 B4 B5 B6 B7 B8 B11 C31 C32 C56 C61 C63 C64 C65 G1 G4
	RASU4	Develop (if necessary) additional rearing capacity	B2 B3 B4 B5 B6 B7 B8 B11 C10 C26 C30 C46 C48 C49 G1 G4	B2 B3 B4 B5 B6 B7 B8 B11 C10 C26 C30 C46 C48 C64 G1 G4	B2 B3 B4 B5 B6 B7 B8 B11 C10 C64 C65 G1 G4
	RASU5	Support ongoing Lake Mohave conservation efforts	B1 B2 B7 B8 C30 C31 C32 C41 C61 G1 G4	B1 B2 B7 B8 C30 C31 C32 C41 C61 G1 G4	B1 B2 B7 B8 C31 C32 C41 C61 C63 C65 G1 G4
	RASU6	Monitor, research, and adaptively manage augmentations and created habitat	B2 B7 B8 B11 C8 C10 C23 C30 C31 C32 C33 C40 C41 C44 C45 C46 C49 C56 C57 C59 C61 D8 F5 G1 G4	B2 B7 B8 B11 C8 C23 C30 C31 C32 C33 C40 C44 C46 C56 C57 C59 C61 C63 D8 F5 G1 G4	B2 B7 B8 B11 C31 C32 C40 C56 C57 C59 C61 C63 C64 C65 D8 F5 G1 G4
	RASU7	Funding for ongoing Reclamation/Southern Nevada Water Authority Lake Mead studies	B6 B11 C13 G1 G4	B6 B11 C13 G1 G4	B6 B11 C13 G1 G4
	RASU8	Continue razorback sucker conservation measure identified in the 2001 BO	B1 B6 B11 C26 C30 G1 G4	B1 B6 B11 C26 C30 G1 G4	B1 B6 B11 G1 G4
	MRM5	Monitor selenium levels in backwater	C59 G1 G4	C59 G1 G4	C59 G1 G4

Table 1-11.—Status of Conservation Measures

Species/Habitat/Action	Code	Description	FY14 Approved	FY15 Approved	FY16 Proposed
Western Red Bat	WRBA1	Status/habitat surveys	C3 D9 F4 G1 G4	C3 D9 F4 G1 G4	C3 D9 F4 G1 G4
	WRBA2	**Create 765 acres — Creditable acres established exceed requirement**	C3 D9 E1 E3 E4 E5 E8 E16 E21 E24 E33 E34 G1 G4	C3 D9 E1 E3 E4 E5 E8 E16 E21 E24 E33 E34 G1 G4	C3 D9 E1 E3 E4 E5 E8 E16 E21 E24 E33 E34 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C35 D9 E21 F4 G1 G4	C3 C5 C35 D9 E21 F4 G1 G4	C3 C35 D9 E21 F4 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 F1 F4 G1 G4	C3 F1 F4 G1 G4	C3 F1 F4 G1 G4
	CMM1	Reduce risk of loss of habitat to wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			
Western Yellow Bat	WYBA1	Conduct surveys for species distribution	C3 D9 G1 G4	C3 D9 G1 G4	C3 D9 G1 G4
	WYBA2	Avoid removal of roost trees (palms)	E16 F4 G1 G4	E16 F4 G1 G4	E16 F4 G1 G4
	WYBA3	**Create 765 acres – Creditable acres established exceed requirement**	C3 D9 E1 E3 E4 E5 E8 E21 E24 E33 E34 F4 G1 G4	C3 D9 E1 E3 E4 E5 E8 E21 E24 E33 E34 F4 G1 G4	C3 D9 E1 E3 E4 E5 E8 E21 E24 E33 E34 F4 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C35 D9 E21 F4 G1 G4	C3 C5 C35 D9 E21 F4 G1 G4	C3 C35 D9 E21 F4 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 F1 F4 G1 G4	C3 F1 F4 G1 G4	C3 F1 F4 G1 G4
	CMM1	Reduce risk of loss of habitat to wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			
Desert Pocket Mouse	DPMO1	Locate occupied habitat, restore disturbed habitat	C3 F3 G1 G4	C3 F3 G1 G4	C3 F3 G1 G4

Table 1-11.—Status of Conservation Measures

Species/Habitat/Action	Code	Description	FY14 Approved	FY15 Approved	FY16 Proposed
Colorado River Cotton Rat	CRCR1	Status/habitat surveys — define habitat first 5 years	C3 C27 F3 G1 G4	C3 C27 F3 G1 G4	C3 C27 F3 G1 G4
	CRCR2	**Create 125 acres – Creditable acres established exceed requirement**	C3 C54 E9 E16 E21 E34 G1 G4	C3 C54 E9 E16 E21 E34 G1 G4	C3 C54 E9 E16 E21 E34 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C54 C60 F1 F3 G1 G4	C3 C54 C60 F1 F3 G1 G4	C3 C54 C60 F1 F3 G1 G4
	CMM1	Reduce risk of loss of habitat to wildfire	C54 E18 G1 G4	C54 E18 G1 G4	C54 E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			
Yuma Hispid Cotton Rat	YHCR1	Status/habitat surveys — define habitat first 5 years	C3 C27 G1 G4	C3 C27 G1 G4	C3 C27 G1 G4
	YHCR2	**Create 76 acres – Creditable acres established exceed requirement**	C3 C54 E16 E27 E28 E34 G1 G4	C3 C54 E16 E27 E28 E34 G1 G4	C3 C54 E16 E27 E28 E34 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C54 C60 F1 F3 G1 G4	C3 C54 C60 F1 F3 G1 G4	C3 C54 C60 F1 F3 G1 G4
	CMM1	Reduce risk of loss of habitat to wildfire	C54 E18 G1 G4	C54 E18 G1 G4	C54 E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			
Western Least Bittern	LEBI1	Create 512 acres	C3 E9 E14 E16 E21 E26 E27 E28 E34 F7 G1 G4	C3 E9 E14 E16 E21 E26 E27 E28 E34 F7 G1 G4	C3 E9 E14 E16 E21 E26 E27 E28 E34 F7 G1 G4
	MRM1	Define habitat characteristics	C3 C24 D1 E21 F2 F7 G1 G4	C3 C24 D1 E21 F2 F7 G1 G4	C3 C24 C66 D1 E21 F2 F7 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 D1 F1 F2 F7 G1 G4	C3 C24 D1 F1 F2 F7 G1 G4	C3 C24 C66 D1 F1 F2 F7 G1 G4
	MRM5	Monitor selenium levels			
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4

Table 1-11.—Status of Conservation Measures

Species/Habitat/Action	Code	Description	FY14 Approved	FY15 Approved	FY16 Proposed
California Black Rail	BLRA1	Create 130 acres	C3 E14 E16 E26 E27 E28 E34 F7 G1 G4	C3 E14 E16 E26 E27 E28 E34 F7 G1 G4	C3 E14 E16 E26 E27 E28 E34 F7 G1 G4
	BLRA2	Maintain existing occupied habitat	C3 G1 G4 H1	C3 G1 G4 H1	C3 G1 G4 H1
	MRM1	Define habitat characteristics	C3 C24 D1 F2 G1 G4	C3 C24 D1 F2 G1 G4	C3 C24 C66 D1 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 C59 D1 F1 F2 G1 G4	C3 C24 C59 D1 F1 F2 G1 G4	C3 C24 C59 C66 D1 F1 F2 G1 G4
	MRM5	Monitor selenium levels	C59	C59	C59
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4
Yellow-billed Cuckoo	YBCU1	Create 4,050 acres	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E34 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E34 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E34 G1 G4
	YBCU2	Maintain existing habitat	C3 D7 E21 G1 G4 H1	C3 D7 E21 G1 G4 H1	C3 D7 E21 G1 G4 H1
	MRM1	Define habitat characteristics	C3 C5 C24 C37 C42 D5 D6 D7 E21 F2 G1 G4	C3 C5 C24 C37 C42 D5 D6 D7 E21 F2 G1 G4	C3 C24 C42 D5 D6 D7 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 C55 C60 D5 D6 D7 F1 F2 G1 G4	C3 C24 C55 C60 D5 D6 D7 F1 F2 G1 G4	C3 C24 C55 C60 D5 D6 D7 F1 F2 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	C55 E18 G1 G4	C55 E18 G1 G4	C55 E18 G1 G4
	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4

Table 1-11.—Status of Conservation Measures

Species/Habitat/Action	Code	Description	FY14 Approved	FY15 Approved	FY16 Proposed
Elf Owl	**ELOW1**	**Create 1,784 acres in Reaches 3–5 – Creditable acres established exceed requirement**	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E33 E34 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E33 E34 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E33 E34 G1 G4
	ELOW2	Install elf owl boxes before Gila woodpeckers established	C3 G1 G4	C3 G1 G4	C3 G1 G4
	MRM1	Define habitat characteristics	C3 C24 C36 C37 C42 D5 D6 E21 F2 G1 G4	C3 C24 C36 C37 C42 D5 D6 E21 F2 G1 G4	C3 C24 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 C55 D5 D6 F1 F2	C3 C24 C55 D5 D6 F1 F2	C3 C24 C55 D5 D6 F1 F2
	MRM3	Research nest competition of European starlings	C3 G1 G4	C3 G1 G4	C3 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	C55 E18 G1 G4	C55 E18 G1 G4	C55 E18 G1 G4
	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4
Gilded Flicker	GIFL1	Create 4,050 acres in Reaches 3–7	C3 C52 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E34 G1 G4	C3 C52 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E34 G1 G4	C3 C52 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E34 G1 G4
	GIFL2	Install artificial snags until vegetation has matured			
	MRM1	Define habitat characteristics	C3 C5 C24 C37 C42 C52 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 C52 D5 D6 E21 F2 G1 G4	C3 C24 C42 C52 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 C55 D5 D6 F1 F2 G1 G4	C3 C24 C55 D5 D6 F1 F2 G1 G4	C3 C24 C55 D5 D6 F1 F2 G1 G4
	MRM3	Research nest competition of European starlings	C3 G1 G4	C3 G1 G4	C3 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	C55 E18 G1 G4	C55 E18 G1 G4	C55 E18 G1 G4
	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4

Table 1-11.—Status of Conservation Measures

Species/Habitat/Action	Code	Description	FY14 Approved	FY15 Approved	FY16 Proposed
Gila Woodpecker	**GIWO1**	**Create 1,702 acres in Reaches 3–6 – Creditable acres established exceed requirement**	C3 E3 E4 E5 E8 E16 E21 E24 E27 E28 E34 G1 G4	C3 E3 E4 E5 E8 E16 E21 E24 E27 E28 E34 G1 G4	C3 E3 E4 E5 E8 E16 E21 E24 E27 E28 E34 G1 G4
	GIWO2	Install artificial snags			
	MRM1	Define habitat characteristics	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 C24 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 C55 D5 D6 F1 F2 G1 G4	C3 C24 C55 D5 D6 F1 F2 G1 G4	C3 C24 C55 D5 D6 F1 F2 G1 G4
	MRM3	Research nest competition of European starlings	C3 G1 G4	C3 G1 G4	C3 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	C55 E18 G1 G4	C55 E18 G1 G4	C55 E18 G1 G4
	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4
Vermilion Flycatcher	VEFL1	Create 5,208 acres	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E33 E34 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E33 E34 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E33 E34 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C24 C37 C42 C51 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 C51 D5 D6 E21 F2 G1 G4	C3 C24 C42 C51 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 C51 C55 C60 D5 D6 F1 F2 G1 G4	C3 C24 C51 C55 C60 D5 D6 F1 F2 G1 G4	C3 C24 C51 C55 C60 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation			
	CMM1	Reduce risk of loss of habitat affected by wildfire	C55 E18 G1 G4	C55 E18 G1 G4	C55 E18 G1 G4
	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4

Table 1-11.—Status of Conservation Measures

Species/Habitat/Action	Code	Description	FY14 Approved	FY15 Approved	FY16 Proposed
Arizona Bell's Vireo	BEVI1	Create 2,983 acres	C3 C5 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E33 E34 G1 G4	C3 C5 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E33 E34 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E33 E34 G1 G4
	MRM1	Define habitat characteristics	C3 C37 C42 D5 D6 E21 F2 G1 G4	C3 C37 C42 D5 D6 E21 F2 G1 G4	C3 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 C55 D5 D6 F1 F2 G1 G4	C3 C24 C55 D5 D6 F1 F2 G1 G4	C3 C24 C55 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation			
Sonoran Yellow Warbler	YWAR1	Create 4,050 acres	C3 E1 E3 E4 E5 E8 E16 E21 E27 E28 E34 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E27 E28 E34 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E27 E28 E34 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 C24 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 C55 C60 D5 D6 F1 F2 G1 G4	C3 C24 C55 C60 D5 D6 F1 F2 G1 G4	C3 C24 C55 C60 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation			
	CMM1	Reduce risk of loss of habitat affected by wildfire	C55 E18 G1 G4	C55 E18 G1 G4	C55 E18 G1 G4
	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4

Table 1-11.—Status of Conservation Measures

Species/Habitat/Action	Code	Description	FY14 Approved	FY15 Approved	FY16 Proposed
Summer Tanager	**SUTA1**	**Create 602 acres — Creditable acres established exceed requirement**	C3 E1 E3 E4 E5 E8 E16 E21 E27 E28 E34 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E27 E28 E34 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E27 E28 E34 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 C24 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 C55 D5 D6 F1 F2 G1 G4	C3 C24 C55 D5 D6 F1 F2 G1 G4	C3 C24 C55 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation			
	CMM1	Reduce risk of loss of habitat affected by wildfire	C55 E28 G1 G4	C55 E28 G1 G4	C55 E28 G1 G4
	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4
Flat-tailed Horned Lizard	**FTHL1**	**Acquire and protect 230 acres – Completed**	C3 G1 G4	C3 G1 G4	C3 G1 G4
	FTHL2	Implement conservation measures to avoid take	C3 E30 G1 G4	C3 E30 G1 G4	C3 G1 G4
Relict Leopard Frog	RLFR1	10,000/year for 10 years to conservation program	C4 G1	C4 G1	C4 G1
Flannelmouth Sucker	FLSU1	85 acres – Reach 3	C3 C53 E15 E16 E25 E32 E34 G1 G4	C3 C53 E15 E16 E25 E32 E34 G1 G4	C3 C53 E16 E25 E32 E34 G1 G4
	FLSU2	80,000/year for 5 years	C15 G1 G4	C15 G1 G4	G1 G4
	FLSU3	Develop management needs/strategies	C15 C53 G1 G4	C15 C53 G1 G4	C53 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C59 G1 G4	C3 C59 G1 G4	C3 C59 G1 G4
	MRM5	Monitor selenium levels in backwaters	C59 G1 G4	C59 G1 G4	C59 G1 G4

Table 1-11.—Status of Conservation Measures

Species/Habitat/Action	Code	Description	FY14 Approved	FY15 Approved	FY16 Proposed
MacNeill's Sootywing Skipper	MNSW1	Status surveys/habitat — define habitat first 5 years	C3 F6 G1 G4	C3 F6 G1 G4	C3 F6 G1 G4
	MNSW2	**Create 222 acres — Creditable acres established exceed requirement**	C3 E1 E3 E4 E5 E16 E21 E34 G1 G4	C3 E1 E3 E4 E5 E16 E21 E34 G1 G4	C3 E1 E3 E4 E5 E16 E21 E34 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 F1 F6 G1 G4	C3 F1 F6 G1 G4	C3 F1 F6 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			
Sticky Buckwheat	STBU1	10,000/year until 2030 to conservation program	C2 G1	C2 G1	C2 G1
Threecorner Milkvetch	THMI1	10,000/year until 2030 to conservation program	C2 G1	C2 G1	C2 G1
California Leaf-nosed Bat	CLNB1	Distribution surveys	C3 C34 D9 G1 G4	C3 C34 D9 G1 G4	C3 D9 G1 G4
	CLNB2	Create habitat near roost sites (priority when creating cottonwood-willow, mesquite habitat for other species)	C3 C34 E1 E3 E4 E5 E8 E16 E21 E24 E34 G1 G4	C3 C34 E1 E3 E4 E5 E8 E16 E21 E24 E34 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E34 G1 G4
	MRM1	Define habitat characteristics	C3 C5 D9 E21 F4 G1 G4	C3 C5 D9 E21 F4 G1 G4	C3 D9 E21 F4 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 F4 G1 G4	C3 F4 G1 G4	C3 F4 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habit affected by wildfire			

Table 1-11.—Status of Conservation Measures

Species/Habitat/Action	Code	Description	FY14 Approved	FY15 Approved	FY16 Proposed
Pale Townsend's Big-eared Bat	PTBB1	Distribution surveys	C3 D9 G1 G4	C3 D9 G1 G4	C3 D9 G1 G4
	PTBB2	Create habitat near roost sites	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E34 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E34 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E34 G1 G4
	MRM1	Determine habitat characteristics	C3 C5 D9 E21 F4 G1 G4	C3 C5 D9 E21 F4 G1 G4	C3 D9 E21 F4 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 F4 G1 G4	C3 F4 G1 G4	C3 F4 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			
Colorado River Toad	CRTO1	Distribution surveys, habitat affinity, limiting factors	C3 C62 D12 G1 G4	C3 C62 D12 G1 G4	C3 C62 D12 G1 G4
	CRTO2	Protect existing occupied habitat	C3 C62 G1 G4 H1	C3 C62 G1 G4 H1	C3 C62 G1 G4 H1
	CRTO3	Research to establish in unoccupied habitat	C3 C62 G1 G4	C3 C62 G1 G4	C3 C62 G1 G4
Lowland Leopard Frog	LLFR1	Distribution surveys, habitat affinity, limiting factors	C3 C62 D12 G1 G4	C3 C62 D12 G1 G4	C3 C62 D12 G1 G4
	LLFR2	Protect existing occupied habitat	C3 C62 G1 G4 H1	C3 C62 G1 G4 H1	C3 C62 G1 G4 H1
	LLFR3	Research to establish in unoccupied habitat	C3 C62 G1 G4	C3 C62 G1 G4	C3 C62 G1 G4
Other					
Topock Marsh Pumping	AMM2	**Avoid flow-related impacts on covered species — Completed**	E17	E17	E17
Law Enforcement and Fire Suppression	CMM1	Reduce effects of fire and vandalism on created habitats	E18	E18	E18

4. *Any recommendation made by the USFWS or any State wildlife agency regarding the LCR MSCP*

   The July 30, 2014, consistency letter from the USFWS for the *Final Implementation Report, Fiscal Year 2015 Work Plan and Budget, Fiscal Year 2013 Accomplishment Report,* and the December 19, 2014, letter concurring with the underfunding makeup strategy are included in attachment C.

5. *Approval or rejection of any minor modification described in Section 14.1 of the Implementation Agreement*

   On April 23, 2014, the Steering Committee approved minor modifications to three conservation measures (WYBA3, BEVI1, and CRCR2). WYBA3 was modified to include foraging in cottonwood-willow habitat and mesquite habitats. BEVI1 was modified to include cottonwood-willow I–II habitats. CRCR2 was modified to include cottonwood-willow and mesquite habitats. The USFWS, in a letter dated September 16, 2014, approved the three minor modifications. The USFWS letter is included in attachment C.

2001 Biological Opinion

In addition to fulfilling the requirements in the LCR MSCP HCP, the work plans also satisfied conservation measures required in the 2001 BO. The requirements listed in the 2001 BO were integrated into the program and are being implemented by Reclamation in conjunction with the LCR MSCP. According to the Record of Decision signed on January 16, 2001, the interim surplus criteria (ISC) will expire on December 31, 2015. Requirements under the 2001 BO specifically related to the Secretarial Implementation Agreement were completed in FY08. Monitoring under Conservation Measure 4, Tier 1a was to continue until 5 years after implementation of all water transfers covered under the 2001 BO. A review of the current monitoring program, including the methodology and results from the first 5 years, was completed, and a decision was made to discontinue this monitoring. A concurrence letter was received from the USFWS on August 14, 2012.

Requirements under the 2001 BO specifically related to the ISC include:

1. *Reclamation will continue to provide funding and support for the ongoing Lake Mead Razorback Sucker Study. The initial continuation will be conducted for 5 years, followed by a review and determination of the scope of studies for the following 10 years of the duration of the ISC.*

The ongoing 5 years of study have been completed through Work Task C13. A 10-year summary report for the Lake Mead Razorback Sucker Study has been compiled and is currently being used by the newly formed Lake Mead Razorback Sucker Work Group to determine actions to be implemented during the final 10-year duration of the ISC.

2. *Reclamation will provide rising spring water surface elevations of 5–10 feet on Lake Mead to the extent practicable and that hydrologic conditions allow.*

   During the period of the ISC compliance actions to date, there has been no practicable opportunity to provide rising spring water surface elevations.

3. *Reclamation will continue existing operations on Lake Mohave that benefit native fish during the 15-year ISC period and will explore additional ways to provide benefits to native fish.*

   To date, existing operations on Lake Mohave that benefit native fish have been continued.

4. *Reclamation will monitor water levels of Lake Mead from February through April of each year during the 15 years that the ISC are in place. Should water levels reach 1,160 feet because of the implementation of the ISC, Reclamation will implement a program to collect and rear larval razorback sucker in Lake Mead during the spawning season following this determination.*

   During the February through April 2012 period, water levels at Lake Mead were recorded below the 1,160 mean sea level elevation. Low lake levels were the result of a continuing drought rather than due to ISC activities. Although not required under the 2001 BO, Reclamation, the Southern Nevada Water Authority (SNWA), and the Nevada Division of Wildlife (NDOW) cooperatively reared razorback sucker larvae captured from Lake Mead for future repatriation into Lake Mead. Both the Lake Mead Fish Hatchery and Overton Wildlife Management Area (Overton WMA) were used for rearing during FY14 (B6 and B11, respectively).

California Endangered Species Act Permit

In conjunction with Federal ESA coverage, California State law requires CESA permitting for California activities. The California partners applied for and received a CESA Incidental Take Permit pursuant to California Department of Fish and Game Code Sections 2081(a) and 2081(b). The California partners negotiated the terms of the CESA permit with the CDFW to be compatible with the LCR MSCP. This CESA permit provides compliance only for California partners.

The LCR MSCP conservation activities fulfill the requirements of the CESA permit; however, certain CESA permit requirements are more specific in relationship to location or timing. All other CESA permit requirements are otherwise the same as those for the LCR MSCP. By meeting LCR MSCP requirements in FY14, CESA program requirements were also met for FY14.

Listed below are the CESA requirements that are more detailed than the LCR MSCP HCP:

1. Requirements for various types of coordination with the CDFW during the identification, development, and construction and maintenance for habitat created or restored within the State of California under the LCR MSCP.

2. Various reporting requirements to be made to the CDFW, including annual status reports and notifications.

3. Riparian, marsh, and backwater replacement plans are to be submitted to the CDFW for approval for riparian and marsh habitat creation and restoration within the State of California under the LCR MSCP.

4. Monitoring, research, and adaptive management plans for the replacement habitat created or restored under the LCR MSCP within the State of California are to be submitted to the CDFW for approval.

5. Locations of all habitats replaced or restored in the State of California under the LCR MSCP must be approved by the CDFW.

6. A minimum of 2,614 acres of the LCR MSCP riparian replacement habitat is to be located in the State of California, including 1,566 acres of cottonwood-willow and 1,048 acres of honey mesquite.

7. A minimum of 240 acres of LCR MSCP marsh habitat is to be created or restored within the State of California, including 170 acres for Yuma clapper rail and 70 acres for California black rail. The acreage shall also support at least 58 acres of Colorado River cotton rat habitat.

8. A minimum of 194 acres of LCR MSCP backwater habitat is to be created or restored within the State of California.

9. Habitat created within the State of California will be protected in perpetuity.

10. An endowment fee of $295.00 per acre (in 2005 dollars) will be provided to the CDFW for each acre of habitat that is transferred to them in Fee Title at the time of transfer.

11. A total of 270,000 razorback sucker and 200,000 bonytail of at least 12 inches in length will be stocked into Reaches 4 and 5.

Through FY14, 75,297 razorback sucker and 19,966 bonytail (305 millimeters [mm] or greater in total length [TL]) have been stocked into Reaches 4 and 5 (see tables 1-10b–c.). Since the start of the LCR MSCP, 95,263 native fish have been stocked into the LCR in California.

In FY14, land covers were established at the LDCA. However, due to the dynamic nature of the site, the land covers will not be reported until all planting is complete in FY15. The conservation area includes lands in both California and Arizona.

Through FY14, 985 acres of cottonwood-willow and honey mesquite land cover met the structural type required for riparian replacement habitat. Reclamation is in the process of gathering the appropriate hydrologic data to determine saturated soils, moist soils, or slow-moving water. Once determined, riparian replacement habitat at Palo Verde Ecological Reserve (PVER) will be evaluated.

OVERVIEW OF WORK TASKS

Fish Augmentation, Monitoring, and Research

Monitoring and Research of Terrestrial, Riparian, and Marsh Habitats and Associated Covered Species

Conservation Area Development, Maintenance, and Adaptive Management

FISH AUGMENTATION, MONITORING, AND RESEARCH

As described in the HCP, 17 conservation measures for 4 native fish species will be implemented under the LCR MSCP: 8 conservation measures for razorback sucker, 5 for bonytail, 3 for flannelmouth sucker, and 1 for humpback chub. These conservation measures are addressed through the numerous work plans presented in this report. A brief summary of the work completed, ongoing activities, and proposed future work is provided below.

The work accomplished in support of native fish is divided into six sections: Fish Augmentation (Section B), Species Research (Section C), System Monitoring (Section D), Conservation Area Development and Management (Section E) (covered in the Section E Overview), Post-Development Monitoring (Section F), and Adaptive Management Program (Section G). Each of these sections has an important relationship to the other sections. In general, fish augmentation and species habitat goals tend to drive the other sections. Under Section C, information on how to more efficiently augment native fish populations (Section B) and how to build effective habitats for native fish (Section E) is provided. Under Post-Development Monitoring (Section F), feedback on the relative success of these created habitats is provided and may also provide data to make adaptive management recommendations (Section G). Monitoring may also identify areas in which additional research is needed (Section D). The general progression of these work tasks is as follows: valuable information gained from research (Section C) becomes incorporated into a regular process or protocol in augmentation activities (fish handling protocol, stocking technique, etc.), habitat creation (appropriate water depth, substrates, etc.), or management regime (maintaining particular levels of water quality, water levels, etc.) through the adaptive management process. When research-based monitoring, which has been conducted during the development of a conservation area (under Section C), evolves into a standardized set of protocols and the development phase of that conservation area is completed, this monitoring may continue as part of Post-Development Monitoring (Section F). Similarly, a monitoring regime that is implemented within the system as part of research investigations may eventually become covered under Section D. The level of frequency and intensity of this additional monitoring may be reduced as appropriate to meet the goals of the Sections D and F work tasks. A number of these specific work task progressions are detailed in the sections below.

Fish Augmentation (Section B)

The goal of the LCR MSCP Fish Augmentation Program is to provide the effort to stock a total of 660,000 subadult razorback suckers and 620,000 subadult bonytail chubs for reintroduction into the Colorado River over a 50-year period.

Between 2005 and the end of FY14, 208,675 native fish have been stocked toward completing this goal. This includes 141,967 razorback sucker that have been stocked in Reaches 3–5 (RASU3) and 66,708 bonytail that have been stocked in Reaches 2–5 (BONY3). In addition, 97,733 razorback sucker have been stocked into Reach 2 during this period in support of maintaining a genetic refuge in Lake Mohave (RASU5) (see tables 1-10a–c). This rate of stocking continues to meet or exceed the annual program goals. An updated fish augmentation plan for the LCR MSCP was drafted in FY14. It will be finalized in FY15 and will be available on the LCR MSCP Web site when complete.

To obtain sufficient numbers of young fish for grow-out and eventual stocking, an adult broodstock for each species must be maintained under the LCR MSCP. The adult razorback sucker population in Lake Mohave is the most genetically diverse among razorback sucker populations and is the primary broodstock for this species. Under the LCR MSCP, offspring are captured from this stock directly from the lake and are reared at the Willow Beach National Fish Hatchery (Willow Beach NFH) in Arizona. The fish are then stocked into the LCR. A second broodstock of razorback sucker, developed by the USFWS from Lake Mohave offspring, is maintained at the Southwestern Native Aquatic Resources & Recovery Center (SNARRC) in Dexter, New Mexico. Additional fish rearing capacity is located at the Achii Hanyo Native Fish Rearing Facility (Arizona), Lake Mead Fish Hatchery (Nevada), Overton WMA (Nevada), and the Bubbling Ponds Fish Hatchery (Arizona). In 2007, the exotic quagga mussel was found in Lake Mead. To ensure that quagga mussels do not gain access to Bubbling Ponds Fish Hatchery, razorback sucker larvae are being provided to the hatchery from the SNARRC broodstock.

The SNARRC maintains the only bonytail broodstock in the world (the parents of these fish also came from Lake Mohave). A genetic management plan for this stock has been developed by the USFWS and is in effect. LCR MSCP funding is provided to the SNARCC to support the maintenance of this broodstock, hatch out bonytail, and deliver the young to grow-out facilities.

FY14 Accomplishments

Fish production levels were similar to those in FY13. Production goals are still on track to be ramped up in FY19–30. In order to meet longer-term production goals beginning in FY19, FY14 funds were used to assist in the construction of four new ponds at the SNARRC.

Production in FY14–18 will continue to focus on providing fish for species research. Stocked native fish have been found to persist in some reaches of the LCR, but because research and monitoring information has indicated that post-stocking survival is still low, augmentation research needs to focus on improving

post-stocking survival. Therefore, research that targets improvements in augmentation effectiveness has continued in FY14. These investigations have focused on two areas of the augmentation program: stocking/handling techniques and stocking more "fit" fish. Investigations of stocking/handling techniques involve comparing survival of fish stocked: during day versus night, at different locations, during different seasons, and at larger stocking sizes. Studies that are seeking to improve fish fitness as a way to improve post-stocking survival include flow conditioning fish to improve physical attributes and training fish to recognize and avoid predators. Some of these specific augmentation research efforts and accomplishments are detailed in "Species Research (Section C)" below.

Fish augmentation work tasks were presented in "Fish Augmentation (Section B)." Key accomplishments for FY14 include:

- Successful capture of 28,937 wild razorback sucker larvae from Lake Mohave (B1).

- Tagging and stocking of 12,116 razorback sucker from the Willow Beach NFH (B2).

- Tagging and stocking of 415 razorback sucker and 513 bonytail from the Achii Hanyo Native Fish Rearing Facility (B3). These numbers represent fish that were stocked in December 2013 (FY14). These same numbers were inadvertently reported last year as fish stocked in FY13. This error in fiscal year reporting does not affect the totals in tables 1-10a–c.

- Tagging and stocking of 7,623 bonytail from the SNARRC and maintenance of the bonytail broodstock at the SNARRC (B4).

- Transfer of 75,000 larval razorback sucker to Bubbling Ponds Fish Hatchery from the SNARRC (B4).

- Tagging and stocking 11,933 razorback suckers from Bubbling Ponds Fish Hatchery (B5).

- Lake Mead Fish Hatchery (B6) received 100 razorback suckers from Lake Mead, 4,500 fingerling razorback suckers from Lake Mohave, and 56,000 bonytail chubs from Wahweap State Fish Hatchery.

- Stocking 755 razorback suckers into lake-side rearing ponds (B7).

FY15 Activities

Fish augmentation actions currently underway in FY15 are similar to those conducted in FY14 with some notable exceptions. In early FY15, the fish

augmentation section of the CESA permit was analyzed; there was some inconsistency with fish target length for Reaches 4 and 5 in California likely due to the conversion from standard to metric units. We received clarification and affirmation from the CDFW that fish stocked in Reaches 4 and 5 will be ≥ 305 mm TL. In response, we have removed records of previously credited fish that were measured as < 305 mm at the time of stocking into Reaches 4 and 5. This included 401 razorback sucker and 265 bonytail that were removed from the augmentation records. The updated totals are reported in tables 1-10b–c, respectively. We have also alerted the hatcheries of this length requirement for fish in Reaches 4 and 5.

Similar to the changes we made in FY14 in production at the other hatcheries, a new agreement will be initiated in FY15 to continue fish production and to prepare for increased production goals at Bubbling Ponds Fish Hatchery. Major infrastructure repairs were expected in FY15 at the hatchery; however, these are unlikely to occur during this fiscal year. The Arizona Game and Fish Department (AGFD) has purchased property adjacent to the Bubbling Ponds Fish Hatchery with the intention of replacing the existing native fish rearing capacity with a new facility dedicated to native fish. Discussions are ongoing to determine the role of the LCR MSCP in its development. More information will also be needed to determine what the benefits of this new facility will be compared with the commitment of LCR MSCP resources. Until we have more information, only a portion of the FY15 budget will go toward necessary infrastructure improvements on the existing facility. Some funds will also be supplied to gather preliminary information to help estimate the costs and potential capacity of a new native fish rearing facility.

Production numbers at the SNARRC increase again in FY15 to provide 8,000 to 10,000 bonytail. The Willow Beach NFH will maintain razorback sucker production at a target of 9,000. Starting in FY15, however, the Willow Beach NFH is implementing a new rearing strategy to produce larger fish (> 400 mm) for Lake Mohave. In past years, large numbers of fish have been produced for the lake; however, data collected under Work Tasks C12 (closed) and D8 suggests that stocking larger fish would have a more pronounced effect on increasing population size through greater survival. Fish > 400 mm also have a higher probability of contributing to the genetic diversity of Lake Mohave within the first year of their repatriation. The approach is somewhat conservative but also has incorporated the logistic realities of the hatchery's capacity as well as economic considerations. The plan is to increase the number of fish > 400 mm stocked into Lake Mohave without having an unacceptable decline in total stocking numbers of fish per year. To do this, the hatchery will begin decreasing densities in year classes of fish over the next 5 years to encourage greater growth, which will result in a slow ramp up of fish > 400 mm. The expectation is to have an entire year class (8,000–10,000 fish) averaging > 400 mm. Larval collection goals have also

been reduced accordingly. Under this scenario, the number of fish stocked per year is expected to remain in the range of 8,000–10,000 razorback suckers. In 5 years, the expectation is to have an entire year class that averages > 400 mm TL.

Research continues to focus on improving post-stocking survival of razorback sucker and bonytail. To ascertain if fish conditioning translates to improved survival, we intend to continue implementing experimental stocking treatments using these conditioned fish. Preliminary research is being initiated under Work Task G3 to prepare for the expansion of stocking locations and to further investigate causes of post-stocking mortality, with a focus on the pressures that are causing more immediate mortality.

Proposed FY16 Activities

Routine fish augmentation plans for FY16 will repeat the successful activities conducted in previous years of the program and are described in Work Tasks B1–B12. Additional production fish may be available in FY15. Lake Mead Fish Hatchery is expected to produce approximately 2,000 razorback sucker toward annual augmentation goals; the stocking reach will be determined. A number of bonytail donated from Wahweap State Fish Hatchery in FY14 may reach stocking size by FY16; the number of fish and stocking location is yet to be determined. Some of these fish may also be used in experiments such as those for conditioning or habitat selection. Pilot stocking (research under Work Task C64) of bonytail is expected to continue in Reach 2 and be combined with bonytail stocking of Reach 2 in FY16.

Fish rearing facility infrastructure repairs, improvements, and expansion may be necessary to secure current production and to meet increases in augmentation goals for FY19. Potential locations will be evaluated based on feasibility and cost effectiveness. A new work task, Work Task B12, is proposed for FY16. This work task will support the relocation and maintenance of a second bonytail broodstock. Bonytail are considered functionally extirpated from the LCR, so in terms of species conservation, the establishment of a second bonytail broodstock location is one of the most important measures that can be achieved. Having a redundant source to house the genetics of bonytail provides a safeguard against total loss in the case of a catastrophic event at one of these locations. It also provides additional security and potentially another source of bonytail production for the LCR MSCP augmentation program in the future.

Stocking targets for FY16 are as follows:

- Razorback sucker larvae will continue to be collected from Lake Mohave with a target range of 17,000–20,000 larvae.

- Reach 2 will receive a total of 9,000 razorback sucker, including 1,000 razorback sucker > 400 mm TL. These will be wild-caught larvae collected at Lake Mohave and reared at the Willow Beach NFH, Achii Hanyo Native Fish Rearing Facility, or in lake-side ponds. Experimental/pilot stocking with bonytail will continue in Reach 2 in greater numbers (up to 2,000 from the SNARRC) to ensure augmentation and research goals will be satisfied.

- Reach 3 will receive 6,000 razorback sucker from Bubbling Ponds Fish Hatchery and 8,000–10,000 bonytail from the SNARRC.

- Reaches 4 and 5 will receive 6,000 razorback sucker (minimum 305 mm TL) from Bubbling Ponds Fish Hatchery and 4,000 bonytail (minimum 305 mm TL) from the Achii Hanyo Native Fish Rearing Facility and/or the SNARRC.

In addition to continuing the new rearing strategy at the Willow Beach NFH to raise larger razorback sucker for Lake Mohave, the potential benefits and tradeoffs of collecting genetic samples at the time of stocking will be explored. This is discussed in more detail in "Species Research (Section C)" below.

Species Research (Section C)

Research is being conducted on covered fish species and their habitats to: (1) guide selection and application of conservation techniques, (2) document successful implementation of conservation measures, and (3) develop alternatives to conservation actions that prove ineffective through the Adaptive Management Program (AMP). This strategy will allow researchers to quantify existing knowledge, identify data gaps, and design and implement species research to fill these data gaps. Conceptual ecological models (CEMs) have been developed for razorback sucker and bonytail (under Work Task G4) and will assist in further identifying these data gaps and help to prioritize and redefine research topics.

FY14 Accomplishments

Fish research work tasks presented in this section detail the accomplishments for FY14. Some of the more significant findings from FY14 are:

Fish Augmentation and Distribution Research

- Predator detection and avoidance conditioning is ongoing (C10 and C11). Results have indicated that conditioned bonytail and razorback sucker had higher survival rates than unconditioned bonytail and razorback sucker when exposed to largemouth bass and channel catfish.

- The results from research using sonic-tagged razorback sucker (C13) suggest that, based on movement patterns, areas of the Colorado River inflow and in the lower Grand Canyon may both contain important habitats for this species.

General Species Research

- Additional work under Work Task C53 suggested habitat use and movement patterns in subadult flannelmouth sucker in Reach 3. Flannelmouth sucker were associated with emergent vegetation during the daytime and moved into deeper, open water areas in the evenings. This pattern was not, however, observed in backwaters with higher turbidity.

- The lower limits for salinity, measured as specific conductance in microsiemens per centimeter (µS/cm), were determined for bonytail egg development and bonytail larval survival at both 20 and 25 degrees Celsius (°C) (C32).

Created Habitat Research

- A water management study at the Imperial Ponds Conservation Area (IPCA) (C25) suggested that the ponds could be managed less intensively with respect to the use of surface water. This information made the use of well water a viable option to supply the ponds with a non-native fish-free water source. These improvements have been made under Work Task E14 and now provide non-native fish-free water to all six ponds.

- A renovation plan was completed. It identifies the protocols and procedures that will be used to renovate the six ponds at the IPCA (C25) and includes a post-renovation monitoring plan to track the success of the renovation.

The following projects were completed in FY14:

1. *Work Tasks C10 and C11: Razorback Sucker Rearing Studies/ Bonytail Rearing Studies*, respectively. Results have indicated that, conditioned bonytail and razorback sucker had higher survival rates than unconditioned bonytail and razorback sucker when exposed to largemouth bass and channel catfish. Predator detection and avoidance conditioning is ongoing; however, this research will continue under Work Task 61. Work tasks C10 and C11 were closed in FY14.

2. *Work Task C39: Post-Stocking Distribution and Survival of Bonytail in Reach 3*. Overall poor survival of stocked bonytail for this study have made it difficult to draw conclusions regarding survival based solely on location. Detections of bonytail in the main channel indicated the use of dense cover including bulrush. Stocking and monitoring of bonytail in these areas will continue in FY15 under Work Task C64. Work Task 39 was closed in FY14.

3. *Work Tasks C41and C58: Role of Artificial Habitat in Survival of Razorback Sucker and Bonytail* and *Investigating Shoreline Habitat Cover for Bonytail*, respectively. These individual work tasks were closed in FY14. Continuation of ongoing research for both these work tasks as well as additional research directed to answer questions regarding habitat features important to the success of created backwaters will be continued in FY15 under Work Task C63.

4. *Work Task C45: Ecology and Habitat Use of Stocked Razorback Sucker in Reach 3*. Data collected continues to suggest that available cover in backwaters is the primary characteristic for determining razorback sucker use; this includes turbidity and/or vegetation type. This work will continue in FY15 and will be described in the "FY15 Activities" of Work Task C64.

5. *Work Task C47: Genetic Monitoring and Management of Recruitment in Bonytail Rearing Ponds*. This work task was intended to be closed in FY14. Due to delays in funding transfers, a no-cost extension for this work was granted. Research will be completed in FY15 using obligated FY14 funds; no costs will be incurred in FY15. Results will be reported in the FY15 accomplishments.

6. *Work Task C49: Investigations of Razorback Sucker and Bonytail Movements and Habitat Use Downstream from Parker Dam*. Bonytail were unavailable in FY14, and sonic-tagged razorback sucker reared in two different environments, hatchery and backwater, were released in order to monitor dispersal and relative survival. The average net movement of all backwater-reared razorback was 15% greater than hatchery-reared razorback. Mortality of backwater razorback as a whole (36%) was greater than hatchery razorback (32%) but varied based on stocking location. This work is being stopped and re-evaluated in FY15. Any future work will be described under Work Task C64.

7. *Work Task C56: Characterization of Lake Mohave Backwaters to Evaluate Factors Influencing Spawning Success*. This work task was closed in FY14, and no expenditures were incurred in that fiscal year.

FY15 Activities

Research in FY15 will continue to focus on post-stocking survival, genetics, and habitat use and needs of native fish. Much of this work represents ongoing long-term efforts. Because re-contact rates for stocked fish are low, multi-year studies are typically needed to adequately assess stocking treatment affects.

Research work tasks that assess the genetics for razorback sucker and bonytail will continue through FY18. Because Lake Mohave is being managed as the broodstock for razorback sucker genetics on the LCR, some degree of long-term genetic monitoring will be necessary to appropriately inform conservation efforts for the duration of the program. This is also true for other river reaches as well as for created backwater habitats, although the intensity of this monitoring effort will likely vary depending on location. Genetic monitoring of backwaters will be necessary to describe long-term dynamics from a genetics sustainability standpoint and may require directed research to help guide the management of native fish populations. The knowledge and tools to effectively develop a standardized genetic monitoring program that would be more appropriately implemented, carried out, and reported on as a system-wide monitoring work task under System Monitoring (Section D) is expected to be acquired by FY19. As part of an effort to transition these research investigations into regular monitoring, some changes will be implemented regarding how genetic material is gathered to help improve data collection and help suggest true, long-term genetic monitoring needs. In FY15, the efficacy of collecting genetic fin clips at the time of tagging will be tested. By collecting tissue samples for genetic testing during tagging, the genetics of each fish stocked could be sampled. Genetic samples would be held for future analyses and only run if the fish is contacted. Because of the increased effectiveness of remote passive integrated transponder (PIT) scanners in re-contacting fish, there is potential that this process may greatly increase the precision of the genetic stock assessment of Lake Mohave over time. It would also likely reduce the need for netting fish during the spawning season, resulting in lower long-term costs. A pilot demonstration is planned for early in FY16 to determine the feasibility and potential cost effectiveness of implementing this change. An independent review of the genetic research will be initiated to help identify long-term genetic monitoring needs of the program as part of the adaptive management process.

Nighttime stocking efforts will also continue to be evaluated in FY15 as will flow conditioning research and predator avoidance trials (C61). Assessments of riverine habitat use (C64) by razorback sucker and bonytail and habitat features important in backwater creation (C63) are ongoing. Field investigations of immediate post-stocking mortality (C65) are to commence in FY15.

Previous research that has identified ways of improving fish propagation and culturing will be incorporated into regular practices whenever possible and practical. No new Species Research (Section C) work tasks are beginning in FY15; however, additional research is being initiated under Work Task G3 in FY15.

Activities in FY15 also include a reorganization of several work tasks. The intent is to refocus research into more generalized program goals and combine efforts that overlap within these goals to increase overall effectiveness and efficiency. These work task mergers and the expected work flow transitions are detailed in the table below. The table indicates the work tasks in FY14 and their general research goal, what work task replaces the corresponding FY14 work tasks in FY15, and the logical migration of how this research might become incorporated as part of a regular practice or protocol under a long-term work task when investigations are completed.

Work Task in FY14	Work Task in FY15	Work Task through FY18
Post-stocking survival		
C10	C61	Some stocking treatments derived from this research may be incorporated into augmentation (Fish Augmentation [Section B] work tasks). Long-term monitoring of these fish may continue to occur under Work Task D8.
C11	C61	
C61	C61	

Laboratory testing of flow-conditioned fish and predator identification and avoidance training will advance into paired stocking treatments in FY15 under merged Work Task C61 (C10, C11, and C61). This work will indicate whether or not these treatments translate into improved post-stocking survival.

Work Task in FY14	Work Task in FY15	Work Task through FY18
Backwater habitat investigations		
C41	C63 (new)	Informs on habitat features important in created backwaters (Conservation Area Development and Management [Section E] work tasks) to improve survival and stocking success (Fish Augmentation [Section B] work tasks). Long-term monitoring may continue under Work Tasks F5 or D8.
C58	C63 (new)	

Habitat research will continue in order to define the relative importance of habitat features for created backwaters, and it will be covered under a new, more encompassing work task, Work Task C63.

Work Task in FY14	Work Task in FY15	Work Task through FY18
Dispersal, habitat use		
C39	C64 (new)	Pilot stockings and monitoring networks to inform augmentation (Fish Augmentation [Section B] work tasks); long-term monitoring using these networks may continue to occur under Work Task D8.
C45	C64 (new)	
C49	C64 (new)	
G3 (preliminary work)	C64 (new)	

Research under Work Tasks C39, C45, and C49 needs to continue in order to continue to appropriately inform managers of the LCR MSCP Fish Augmentation Program and identify relevant information on habitat use, dispersal, and survival of stocked fish.

In FY15, these work tasks are combined into Work Task C64. The activities covered under this work task both consolidate and build on the work that has been undertaken and accomplished under these previous work tasks.

The intent of Work Task C64 is to formalize the approaches used to identify appropriate stocking locations throughout Reaches 2–5 and to set up a monitoring network to track these stocked fish to answer a number of research questions. This will be accomplished through pilot releases of tagged fish to identify dispersal and movement of individuals or groups of fish. It may also provide information on preliminary post-stocking habitat selection, use, and survival. This information can then be used to: (1) establish a more appropriate monitoring network in terms of where to locate remote sensing equipment or other sampling gear with higher probabilities for contacts, (2) indicate locations that may be better suited for stocking fish, and (3) possibly identify additional aggregations of native fish.

The networks that are established under Work Task C64 will also provide monitoring information on the effectiveness of different stocking treatments (conducted under Work Task C61) as well as long-term information on survival, habitat use, and movement of native fish in these reaches. Eventually, these established long-term monitoring networks may be used for system-wide monitoring and would be covered through Work Task D8.

Work Task in FY14	Work Task in FY15	Work Task through FY18
G3	C65 (new)	Informs on immediate sources of post-stocking mortality. May help focus stocking treatments (C61) and suggested improvements may be incorporated into stocking protocols (Fish Augmentation [Section B] work tasks).

Work Task C65 is new in FY15, and it is intended to fill knowledge gaps and allow research and management to focus on what could be the most important factors affecting post-stocking survival. This work task builds directly on the knowledge gained from Work Task C46 (closed) and takes the next step from observing stress indicators in stocked fish and investigating how this translates into actual latent post-stocking mortality. These data are important to assess the effect of stocking treatments relative to stress-related mortality, bird predation, or other factors that may be accounting for immediate post-stocking mortality. It will allow managers to better prioritize and target solutions, like those being tested under Work Task C61, or find new ways to improve survival of stocked fishes by identifying what factors are the greatest sources of immediate mortality.

Proposed FY16 Activities

The efforts in FY16 will continue to focus on two major research goals: (1) providing information to improve post-stocking survival and (2) identifying important habitat and life history needs to help guide backwater creation. Research for life history requirements will continue in FY16 under Work Task C32 and will again focus on identifying water quality thresholds for native fish.

Genetic research will continue in FY16 in order to provide guidance for long-term management of both the Lake Mohave genetic broodstock and created backwater populations. Specific to Lake Mohave, the potential benefits and tradeoffs of collecting genetic samples at the time of stocking at the Willow Beach NFH will be explored by implementing a pilot test during razorback sucker tagging in early FY16.

System Monitoring (Section D)

System monitoring is conducted on existing populations of covered fish species to determine population status, distribution, density, migration, productivity, and other ecologically important parameters. System monitoring for razorback sucker and bonytail is covered under Work Task D8. Monitoring data for flannelmouth sucker are included in the research actions covered under Work Task C15 (closed).

FY14 Accomplishments

Multi-agency, lake-wide fish surveys were conducted on Lakes Mead, Mohave, and Havasu and on river reaches between these reservoirs. Surveys were completed using nets and electrofishing boats.

Research studies conducted in each reach added additional fishery status information. The razorback sucker population in Reach 1 is estimated to be approximately 589 adults, similar to 2012 and 2013. Larvae and juvenile fish were observed along with active spawning in four separate areas in the lake. Bonytail have not been contacted and are considered absent from Reach 1. Reach 2 had an estimated population of 3,284 repatriated razorback sucker. This estimate is lower but similar to the 2013 estimate of 3,588. Reach 3 had a razorback sucker population estimate of 4,456, which was a slight decrease in the estimate from 2013 of 4,524. Some measure of caution should be used when applying this information; the confidence intervals (CIs) associated with these estimates also indicate that substantial year-to-year variation may exist. In addition, these CIs may actually be greater than the changes in yearly population estimates. Repatriated bonytail contacts through netting in Reach 3 increased when compared to what was recorded in previous years; however, all the re-contacts were fish that had been released only months prior to the netting surveys.

In FY14, both razorback sucker and bonytail were stocked above and below Headgate Rock Dam as part of Work Task C49. Additional fish were released below Palo Verde Diversion Dam. A small population of razorback sucker continues to persist below the Palo Verde Diversion Dam; 98 unique razorback sucker were contacted with scanners in the A-7, A-10, and Palo Verde backwaters. PIT tag records indicated that these fish were all stocked between 2005 and 2008. Additionally, 54 larvae were also recorded in the A-10 backwater. Overall re-contacts of stocked fish are low in this reach, and population estimates were not calculated due to the low number of contacts. Additional surveys were conducted in Reaches 4 and 5 to identify any areas where potential persistence of native fish was occurring or if there were other areas that contained features suitable for future native fish stocking efforts.

System-wide monitoring under Work Task D8 has identified a number of connected backwaters where razorback sucker populations appear to be persisting. Although the creation of disconnected backwaters as habitat for native fishes is a priority under this program, these observations suggest that connected backwaters are selected and used by razorback sucker and can provide value for species conservation.

FY15 Activities

Monitoring data will be collected for Reaches 1–5. Information will be gleaned from ongoing fish research activities as well as through fish monitoring field work. Field work will include collecting larvae, trammel netting, electrofishing, remote sensing of PIT-tagged fish, and active and passive tracking of sonic-tagged fish. Additional surveys will be conducted in Reaches 4 and 5 with an emphasis on remote sensing in available backwater locations.

The use of PIT tag scanners has been embraced to increase precision in calculating population estimates and to contact fish that likely would not have been captured through discreet netting events. This technology has shown great promise in its utility for many fish monitoring applications. This technology will continue to be explored, exploited, and refined for the LCR MSCP into the future. Expanding the use of these devices in other river reaches and attempting to increase the spatial coverage of deployed units to provide a more robust estimator of abundance will necessarily increase program expenditures to procure and maintain these units. In the long-term, better data will be available to inform management decisions and will reduce the need for more invasive and labor-intensive sampling techniques. Beginning in FY15, a demonstration will be conducted during the March razorback roundup to compare the traditional use of trammel netting versus an effort to more closely match spatially this coverage using remotely deployed PIT scanners. This effort is summarized in the Adaptive Management Program (Section G) section of this document (G4).

Proposed FY16 Activities

Monitoring will continue in all reaches as previously outlined, and participation in multi-agency field surveys will proceed. Monitoring efforts will continue to rely on and expand the use of remote PIT scanning technology, as this technology has proven effective in increasing both contact probabilities and precision in population estimates.

Post-Development Monitoring (Section F)

Post-development monitoring will be conducted at each conservation area following completion of habitat creation activities in order to evaluate both the maturation of the site as it develops into covered species habitat and the use of the habitat by the covered species. Under Work Task F5, funding is provided to support post-development monitoring of the Beal Lake Conservation Area (BLCA) and the Big Bend Conservation Area (BBCA). Monitoring of Imperial Ponds is being covered under Work Task C25, as the conservation area is still under development.

FY14 Accomplishments

Water quality at Beal Lake was monitored throughout the backwater using deployed continuous monitoring instruments. Low levels of dissolved oxygen (DO) +- and high temperatures were observed locally but not lake-wide. The backwater was isolated from Topock Marsh following the detection of golden algae in 2013; this closure has resulted in a rapid increase in specific conductivity, which is nearing 11,000 µS/cm. Zooplankton and phytoplankton results continue to show relatively low levels of plankton biomass. No golden algae have been

detected in Beal Lake since May 2013. Limited electrofishing and netting surveys detected many of the non-native species that were known to have previously inhabited the backwater.

Routine monitoring at the BBCA continued in FY14; native fish contacts included eight razorback sucker and one flannelmouth sucker. All of the razorback originated from localized stocking events from the past 2 years. Larval flannelmouth sucker and razorback sucker were captured at rates similar to years past. Multiple telemetered juvenile flannelmouth sucker (C53) were contacted in the backwater and were routinely contacted in the dense bulrush stands near the center of the backwater. Remote PIT scanners were deployed and successfully contacted 14 razorback sucker within the conservation area. Water quality parameters remained within thresholds for all native fish. Zooplankton monitoring was discontinued.

FY15 Activities

Monitoring activities for Beal Lake will be focused on water quality and plankton, with a continued emphasis on golden algae. Improvements in water quality will need to be addressed before stocking native fishes. In FY15, the earthen canal that connects Beal Lake to Topock Marsh will be cleared to help manage and enhance the flow of surface water into the lake. These activities will be performed under Work Task E1.

The BBCA will be monitored at a level similar to FY14. In lieu of electrofishing, additional effort will be expended to deploy remote PIT scanners during routine monitoring. Water quality monitoring will continue.

Proposed FY16 Activities

The activities from FY15 will continue into this year. Recommendations for management guidelines and future outbreaks of golden algae at Beal Lake will dictate future monitoring and research objectives for the site. A drawdown of Beal Lake is planned for FY16. This management action will be employed to induce surface and groundwater flow into the lake to improve water quality and potentially reduce the likelihood of future golden algae outbreaks. The majority of the effort and expense for this management action will be captured under Work Task E1; however, additional monitoring is expected during and after the drawdown event. Future plans for Beal Lake depend on the ability to first address and manage water quality issues, particularly golden algae. Additional future experimentation will focus on the impact of piscivorous bird predation in the lake (C65). BBCA activities will be similar to the previous year.

Adaptive Management Program (Section G)

Under the LCR MSCP AMP, uncertainties encountered during implementation of the conservation measures outlined in the HCP will be addressed. The program has three central components: (1) gauging the effectiveness of existing conservation measures, (2) proposing alternative or modified conservation measures as needed, and (3) addressing changed and unforeseen circumstances.

The *Final Science Strategy* details the AMP process for the research and monitoring programs at the project and programmatic levels. A 5-year planning cycle has been identified to allow for the receipt of new information, the analysis of that information, and the incorporation of the new information into the design or direction of future work tasks. The 5-year planning cycle will allow for a review of past activities and the setting of priorities for the next 5-year cycle. The *Final Five-Year Monitoring and Research Priorities for the Lower Colorado River Multi-Species Conservation Program: 2013–2017* was completed in FY12.

Implementation of the AMP to address uncertainties, evaluate the effectiveness of research and monitoring activities, and improve management is allocated under Work Task G4. Data management (G1) is an integral component of any conservation program, including the LCR MSCP. Funds are allocated to design a data management system capable of tracking all information needed in the decisionmaking process. Funding allocated under Work Task G3 to begin research studies identified as priorities, when applicable, will continue.

The current needs under the AMP are in the form of data collection and organization so that the information can be readily accessed for use in the decisionmaking process. For native fish, all stocking and tagging data developed under the LCR MSCP are maintained in an electronic database. Another need is a toolbox of evaluation techniques that can gauge the effectiveness of conservation measures as they are completed. Work Task G3 will allow for the development of these tools. Funds allocated from this work task are used to initiate reconnaissance-level investigations. If more research is needed, the work is written up as a separate research study and submitted for funding under “Species Research (Section C)” above.

Fishery program activities under the LCR MSCP are coordinated with other recovery actions (Upper Colorado River Endangered Fish Recovery Program, San Juan River Basin Recovery Implementation Program, and Glen Canyon Dam AMP) through annual participation in meetings and presentations to research and management groups. These groups include local chapters of the American Fisheries Society, the Colorado River Aquatic Biologists, the Lake Mead Work Group, the Lake Mohave Native Fish Work Group, and the Lower Colorado River Native Fish Work Group.

FY14 Accomplishments

In FY14, Work Task G4 funds were used to complete the razorback sucker CEM, which will provide a clear framework for identifying data gaps and can thus help to prioritize future research and monitoring as well as guide management actions.

In FY14 fish research and monitoring projects were being evaluated for inclusion into the LCR MSCP data management process, which includes development of program-wide standards for data collection, documentation of data collection processes in the field, and automating data collection using mobile devices. These standards ensured that collected data were consistent. Spatial fish detections from system monitoring activities on Lake Mohave continued to be analyzed and were included in the LCR MSCP database. Once the evaluation is completed, adjustments to data collection efforts may be recommended. Maintenance of the fish augmentation database continued.

The use of radio telemetry tags was tested on juvenile flannelmouth sucker in FY14. This pilot effort revealed some ways to overcome limitations in the technology and optimize its use for tracking flannelmouth sucker. This technology is being implemented for use in FY15 under work task C53.

Small mesh nets and larval surveys were conducted in Reach 3. No juvenile native fish were contacted; however, larvae were present throughout the reach. Small mesh netting will continue in Reach 3 in FY15 as an incorporation of monitoring for this smaller life stage through other ongoing research and monitoring efforts (C64 and D8) in this reach.

Preliminary investigations to assess the potential sources and relative magnitude of immediate post-stocking mortality were initiated in FY14. A study plan was developed to assess latent mortality of stocked fish in LCR MSCP Reaches 2 and 3. In addition, a bioenergetics model of piscivorous bird predation was also being developed. The model was a first step in assessing the relative effect that bird predation was having on the survival of stocked fish. The field work for both these investigations of post-stocking latent mortality will be completed through Work Task C65 beginning FY15.

To ensure a start in FY15, FY14 funding from Work Task G3 was used to acquire sonic tags, manual tracking equipment, and submersible ultrasonic receivers (SURs) for use in the FY15 pilot release of sonic-tagged bonytail in Lake Mohave, covered under Work Task C64. Data gathered from this effort will be used to help inform managers of future stocking needs of bonytail in Lake Mohave to meet program commitments.

FY15 Activities

During this fiscal year, the bonytail and flannelmouth sucker CEMs are being developed.

During FY15, fish research and monitoring projects will continue to be evaluated for inclusion into the LCR MSCP data management process, which includes development of program-wide standards for data collection, documentation of data collection processes in the field, and automating data collection using mobile devices. Data dictionaries or Mobile Electronic Field Forms (MEFFs) will be developed for fish projects on a priority basis. Spatial fish detections from system monitoring activities on Lake Mohave continued to be analyzed and were included in the LCR MSCP database. Recommendations for inclusion of standardized localities are expected during this fiscal year. Maintenance of the fish augmentation database has continued.

A number of fisheries research investigations are being initiated through Work Task G3 in FY15 and include periphery research that may be discreet and answer a simple question with no future commitments, be an additional part of a larger research effort captured under an existing work task, or lay the foundation for research to be conducted in a new work task. Work Task G3 research starts in FY15 and includes evaluating various techniques designed to detect and document avian predation through observation and monitoring of roosting sites. The information gathered will assist in quantifying avian pressure on native fish, which will not only provide for more robust modeling and estimates for survival, but may also assist with ongoing work under Work Task C65.

Proposed FY16 Activities

In FY16, technical, independent, and peer reviews of fisheries projects, as part of the adaptive management process, will continue under the AMP (G4). Once the CEMs are final, they will be used in the adaptive management process to prioritize future research and monitoring as well as guide management actions. LCR MSCP database structure development and creation of MEFFs will continue, with other data modules being constructed on a priority basis. Funding allocated under Work Task G3 to begin research studies identified as priorities, when applicable, will continue.

MONITORING AND RESEARCH OF TERRESTRIAL, RIPARIAN, AND MARSH HABITATS AND ASSOCIATED COVERED SPECIES

As described in the HCP, conservation measures for 22 covered and 5 evaluation wildlife species that rely on terrestrial, riparian, and marsh habitat will be implemented under the LCR MSCP. These conservation measures are addressed through the numerous work tasks presented in this report. A brief summary of the work completed, ongoing activities, and proposed future work is provided below.

The work accomplished in support of terrestrial wildlife and plants is divided into five sections: Species Research (Section C), System Monitoring (Section D), Conservation Area Development and Management (Section E) (covered in the Section E Overview), Post-Development Monitoring (Section F), and Adaptive Management Program (Section G). Each of these sections has an important relationship to the other sections.

A habitat-based approach for the conservation of covered species is used under the LCR MSCP. It involves the maintenance of existing habitat and the development and management of habitats that are created by the program (Section E), which requires knowledge of the key environmental characteristics (vegetation and abiotic) important for each species. Species' populations are also monitored to determine if and to what extent they are using the habitat (Section F) and includes monitoring to evaluate the ongoing status of covered species and their habitats in the LCR planning area (Section D).

For some species, fundamental information is lacking, and research projects (Section C) are implemented to fill those gaps. This research includes developing effective methods to detect species and monitor populations and to identify important characteristics of their habitat. For other species, research focuses on the types and frequency of management activities required to maintain functional species habitat over the term of the LCR MSCP (Sections C and G).

Species Research (Section C)

Research is being conducted on covered wildlife species and their habitats to: (1) guide selection and application of conservation techniques and (2) document successful implementation of conservation measures, and (3) develop alternatives to conservation actions that prove ineffective. This strategy will allow for

quantification of existing knowledge, identification of data gaps, and design and performance of species research to fill data gaps that will inform implementation of the conservation measures.

The LCR MSCP conservation measures direct that habitat characteristics must be determined for 21 species either under conservation measure MRM1, species-specific conservation measures requiring distribution and/or habitat surveys (CRCR1, YHCR1, MNSW1, CRTO1, and LLFR1), or species-specific conservation measures requiring the creation and management of covered species habitat. These species include:

- Yuma clapper rail
- Southwestern willow flycatcher
- Western red bat
- Western yellow bat
- Colorado River cotton rat
- Yuma hispid cotton rat
- MacNeill's sootywing skipper
- Western least bittern
- California black rail
- Yellow-billed cuckoo
- Elf owl
- Gilded flicker
- Gila woodpecker
- Vermilion flycatcher
- Arizona Bell's vireo
- Sonoran yellow warbler
- Summer tanager
- California leaf-nosed bat
- Pale Townsend's big-eared bat
- Colorado River toad
- Lowland leopard frog

Species research work tasks focus on key priorities set in the *Five-year Monitoring and Research Priorities for the Lower Colorado River Multi-Species Conservation Program (2013–2017)* report.

FY14 Accomplishments

In 2014, Reclamation implemented 11 research projects focused on 19 terrestrial covered and evaluation species. This research was concentrated on developing effective survey methods, understanding population size and habitat connectivity through genetic analyses, and measuring characteristics of habitat to determine the components that are critical to support these species.

Prior to FY14, methods to detect covered and evaluation species with known levels of accuracy were identified and approved for many LCR MSCP terrestrial species. In FY14, research continued on the elf owl (C24); gilded flicker (C52); Colorado River cotton rat, desert pocket mouse, and Yuma hispid cotton rat (C27); and Colorado River toad (C62).

- *Work Task C24*: *Avian Species Habitat Requirements*. A study was initiated to test the elf owl's responsiveness to call playback at short distances (50–250 meters [m]) in obstructed habitat, record their use of riparian habitat, and, on a broad scale, document what type of riparian habitat elf owls are using. This study was needed, because under previous surveys for the elf owl on the LCR, only one was detected near Blankenship Bend during a 2-year period.

- *Work Task C52*: *Gilded Flicker Detectability and Distribution Study*. Testing continued on capture and radio telemetry tracking and gathering additional information on the breeding chronology of the gilded flicker. This study was initiated to: (1) estimate time periods of breeding and post-breeding stages and document breeding season behaviors to help interpret results of sightings, (2) document gilded flicker travel distances during and after nesting season to document if it is possible that birds nesting in saguaro habitat may also utilize disconnected riparian habitat, and (3) help define habitat use of the gilded flicker during the breeding and non-breeding season.

- *Work Task C27*: *Small Mammal Population Studies*. The field work for the Colorado River cotton rat and Yuma hispid cotton rat mark-recapture/ habitat study was completed. Data suggest that trapping success is greatest in locations with dense herbaceous vegetation at least 0.5 m in height. Genetic samples of both cotton rats and desert pocket mouse were submitted for Next-Gen sequencing to identify genetic markers that can be used to differentiate the cotton rat species and the subspecies of the desert pocket mouse.

- *Work Task C62*: *Lowland Leopard Frog and Colorado River Toad Habitat and Ecology Study*. Field work began in July to locate occupied breeding habitat for the Colorado River toad at study sites within the watershed of Bill Williams River and also along the Aqua Fria River and Verde River watersheds, as a sufficient sample size of sites was not available on the Bill Williams River. Breeding was confirmed in all three watersheds, with the majority occurring within one site (Adobe Dam) in the Agua Fria River watershed. Habitat data were collected where egg masses were discovered.

The genetics study to characterize California leaf-nosed bat populations at roost sites continued in FY14 (C43). The majority of the sampling effort has been completed. A total of 99 samples from the LCR and other areas within the

species range have been collected. Representative samples were submitted for Next-Gen sequencing to identify specific genetic markers that will best contribute to the full-scale analysis of the genetic diversity and relatedness among roosts.

Habitat characteristics in areas occupied by covered and evaluation species to determine the components that are critical to support breeding populations were studied under four work tasks. Research focused on Arizona Bell's vireo, Sonoran yellow warbler, and Gila woodpecker (C24); Colorado River cotton rat and Yuma hispid cotton rat (C27); western red bat and western yellow bat (C35); and lowland leopard frog and Colorado River toad (C62).

- *Work Task C24*: *Avian Species Habitat Requirements*. In FY14, the fourth year of habitat data were collected for the Sonoran yellow warbler, Arizona Bell's vireo, summer tanager, and Gila woodpecker. Ten use and 10 non-use sites were surveyed per species. Characteristics measured included overstory trees, the shrub and intermediate layer, canopy closure and gaps, total vegetation volume, herbaceous layer, and microclimate.

- *Work Task C27*: *Small Mammal Population Studies*. The field work for the Colorado River cotton rat and Yuma hispid cotton rat mark-recapture/habitat study was completed. Data suggest that cotton rats need dense herbaceous vegetation at least 0.5 m in height, as it provides an important cover for their activities and protects them from predators.

- *Work Task C35*: *Western Red Bat and Western Yellow Bat Roosting Characteristics Study.* Data analyses were completed for the western red bat and western yellow bat roosting study, and it was determined that western yellow bats use cottonwood-willow and mesquite forests primarily for foraging along the LCR, unlike the western red bat, which uses the cottonwood-willow and mesquite forests for both roosting and foraging.

- *Work Task C62*: *Lowland Leopard Frog and Colorado River Toad Habitat and Ecology Study*. Habitat data were collected where Colorado River toads egg masses were detected including: minimum and maximum water depth and temperature, substrate type (e.g., gravel and sand), water temperature, pH, turbidity, stream discharge, and vegetation composition. Non-native predators were also documented.

Research also involved reviewing the current scientific information available for covered and evaluation species to identify new knowledge that will facilitate LCR MSCP activities. The existing knowledge was incorporated into CEMs (G4). In addition to the CEMs, species accounts were prepared to summarize the state of the science pertinent to LCR MSCP activities (C3) for the following covered and evaluation species: Arizona Bell's vireo, yellow warbler, Yuma clapper rail, California black rail, western least bittern, western yellow bat, relict leopard frog, Colorado River toad, lowland leopard frog, Yuma hispid cotton rat, Colorado River cotton rat, desert pocket mouse, elf owl, Gila woodpecker, desert

tortoise, flat-tailed horned lizard, humpback chub, sticky buckwheat, and three-corner milkvetch. Species accounts for southwestern willow flycatcher, yellow-billed cuckoo, and MacNeill's sootywing skipper will be initiated in FY15.

LCR MSCP funds were provided to the National Park Service (NPS) at Lake Mead National Recreation Area to support implementation of conservation measures for sticky buckwheat and threecorner milkvetch (C2) and relict leopard frog (C4) in accordance with Conservation Measures STBU1, THMI1, and RLFR1. Sticky buckwheat and threecorner milkvetch population monitoring and invasive species control activities were conducted to protect the populations at Lake Mead National Recreation Area. Relict leopard frog conservation activities (supported by C4 funds) were completed by the NPS at 19 sites within southern Nevada and northwestern Arizona and included the release of tadpoles and juvenile frogs at 6 experimental sites and 1 natural site as well as diurnal and nocturnal surveys conducted year round at all 19 natural and experimental sites.

The following research projects were closed in FY14:

1. *Work Task C6: Insectivore Prey Base Abundance and Diversity in Conservation Areas*. The study of insectivore prey base and abundance was not implemented following a review of the purpose of the study. Monitoring of insectivore prey may be conducted in the future under Post-Development Monitoring (Section F).

2. *Work Task C35: Western Red Bat and Western Yellow Bat Roosting Characteristics Study*. This study provided information about roosting and foraging habitat for both bat species. The majority of red bat roosts were found roosting in Fremont cottonwoods, and almost all western yellow bat roosts were found in Mexican fan palms. It does not appear that western yellow bats roost in cottonwood-willow dominated habitat, but they do rely on it for foraging habitat.

3. *Work Task C51: Vermilion Flycatcher Detectability and Distribution Study*. This study provided information that confirmed existing habitats and habitats being created and managed at the PVER, Cibola Valley Conservation Area (CVCA), Cibola National Wildlife Refuge (Cibola NWR) Unit #1 (Cibola NWR Unit #1), BLCA, and LDCA are consistent with habitat being used by vermilion flycatcher currently or in the recent past on the Bill Williams River National Wildlife Refuge (Bill Williams River NWR) and at restored habitat at the 'Ahakhav Tribal Preserve. This habitat consists of mature cottonwood, willow, and mesquite stands adjacent to irrigated agricultural fields. Based on this work, it was determined that no additional field work was necessary for this species except to document its presence if observed while conducting other LCR MSCP activities.

FY15 Activities

Research will be conducted at locations occupied by LCR MSCP covered and evaluation species to fill gaps in knowledge. Research will continue to focus on:

1. Developing effective methods to detect covered and evaluation species with known levels of accuracy. Studies will continue on the elf owl (C24), gilded flicker (C52), and lowland leopard frog and Colorado River toad (C62).

2. Evaluating habitat use in areas occupied by covered and evaluation species to determine the components that are critical to support breeding populations. Research will focus on yellow-billed cuckoo (D7), Arizona Bell's vireo (C24), Sonoran yellow warbler (C24), Gila woodpecker (C24), elf owl (C24), Colorado River cotton rat and Yuma hispid cotton rat (C27), western red bat and western yellow bat (C35), and lowland leopard frog and Colorado River toad (C62).

3. Providing LCR MSCP funds to the NPS at Lake Mead National Recreation Area to support implementation of conservation measures for sticky buckwheat and threecorner milkvetch (C2) in accordance with Conservation Measures STBU1 and THMI1.

The following projects are scheduled to be completed in FY15:

1. *Work Task C4: Relict Leopard Frog*. FY15 funding will be provided to the NPS to support the implementation of the conservation measure for this species and in accordance with Conservation Measure RLF1.

Proposed FY16 Activities

Research will be conducted at locations occupied by LCR MSCP covered and evaluation species to fill gaps in knowledge. Research will continue to focus on:

1. Developing effective methods to detect covered and evaluation species with known levels of accuracy for the elf owl (C24), gilded flicker (C52), desert pocket mouse (C27), and lowland leopard frog and Colorado River toad (C62).

2. Completing genetic analyses of California leaf-nosed bats.

3. Studying water depths in occupied marsh bird breeding sites to refine the current habitat management criteria for California black rail (no greater than 1 inch deep) and least bittern and Yuma clapper rail (no more than 12 inches deep) (C66). A study will also be initiated to look at ways to maintain marsh bird habitat through habitat manipulation (C60).

4. Evaluating habitat use in areas occupied by covered and evaluation species to determine the components that are critical to support breeding populations. Research will focus on the yellow-billed cuckoo (D7); Arizona Bell's vireo, elf owl, Sonoran yellow warbler, and Gila woodpecker (C24); Colorado River cotton rat and Yuma hispid cotton rat (C27); California leaf-nosed bat (C43); and lowland leopard frog and Colorado River toad (C62).

5. Providing LCR MSCP funds to the NPS at Lake Mead National Recreation Area to support implementation of conservation measures for the threecorner milkvetch and sticky buckwheat (C2) in accordance with Conservation Measures STBU1 and THMI1.

System Monitoring (Section D)

System monitoring is being conducted to evaluate the ongoing status of covered species and their habitats in the LCR MSCP planning area. Information from these projects provides context to population abundance and incidental observations of covered species on conservation areas.

FY14 Accomplishments

Under the LCR MSCP, system-wide monitoring of marsh birds, southwestern willow flycatcher, yellow-billed cuckoo, bats, rodents, lowland leopard frog, Colorado River toad, avian productivity, and riparian birds along the LCR and adjacent river systems continued.

Marsh bird surveys (D1) were conducted at Topock Gorge and the upper reaches of Lake Havasu during March, April, and May 2014 in coordination with the USFWS as part of a multi-agency, system-wide monitoring effort. All three covered species were encountered: 24 Yuma clapper rail detections in March, 82 in April, and 66 in May; 2 western least bittern detections in March, 12 in April, and 23 in May; and 1 California black rail detection in April and 1 in May.

Presence/absence surveys for southwestern willow flycatcher (D2) were conducted at 87 sites along the LCR and its tributaries in 2014. Life history studies were conducted at the following sites: Muddy River, Nevada; Topock Marsh, Arizona; Bill Williams River National Wildlife Refuge, Arizona; and Alamo Lake, Arizona. Activities included banding, nest monitoring, habitat threat analyses, and microclimate analyses. Willow flycatchers were detected on at least 1 occasion at 61 of the 87 sites. Resident, observed after migration has ended, or breeding southwestern willow flycatchers were detected at 35 sites within the following 6 study areas: Pahranagat National Wildlife Refuge (Pahranagat NWR), Meadow Valley Wash, Muddy River, Topock Marsh, Bill Williams River NWR, and Alamo Lake.

Overall numbers of birds detected and captured were higher in 2014 due to a new survey location (Alamo Lake). For safety reasons, surveys were not conducted along the Virgin River in FY14. (D2 also included post-development monitoring at LCR MSCP conservation areas. Those results are discussed under Post-Development Monitoring (Section F) below.

System monitoring for yellow-billed cuckoo (D7) continued in FY14 with presence/absence surveys at 40 sites along the LCR and Bill Williams River, nest monitoring, banding of young and adults, telemetry, and migration tracking using a Global Positioning System (GPS). A total of 58 confirmed breeding territories and an additional 13 probable and 30 possible breeding territories were detected in FY14. There were four nests found at the Bill Williams River NWR. Up to 101 breeding territories were estimated within the LCR MSCP planning area. A total of 35 nests were monitored. Mayfield nest success was estimated to be 55%. (D7 also included post-development monitoring at LCR MSCP conservation areas. Those results are discussed under Post-Development Monitoring (Section F) below.

Multi-species survey protocols have been developed to monitor additional avian species covered under the LCR MSCP. Under Work Task D5, intensive site-specific data were collected on avian species using a standardized protocol, which enabled a comparison of species occurrence trends on the LCR with those throughout North America. Data collected were reported to the Institute for Bird Populations as part of their national bird monitoring effort. Data were also used on a site-specific level to provide insight on bird use within LCR MSCP conservation areas. Banding was conducted at three conservation areas using the Monitoring Avian Productivity and Survivorship (MAPS) protocol (D5). During the breeding season, there were 242 captures at Cibola NWR Unit #1, 161 total captures at the BLCA, and 69 captures at the CVCA.

Under Work Task D6, a multi-species protocol and sample plan developed by the U.S. Geological Survey to document long-term population trends and habitat use of riparian bird species throughout the LCR MSCP area were used. In FY14, 80 system-wide plots were surveyed for riparian birds (D6), recording approximately 180 species, which included territorial and non-territorial breeding individuals, migrants, and non-breeders. Many species were detected breeding at some survey plots, but present and not breeding at other survey plots. The estimated number of territories of focal species in the LCR MSCP planning area in FY14 were:

- Sonoran yellow warbler (2,821)
- Arizona Bell's vireo (898)
- Gila woodpecker (666)
- Summer tanager (356)
- Gilded flicker (1)
- Vermilion flycatcher (12)

In addition, the 3-year study to test the accuracy of the intensive area search surveys was completed. Results indicated that a more intensive survey effort will document 16% more territories than standard intensive sampling. There are many biological reasons that could account for this, including onset of breeding, migration arrival time, detectability throughout the season, territory size, breeding habitat, behavior, and parental care.

Under Work Task D9, acoustic monitoring and mine outflight counts continued, and a foraging distance study of California leaf-nosed bats and Townsend's big-eared bats was initiated. The five permanent acoustic monitoring stations continued to be used to record bat presence by species year round. Acoustic monitoring and data analysis methods were independently and internally reviewed, and the following recommendations were made through the adaptive management process (G4): (1) limit data analyses to only the two covered and two evaluation species, as collecting data on other species would not inform LCR MSCP species presence and habitat requirements; (2) switch to a sampled approach during the winter and summer peak activity time periods instead of year-round data collection as that data will be sufficient to document species presence; and (3) focus data analyses on presence only, as the five sampling locations and acoustic methods do not provide enough information to monitor absence, population trends, or habitat characteristics. California leaf-nosed bat and Townsends big-eared bat roost outflight counts were conducted in the winter and early summer at 17 mines along the LCR. Based on the roost outflight counts, populations at these roosts continue to appear stable. A foraging distance study of California leaf-nosed bats and Townsend's big-eared bats along the LCR began in FY14. Equipment was tested, and radio tracking training was conducted using four individual bats of different species since no California leaf-nosed bats and Townsend's big-eared were captured.

Surveys were conducted in the Limitrophe north of Hunters Hole Conservation Area and at Pintail Slough to document the presence of covered rodent populations (D10). The Yuma hispid cotton rat was captured within the Limitrophe area.

System monitoring also continued for the lowland leopard frog and Colorado River toad (D12). Presence surveys for Colorado River toads were conducted in the summer of FY14 along 4.3 miles of the Bill Williams River east of Planet Ranch. Visual encounter surveys, tape-playback surveys, digital automated recorders (frog loggers), funnel traps, and eDNA sampling were used. A total of 54 visual encounter and tape-playback surveys were conducted, resulting in captures of 11 Colorado River toads. Digital automated recorders detected Colorado River toads calling on 23 nights.

FY15 Activities

System-wide monitoring of marsh birds, southwestern willow flycatcher, yellow-billed cuckoo, bats, rodents, lowland leopard frog, Colorado River toad, avian productivity, and riparian birds along the LCR and adjacent river systems will continue in FY15.

Marsh bird surveys (D1) will be conducted along the LCR in Topock Gorge and the upper reaches of Lake Havasu during March, April, and May as part of a multi-agency, system-wide monitoring effort in coordination with the USFWS. Presence/absence southwestern willow flycatcher surveys (D2) will be conducted along the LCR, Bill Williams River, Alamo Lake, lower Gila River, and riparian areas in southern Nevada and will include areas along the LCR south of the Bill Williams NWR not surveyed in 2014. Life history studies will be conducted at the following sites: Muddy River, Nevada; Topock Marsh, Arizona; Bill Williams River NWR, Arizona; and Alamo Lake, Arizona. Activities will include banding, nest monitoring, habitat threat analyses, and microclimate analyses.

System monitoring for yellow-billed cuckoo (D7) will continue at 40 sites along with nest monitoring, banding of young and adults, telemetry, and migration tracking with GPS.

Multi-species surveys to monitor additional avian species covered under the LCR MSCP will continue. Under Work Task D5, the MAPS banding stations will continue to operate at all three conservation areas during the 2015 breeding season. Color banding of LCR MSCP covered species will continue to be implemented to increase the effective recapture rate. The 5-year evaluation will be conducted at the BLCA to determine if it should be continued.

Under Work Task D6, long-term population trends and habitat use of riparian bird species throughout the LCR MSCP program area will continue to be documented. Eighty plots will be surveyed for Arizona Bell's vireo, elf owl, Gila woodpecker, gilded flicker, Sonoran yellow warbler, summer tanager, and vermilion flycatcher.

Work Task D9 will continue. The five permanent acoustic monitoring stations will continue to operate. Data will be collected and analyzed for covered and evaluation species presence during winter and summer peak activity periods. Station data from the five non-LCR MSCP managed sites will be analyzed together with the nine habitat creation area stations (F4) as a single acoustic monitoring network to document trends in LCR MSCP species activity levels across the program area. Archived acoustic data will be organized, analyzed, and compiled so that it may be entered into the LCR MSCP database. California leaf-nosed bat and Townsend's big-eared bat roost outflight counts will continue in the winter and early summer.

The foraging distance study of California leaf-nosed bats and Townsend's big-eared bats will continue. In February, up to 12 California leaf-nosed bats were captured at a known winter roosts and were radio tracked for approximately 2 weeks.

System-wide rodent surveys for covered rodent populations (D10) will continue at sites monitored in FY14. If new potential cotton rat habitat is discovered, monitoring will be conducted to document their presence.

System monitoring is also continuing for the lowland leopard frog and Colorado River toad (D12). Species presence data will be collected within the Bill Williams watershed using visual encounter surveys, tape-playback surveys, digital automated recorders (frog loggers), funnel traps, and eDNA sampling. Surveys for lowland leopard frog will begin in February, and surveys for the Colorado River toad will be conducted in the summer and fall.

Proposed FY16 Activities

System-wide monitoring of marsh birds, southwestern willow flycatcher, yellow-billed cuckoo, bats, rodent populations, lowland leopard frog, Colorado River toad, avian productivity, and riparian birds along the LCR and adjacent river systems will continue in FY16.

Marsh bird surveys (D1) will be conducted along the LCR in Topock Gorge and the upper reaches of Lake Havasu during March, April, and May as part of a multi-agency, system-wide monitoring effort in coordination with the USFWS.

Southwestern willow flycatcher presence/absence surveys (D2) will be conducted at approximately 15 study areas along the LCR, Bill Williams River, Alamo Lake, Virgin River, and other riparian areas in southern Nevada. Life history studies will be conducted at the southern Nevada riparian areas, Bill Williams River NWR, Alamo Lake, and Topock Marsh. Activities will include banding, nest monitoring, and microclimate analyses.

System monitoring for yellow-billed cuckoo (D7) will continue at 40 sites along with nest monitoring, banding of young and adults, telemetry, and GPS migration tracking. Data will be used to help design and manage created habitats (Conservation Area Development and Management [Section E]).

Multi-species surveys to monitor additional avian species covered under the LCR MSCP will continue. Under Work Task D5, collection of natural history data on avian species utilizing restoration sites will continue. In FY16, the work task will be evaluated to see if the information gathered from the MAPS banding stations is meeting system-wide and conservation area monitoring needs.

System-wide surveys under Work Task D6 will not be conducted in FY16. The protocol will be reviewed in light of the results from study and peer reviews, and changes will be made, if necessary, to improve the accuracy of the monitoring methods. Surveys will resume in FY17.

Work Task D9 will continue. The five permanent acoustic monitoring stations will continue to operate, and data will be analyzed for covered and evaluation species presence during winter and summer peak activity periods. Data will also be analyzed using the nine habitat creation area stations. California leaf-nosed bat and Townsend's big-eared bat roost outflight counts will continue in the winter and early summer. The foraging study will continue tracking bats from roosts and foraging areas will be monitored to identify foraging distance of California leaf-nosed bats and roosts associated with some of the conservation areas.

Surveys will be conducted within previously known locations to determine the presence of covered rodent populations (D10). If new potential cotton rat habitat is discovered, monitoring will be conducted to document presence.

System monitoring is also continuing for the lowland leopard frog and Colorado River toad (D12). Species presence data will be collected within the Bill Williams watershed using visual encounter surveys, tape-playback surveys, digital automated recorders (frog loggers), funnel traps, and eDNA sampling. Surveys for lowland leopard frog will begin in February, and surveys for the Colorado River toad will be conducted in the summer and fall. A cost-based analysis will be conducted to compare the five monitoring methods and to identify the best methods to use in subsequent years. The project budget will increase in FY16 to fund this analysis and in FY17 to fund resulting revisions to the monitoring protocols.

Post-Development Monitoring (Section F)

Extensive monitoring of created habitats is necessary to evaluate the implementation and effectiveness of habitat creation projects. To accomplish this task, pre-development monitoring is conducted to document baseline conditions prior to habitat creation. After habitat creation has been initiated, post-development monitoring for biotic and abiotic habitat characteristics is conducted to document implementation success and to record both the maturation of the site as it develops into covered species habitat and the use of the habitat by the covered species.

FY14 Accomplishments

In FY14, post-development monitoring for LCR MSCP covered species use was conducted at nine conservation areas (table 1-12). In general, habitat creation projects are created to establish land cover types with the intent that the

Table 1-12.—LCR MSCP Covered Species Post-Development Monitoring in FY14

Conservation Area	Marsh Birds	Southwestern Willow Flycatcher	Yellow-billed Cuckoo	Other Riparian Birds	Bats	Small Mammals	MacNeill's Sootywing
Beal Lake	X	X	X	X	X	X	NS
Big Bend	X	NS	NS	NS	NS	X	NS
Cibola NWR Unit #1	NS	X	X	X	X	X	NS
Cibola Valley	NS	X	X	X	X	X	X
Hart Mine Marsh	X	NS	NS	NS	NS	NS	X
Hunters Hole	X	X	X	X	X	X	NS
Imperial National Wildlife Refuge	X	NS	NS	NS	NS	NS	NS
Palo Verde Ecological Reserve	NS	X	X	X	X	X	X
Yuma East Wetlands	X	X	X	X	X	X	NS

X = surveyed, and NS = not surveyed.

vegetation is managed for covered species. To evaluate effectiveness in providing these habitat requirements (F1), pre- and post-development monitoring was conducted for targeted covered species, including avian species (F2), small mammals (F3), bats (F4), insects (F6), and marsh birds (F7). Post-development monitoring was also conducted at LCR MSCP conservation areas for southwestern willow flycatchers (D2) and yellow-billed cuckoos (D7) under system-wide work tasks.

During system-wide surveys for yellow-billed cuckoos (D7), 54 yellow-billed cuckoo territories were confirmed at LCR MSCP conservation areas, 49 at the PVER (Phases 4–7), 1 at the CVCA (Phase 2), and 4 at Cibola NWR Unit #1 (Crane Roost and Nature Trail).

One possible resident willow flycatcher was observed at LCR MSCP conservation areas in FY14 (D5). The willow flycatcher was detected at the BLCA in the same general area on three consecutive visits from May 21 to June 2. Neither territorial behaviors nor any bands were observed, making it impossible to confirm that the bird detected on each visit was the same individual, but because it was detected in the same area on each visit over a span of more than 7 days, it was considered resident, and the site was considered occupied in 2014. A second flycatcher was detected on July 7 at the PVER, but this individual was detected very briefly and

did not display territorial behavior, and it was likely not a resident flycatcher. Two additional willow flycatchers were detected at the BLCA on May 21 and one flycatcher on May 27 for which residency status could not be confirmed.

LCR MSCP covered riparian bird species and other territorial breeding birds were documented at each conservation area (F2).

- *BLCA* – There were 102 pairs of territorial breeding birds comprising 17 species detected. These included 8 pairs of Sonoran yellow warbler, 13 pairs of Arizona Bell's vireo, and 2 pairs of summer tanager.

- *Cibola NWR Unit #1* – There were 192 pairs of territorial breeding birds comprising 28 species detected. These included four pairs of Arizona Bell's vireo and one Sonoran yellow warbler pair.

- *CVCA* – There were 237 pairs of territorial breeding birds comprising 18 species detected. No LCR MSCP covered species were detected breeding at the CVCA.

- *PVER* – There were 410 pairs of territorial breeding birds comprising 25 species detected. These included five pairs of Sonoran yellow warbler.

- *Yuma East Wetlands* – There were 223 pairs of territorial breeding birds comprising 26 species detected. No LCR MSCP species were detected breeding at Yuma East Wetlands.

- *Hunters Hole Conservation Area* – A few pairs of territorial birds were detected. No LCR MSCP covered species were detected breeding at Hunter's Hole Conservation Area.

Live trapping surveys to detect Colorado River cotton rats and Yuma hispid cotton rats were conducted in the fall of 2013 and the spring of 2014. Cotton rats were captured within all areas except the BLCA and Hunters Hole Conservation Area. All cotton rats captured at the BBCA, PVER, CVCA, and Cibola NWR Unit #1 were Colorado River cotton rats. Cotton rats captured at Yuma East Wetlands were Yuma hispid cotton rats.

Bat presence was monitored at conservation areas and the 'Ahakhav Tribal Preserve demonstration site (F4). Acoustic monitoring detected all four LCR MSCP species at all sites except Hunters Hole Conservation Area, which did not have an acoustic detection of California leaf-nosed bat. Capture surveys were conducted at five LCR MSCP conservation areas (BLCA, PVER, CVCA, Cibola NWR Unit #1, and Yuma East Wetlands) and at the 'Ahakhav Tribal Preserve. Western red bats were captured at the PVER and CVCA. Western yellow bats

were captured at the ‘Ahakhav Tribal Preserve, PVER, CVCA, Cibola NWR Unit #1, and Yuma East Wetlands. California leaf-nosed bats were captured at all five sites. Townsend’s big-eared bats were captured at the BLCA.

MacNeill’s sootywings were monitored (F6) at PVER Phases 4 and 6, the CVCA, and Hart Mine Marsh. Sootywings were detected at all sites despite variable quail bush plant height and width. Adults and larvae were detected at all four conservation areas, and eggs were found at both PVER locations.

Marsh bird surveys were conducted at the BBCA, Hart Mine Marsh, and Field 18 in the IPCA. California black rails were detected at the IPCA in Field 18. Least bitterns were detected at Hart Mine Marsh, the IPCA in Field 18 and Pond 5, Beal Lake, and Yuma East Wetlands. Yuma clapper rails were detected at Hart Mine Marsh, the IPCA in Field 18 and Pond 5, and Yuma East Wetlands.

FY15 Activities

Post-development monitoring for LCR MSCP covered species continues to be conducted at several conservation areas to evaluate how effective the program has been in providing the habitat requirements (F1) in conservation areas. Activities will focus on avian species (F2), small mammals (F3), bats (F4), insects (F6), and marsh birds (F7). Pre-development surveys will be conducted for any new conservation areas.

FY16 Proposed Activities

Post-development monitoring for LCR MSCP covered species will be conducted at several conservation areas to evaluate how effective the program has been in providing the habitat requirements (F1) in conservation areas. Activities will focus on avian species (F2), small mammals (F3), bats (F4), insects (F6), and marsh birds (F7). Pre-development surveys will be conducted for any new conservation areas.

Adaptive Management Program (Section G)

Under the LCR MSCP AMP, uncertainties encountered during implementation of the conservation measures outlined in the HCP will be addressed. The program has three central components: (1) gauging the effectiveness of existing conservation measures, (2) proposing alternative or modified conservation measures as needed, and (3) addressing changed and unforeseen circumstances.

The *Final Science Strategy* details the AMP process for the research and monitoring programs at project and programmatic levels. A 5-year planning cycle has been identified to allow for the receipt of new information, the analysis of that information, and the incorporation of the new information into the design or

direction of future work tasks. The 5-year planning cycle will allow for a review of past activities and the setting of priorities for the next 5-year cycle. The *Final Five-Year Monitoring and Research Priorities for the Lower Colorado River Multi-Species Conservation Program: 2013–2017* was completed in FY12.

Implementation of the AMP to address uncertainties, evaluate effectiveness of research and monitoring activities, and improve management is allocated under Work Task G4. Data Management (G1) is an integral component of any conservation program, including the LCR MSCP. Funds are allocated to design a data management system capable of tracking all information needed in the decisionmaking process. Funding allocated under Work Task G3 to begin research studies identified as priorities, when applicable, will continue.

In FY13, the need for CEMs for the southwestern willow flycatcher and yellow-billed cuckoo was identified to provide a framework that includes the current scientific literature and data needed to establish a common understanding of the species' life history and habitat needs in the context of LCR MSCP management goals. Additionally, these CEMs will help direct future research and monitoring projects by focusing research questions and data collection on those environmental variables that are most informative to management and important to the success of the program.

FY14 Accomplishments

The southwestern willow flycatcher and yellow-billed cuckoo CEMs were completed (G3) in early FY14. Through this process, the program identified the need to update the model with additional habitat characteristics documented in areas outside the LCR MSCP planning area to provide the full suite of habitat characteristics the species used in the Southwestern United States. Both CEMs were being updated with this new information and are expected to be completed in FY15. CEM development for Yuma clapper rail, California black rail, western least bittern, western red bat, western yellow bat, Colorado River cotton rat, Yuma hispid cotton rat, elf owl, gilded flicker, Gila woodpecker, vermilion flycatcher, Arizona Bell's vireo, Sonoran yellow warbler, summer tanager, and MacNeill's sootywing (G4) have been identified and will be developed in FY15.

In FY14, recommendations for three minor modifications to conservation measures were approved by the Steering Committee on April 23. The western yellow bat research and monitoring activities provided habitat information to adjust the conservation measure (WYBA1) to include the creation of roosting "or foraging" habitat since western yellow bats primarily roost in palm trees and forage in cottonwood-willow habitats. Research and monitoring for the Arizona Bell's vireo provided more understanding of the variety of structural types the species uses. The conservation measure (BEVI1) was adjusted to include cottonwood-willow structure types I and II to the current III and IV. The

Colorado River cotton rat monitoring supported the CRCR2 conservation measure to be adjusted to include cottonwood-willow and mesquite habitats since the species has been routinely found in all riparian habitats.

External program reviews were conducted on the vegetation monitoring project, yellow-billed cuckoo project, and bat monitoring program. Based on the review, the vegetation monitoring protocol and sampling design were refined to provide targeted information for management decisions needed to accomplish species-specific conservation measures. These recommendations were implemented, and vegetation monitoring was conducted in a spatially randomized approach targeting areas where the vegetation structure and soils were more consistent with southwestern willow flycatcher and yellow-billed cuckoo habitat characteristics. An external review of the bat research and monitoring program was completed, and recommendations are currently being evaluated through the adaptive management process. Through an external review of yellow-billed cuckoo projects, it was recommended that, in lieu of collecting additional habitat data, existing data and current literature be used and management questions be identified before conducting additional habitat research and monitoring. The recommendations were implemented, and yellow-billed cuckoo habitat research and monitoring will be conducted programmatically through the work being done under Work Tasks F1and C60.

A standardized structure to collect and store data for species and their habitat continued to be created. Automation of data collection was used where appropriate to reduce errors. Documentation of data collection processes using mobile units was provided after specific MEFFs were developed. These forms ensured collected data are consistent. Database module development and management continued in FY14 for the southwestern willow flycatcher (D2 and F2), yellow-billed cuckoo (D7 and F2), bats (D9 and F4), vegetation (F1), and avian species for (D6 and F2). MEFFs were developed, and testing began for southwestern willow flycatcher, yellow-billed cuckoo, MacNeill's sootywing (F6), cotton rat (D10 and F3), lowland leopard frog and Colorado River toad studies (C62 and D12), and bat telemetry monitoring projects (C43). A review of the data collection processes for the southwestern willow flycatcher and yellow-billed cuckoo for remaining modules continued, and remaining MEFFs will be developed for testing in the FY15–16 field season.

FY15 Activities

In FY15, CEM (G4) development continues for Yuma clapper rail, California black rail, western least bittern, western red bat, western yellow bat, Colorado River cotton rat, Yuma hispid cotton rat, elf owl, gilded flicker, Gila woodpecker, vermilion flycatcher, Arizona Bell's vireo, Sonoran yellow warbler, summer tanager, and MacNeill's sootywing. After a literature review, additional information identifying potential habitat characteristics outside the LCR MSCP

planning area, such as the Rio Grande River, have been added to the FY14 southwestern willow flycatcher and yellow-billed cuckoo CEMs and will be completed in FY15.

Following the independent bat research and monitoring program review, through the adaptive management process, research and monitoring will be narrowed to covered and evaluation species and to peak activity periods in FY15. A review of avian system monitoring (D6) will be conducted in FY15. Review of the elf owl study plan is being conducted to support collection of distance of riparian habitat that can be incorporated through the adaptive management process. A standardized structure to collect and store data for species and their habitat continues to be created. Automation of data collection is used where appropriate to reduce errors. Documentation of data collection processes using mobile units are provided after specific MEFFs are developed. These forms ensure collected data are consistent.

Database development and management modules continues in FY15 on the southwestern willow flycatcher (D2 and F2), yellow-billed cuckoo (D7 and F2), bats (D9 and F4), vegetation (F1), cotton rats (D10 and F3), and avian species (D6 and F2). Review and testing of the data collection processes for the remaining data collection modules for southwestern willow flycatcher, yellow-billed cuckoo, MacNeill's sootywing (F6), lowland leopard frog and Colorado River toad studies (C62 and D12), and bat telemetry monitoring projects (C43) will continue.

Funding allocated under Work Task G3 to begin research studies identified as priorities, when applicable, will continue. The evaluation of water management requirements listed in Conservation Measures CLRA1 and LEBI1 (no more than 12 inches deep) and BLRA1 (no greater than 1 inch deep) has been identified as a priority in FY15. Reconnaissance surveys using existing locations will be used to prepare a study plan for further evaluation of Yuma clapper rail, California black rail, and least bittern water management characteristics at the patch scale and at larger manageable scales.

FY16 Proposed Activities

In FY16, technical, independent, and peer reviews of wildlife projects and habitat monitoring will continue under the AMP. CEMs will be completed for inclusion into the adaptive management process. LCR MSCP database structure development and creation of MEFFs will continue, with other species data modules being constructed on a priority basis. Funding allocated under Work Task G3 to begin research studies identified as priorities, when applicable, will continue.

CONSERVATION AREA DEVELOPMENT, MAINTENANCE, AND ADAPTIVE MANAGEMENT

A major component of the LCR MSCP is the creation and management of habitat. Conservation Area Development and Management (Section E) addresses the identification, selection, development, and management of created habitat and any restoration research being conducted. In general, habitat creation projects target land cover types with the intent that the vegetation is managed for or developed into a species-specific habitat for covered species.

Cottonwood-willow, honey mesquite, marsh, and backwater are the predominant land cover types to be created under the LCR MSCP. For terrestrial and marsh land cover types, trees, shrubs, and ground cover are typically planted or seeded to create the desired type. For backwater land cover types, which include open water and associated emergent marsh, the habitat is defined by the evaluation of the physical, chemical, and biological conditions suitable for the establishment and maintenance of healthy populations of fish and other species associated with backwaters. Maturation and management of the land cover types ultimately create the habitat.

As described in the HCP, habitat creation goals for the LCR MSCP include establishing:

1. 5,940 acres of cottonwood-willow
2. 1,320 acres of honey mesquite
3. 512 acres of marsh
4. 360 acres of backwater
   8,132 total acres

To the extent practicable based on site conditions, cottonwood-willow, honey mesquite, marsh, and backwaters will each be restored in proximity to other land cover types to create integrated mosaics of habitat that approximate the relationships among aquatic and terrestrial communities historically present along the LCR flood plain. The selection process is described in the *Draft Guidelines for the Screening and Evaluation of Potential Conservation Areas*, which is available on the LCR MSCP Web site. These conservation areas are discrete areas of conserved habitats managed as a single unit under the LCR MSCP. Conservation areas include LCR MSCP created habitats as well as buffer areas and other lands that may be included in the conservation area design. Conservation areas developed primarily for riparian and marsh species followed a different selection and evaluation process from those established primarily for native fish. The costs associated with development and implementation of the guidelines were captured in Work Task E15 (closed) and E16. Starting in FY13,

the effort to select riparian, marsh, and backwater conservation areas has been captured under Work Task E16 to reflect the intended integration of all land cover types whenever feasible.

Conservation areas developed primarily for riparian and honey mesquite land cover types such as the PVER (E4), CVCA (E5), and Cibola NWR Unit #1 (E24) involve the conversion of existing land cover types (such as active agricultural, fallow agricultural, and undeveloped land) to native riparian species.

Restoration research priorities were developed in accordance with the *Final Science Strategy*. The requirements included methods to cost effectively establish and manage planned land cover types while limiting growth of non-native plant species. Terrestrial restoration research projects included those under Work Tasks E1, E3 (closed), E6 (closed), E7 (closed), E8 (closed), and E34.

Conservation areas that are being developed primarily as disconnected backwaters for native fish prioritize: (1) delivery of 100% non-native fish-free replacement water and (2) the ability to completely drain and renovate the ponds without the use of piscicides. The program recognizes there is value in connected backwaters, and creation of connected backwaters is an option in Reaches 3–5. Backwaters created in Reach 3 will continue to be connected to the main stem river to address the life history requirements of the flannelmouth sucker. Restoration research priorities for backwater development are expected to include researching the screening of water to exclude non-native fish, maintaining water quality in isolated backwaters, and controlling non-native fish species.

Developing, maintaining, and managing the appropriate habitats as dictated by the conservation measures presents several challenges. Present flow regimes on the LCR have been altered considerably from dynamic pre-development flows. Introduced and invasive species exist throughout the program area. Approaches to habitat creation must not only acknowledge the differences from historical conditions but must also be able to work effectively within the context of current conditions. In addition, existing knowledge and practices must be incorporated to take advantage of appropriate available technologies. An example of this as applied to riparian habitat creation is the use of agricultural technology and infrastructure to deliver water and simulate flooding events for riparian habitat creation projects.

To meet these challenges and the goals of the LCR MSCP, five components of habitat creation have been developed: (1) site identification, (2) site selection, (3) development, (4) maintenance, and (5) adaptive management of conservation areas. The following sections describe the distinctions between the components of habitat creation and how they are interconnected within the context of an adaptive management approach.

Site Identification and Selection

A logical process for identifying and selecting locations for habitat creation projects contributes to the overall success of the LCR MSCP. In general, ideal sites are those that have the greatest potential for successfully achieving the desired habitat in the most cost-effective manner. Although this objective appears obvious, it is obscured by a number of variables that can affect both cost-effective development and habitat success: (1) logistical: site accessibility, available infrastructure, and availability of sufficient resources (water); (2) physical: depth to groundwater, soil texture and chemistry, water quality, and eutrophic stage; and (3) political: potential impacts to other species or habitats, permitting requirements, and landowner/partner support. This represents only a portion of the known variables that must be considered when identifying and selecting sites, as unforeseen factors can contribute to greater costs and may limit success in habitat creation. As the program proceeds, this newly acquired knowledge will be incorporated into the site selection processes. Appropriate adaptations are being made through the AMP to properly address and apply newly acquired information, allowing for more accurate assessment of development costs and success potential for future habitat creation projects.

FY14 Accomplishments

LCR MSCP staff attended and contributed at numerous meetings held with other resource agencies and Tribal entities. Meetings were conducted with USFWS representatives from all four refuges on the LCR (Bill Williams River, Cibola, Havasu, and Imperial), two Complex Refuge Managers, and staff from both the Ecological Services and the Arizona Fisheries Research Office of the USFWS. One issue identified during these meetings was the need to upgrade the aging infrastructure that is shared by the Cibola NWR and the LCR MSCP. The USFWS agreed to provide funding up to $500,000 to upgrade the pumps and pump stands at both Cibola NWR Unit #1 and Hart Mine Marsh. Additional LCR MSCP funds necessary to complete the replacement and implementation of the upgrades will be provided.

Conservation Areas

The CDFW and LCR MSCP have partnered with the California Wildlife Board, Trust for Public Land, and The Conservation Fund to identify lands within the State of California that could be secured and developed as conservation areas under the LCR MSCP. The potential acquisitions range in size from small, undeveloped parcels (less than 10 acres) to large parcels over 2,000 acres in size. Securing additional acreage for restoration of marsh and backwaters within California is a high priority at this time.

California Lands

PVER-South. Two adjacent landowners have been contacted and have expressed an interest in selling small, undeveloped parcels that would expand the footprint of PVER-South. During the due diligence portion of a potential land acquisition, some discrepancies in the title documentation were discovered. These discrepancies were being discussed with the landowners and the California State Lands Department, but a resolution has not been reached.

PVID Lands. Unfortunately, an agreement to acquire a large tract of agricultural lands in the southern portion of the PVID could not be reached, and negotiations have ended.

Mohave Valley Lands. Approximately 1,600 acres of land located just south of the Avi Casino in California was considered for purchase. During negotiations with the landowner, the property, a mix of undeveloped land, fallow agricultural land, and a small backwater, were sold to a developer in Needles.

Reach 3 Backwaters

Mohave Valley Conservation Area (MVCA). Development and construction of the MVCA, 56 acres of open water and emergent marsh, along with planting approximately 34 acres of cottonwood-willow and mesquite habitats, was expected to result in approximately 90 acres of native land cover types. A survey of the parcel was conducted to establish new control points and develop elevation contours. Additionally, a temporary gauging station was installed to monitor river stage. These data, in conjunction with the site elevation data, will be used to determine the volume of material that will need to be excavated. A preliminary design drawing was completed. The National Environmental Policy Act (NEPA)/ California Environmental Quality Act (CEQA) permitting process and the U.S. Army Corps of Engineers 404 application were started.

Needles Lagoon. A feasibility report for the backwater was developed and presented to both the city of Needles and the Fort Mohave Indian Tribe. The report reviewed the location and site characteristics, proposed a design and layout for the backwater based on the species-specific conservation measure FLSU2 for the flannelmouth sucker, discussed the design for both the inlet and outlet structures, assessed potential sediment and flood runoff dynamics, and provided a cost estimate for construction and maintenance of the backwater. Although the lagoon does have the potential to be restored, the high cost and technical issues associated with the site do not make it viable at this time. Should conditions change or the priorities of the program be altered, the project may be revised and re-evaluated for implementation at a later date.

Other Lands

Planet Ranch. Negotiations to secure the land (3, 418 acres) and water resources (4,668 acre-feet) for the project located on the Bill Williams River continued; specifically, final details of the lease, donation, and water agreements. NEPA compliance was initiated.

In support of the acquisition, the AGFD Commission approved the acquisition of Planet Ranch in August 2014. Legislation directing the Secretary of the Interior to enter in an agreement for the acquisition of Planet Ranch was signed in December 2014.

Virgin River. The Virgin River lands owned by the NDOW on the Overton WMA have been identified for potential restoration. For safety reasons, the data loggers installed in FY13 are no longer monitored. Data collection may resume at a later date.

FY15 Activities

Conservation Areas

Coordination with resource agencies and attendance at planning meetings is expected to be similar to efforts in FY14. A workshop with representatives of the California parties is anticipated to evaluate the status of establishing new conservation areas within the State of California. Activities will focus on the identification and evaluation of potential conservation areas primarily in California.

The *Pretty Water Conservation Area* (PWCA) (E33), formerly known as the Shark's Tooth Conservation Area, was identified by the selection process, approved by the Steering Committee, and will be restored in FY15. Once complete, the conservation area is expected to provide over 500 acres of honey mesquite in California.

Implementation of the *MVCA* (E34) in Reach 3 will begin. The 56-acre backwater project is located in California near the town of Needles. Drafting of a site-specific Restoration Development and Monitoring Plan for PVER-South is still anticipated; however, it will likely be delayed until ownership issues can be resolved.

A workshop with representatives of the California parties was held to evaluate the status of establishing new conservation areas within the State of California. The following two potential conservation areas are being evaluated: 3 Fingers Lake and Davis Lake. The two lakes are located on the Cibola NWR.

Planet Ranch

A land and water resolution, including the details of the acquisition, was approved by the Steering Committee on April 22, 2015

Backwaters

PVER-South. Negotiations and due diligence for the adjacent undeveloped lands is continuing. We anticipate resolution of landownership, and surveying of property boundaries and initiation of the appraisal process will begin. Pending a successful negotiation, a land and water resolution would be brought to the Steering Committee for approval.

Parker Dam Camp. The process of evaluating techniques to utilize the return flow from Gene Reservoir to create backwaters and establish riparian habitat is continuing.

FY16 Activities

Coordination with resource agencies and attendance at planning meetings is expected to be similar to efforts in FY15. The identification and selection of marsh and backwater projects within the State of California will continue to be a priority.

Parker Dam Camp

A Restoration Development and Monitoring Plan is expected to be drafted and submitted to the Steering Committee. The plan would identify the technique to capture drainage from Gene Reservoir, as well as the restoration concept, which is expected to include 20 acres of backwater and a small riparian component.

3 Fingers Lake

This lake was identified during a workshop with representatives of the California parties in FY15 and has the potential to provide both backwater and marsh land cover types to the program. The lake is located on Cibola NWR within the State of California on lands owned by the USFWS. A Restoration Development and Monitoring Plan is expected to be drafted and submitted to the Steering Committee. Expenditures would include topographic surveying, design, creating a water budget, and drafting of the development plan.

Davis Lake

This lake was also identified during a workshop with representatives of the California parties in FY15. The concept being evaluated includes creation of a shallow marsh similar in size to Hart Mine Marsh. The lake is located on the Cibola NWR within the State of California on lands owned by the USFWS. A Restoration Development and Monitoring Plan may be drafted and submitted to the Steering Committee. Expenditures would include topographic surveying, design, creating a water budget, and drafting of the development plan if necessary.

Figure 1-1 depicts the geographical distribution of 11 established conservation areas as well as 2 potential conservation areas (Planet Ranch and the MVCA) that are being evaluated for inclusion into the LCR MSCP. Figures 1-2 through 1-14 depict each conservation area. Acreage proposed for development, but not yet restored, is shown in yellow. Acreage already restored or stabilized is considered managed and is shown in green. Lands managed by LCR MSCP partners are shown in brown.

Development and Maintenance

Habitat development and maintenance are strongly connected. Created habitat is achieved through the process of development, establishment, and modification of the site, and growth (maturation) of the land cover type. Subsequent management of that land cover type either maintains the specific requirements necessary for that created habitat or moves that land cover type toward achievement of those specific habitat requirements.

Habitats, both aquatic and terrestrial, are dynamic. They are better described as a continuum rather than a stage of development or succession. By using knowledge gained from research, demonstrations, and experience, sites with the greatest potential for success can be identified, and the most effective designs and approaches can be employed to create the targeted cover type.

In the context of current conditions, achieving the desired habitat under the LCR MSCP calls for establishing and managing for a snapshot in time and ecological succession, which may require actively creating disturbances to reset or maintain the land cover type in the proper seral stage (in the case of some riparian habitat). For a backwater, it may involve removing organic matter from the bottom surface to reduce biological oxygen demand and maintain acceptable levels of water quality. In any case, habitat creation does not necessarily end with the establishment of the proper vegetation type or isolation of a backwater.

Over the course of identifying and selecting sites, conducting research studies and demonstration projects, and developing and managing created land cover types, information is gathered that may help to better understand these processes. This feedback, in turn, may serve to modify site selection or establishment approaches for future projects. The information can also reveal program needs not previously anticipated. For example, during collections for Work Task E7 (closed), it became apparent that establishment of native plant nurseries would be needed to supply an adequate source of cuttings for future large-scale propagation and establishment of riparian vegetation. A centralized location with an easily accessible supply of riparian species would also reduce the time and costs associated with collection. These nurseries were incorporated into the phased development plans for Work Tasks E4 and E5.

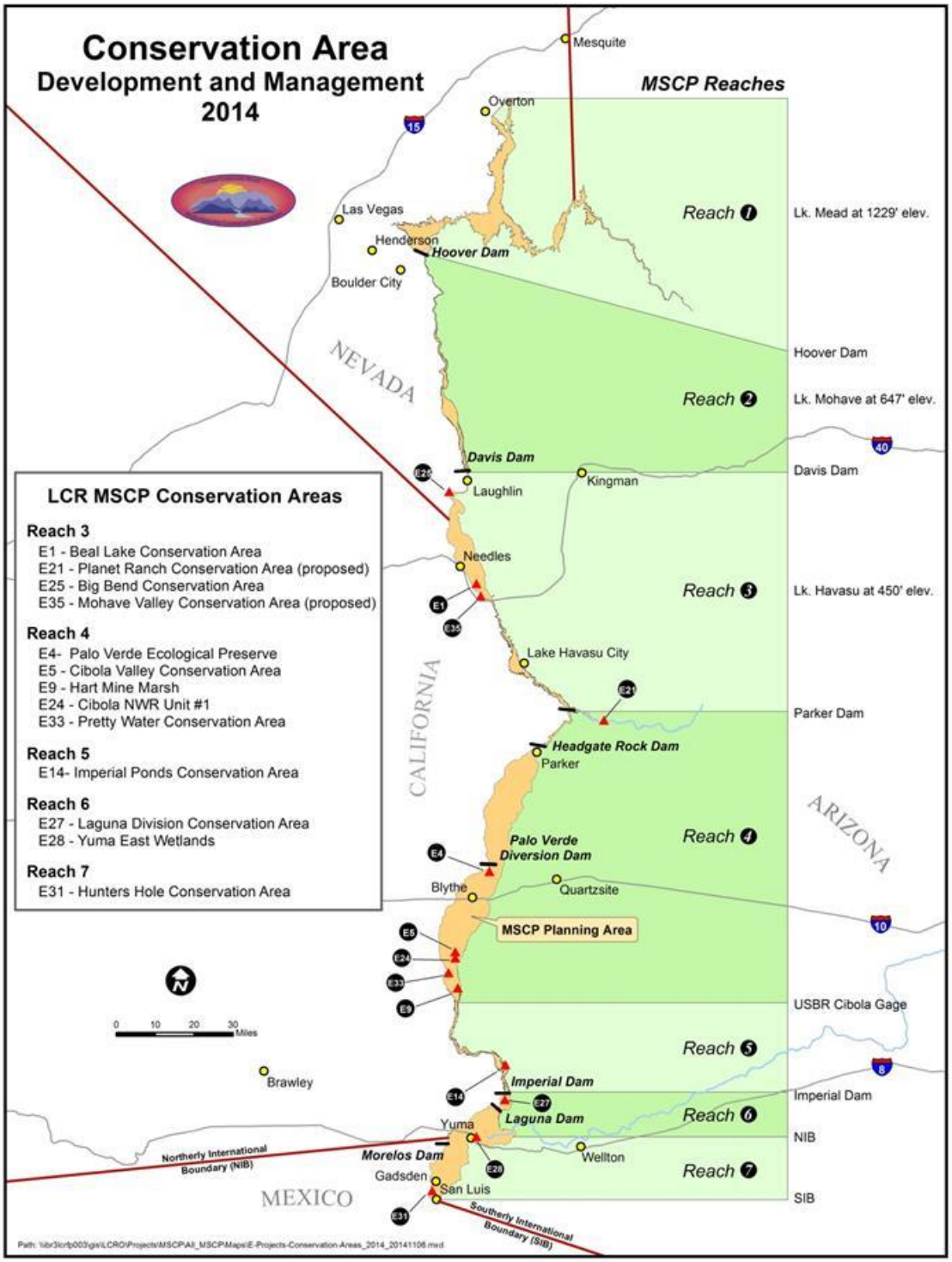


Figure 1-1.—Conservation area development and management, 2014.

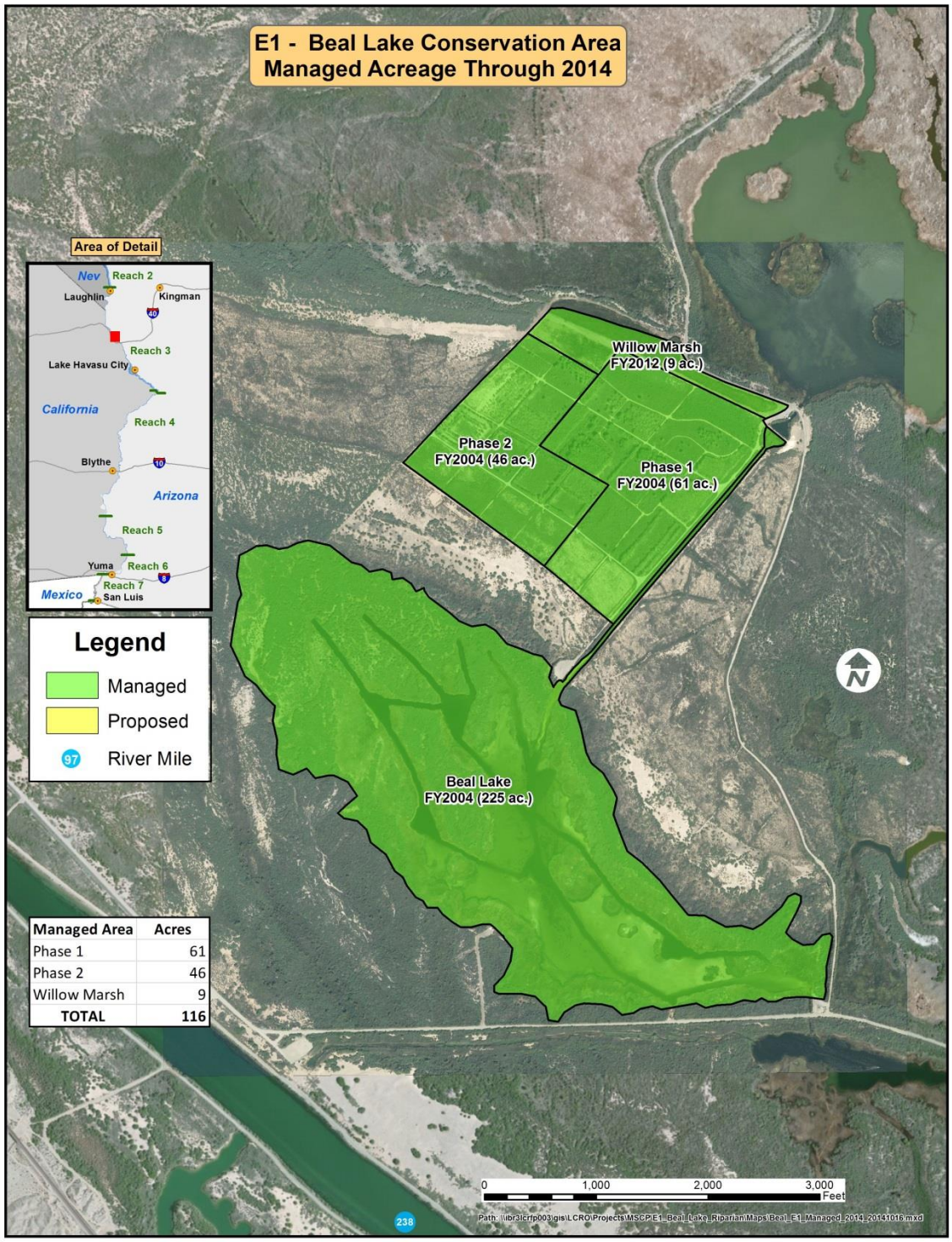
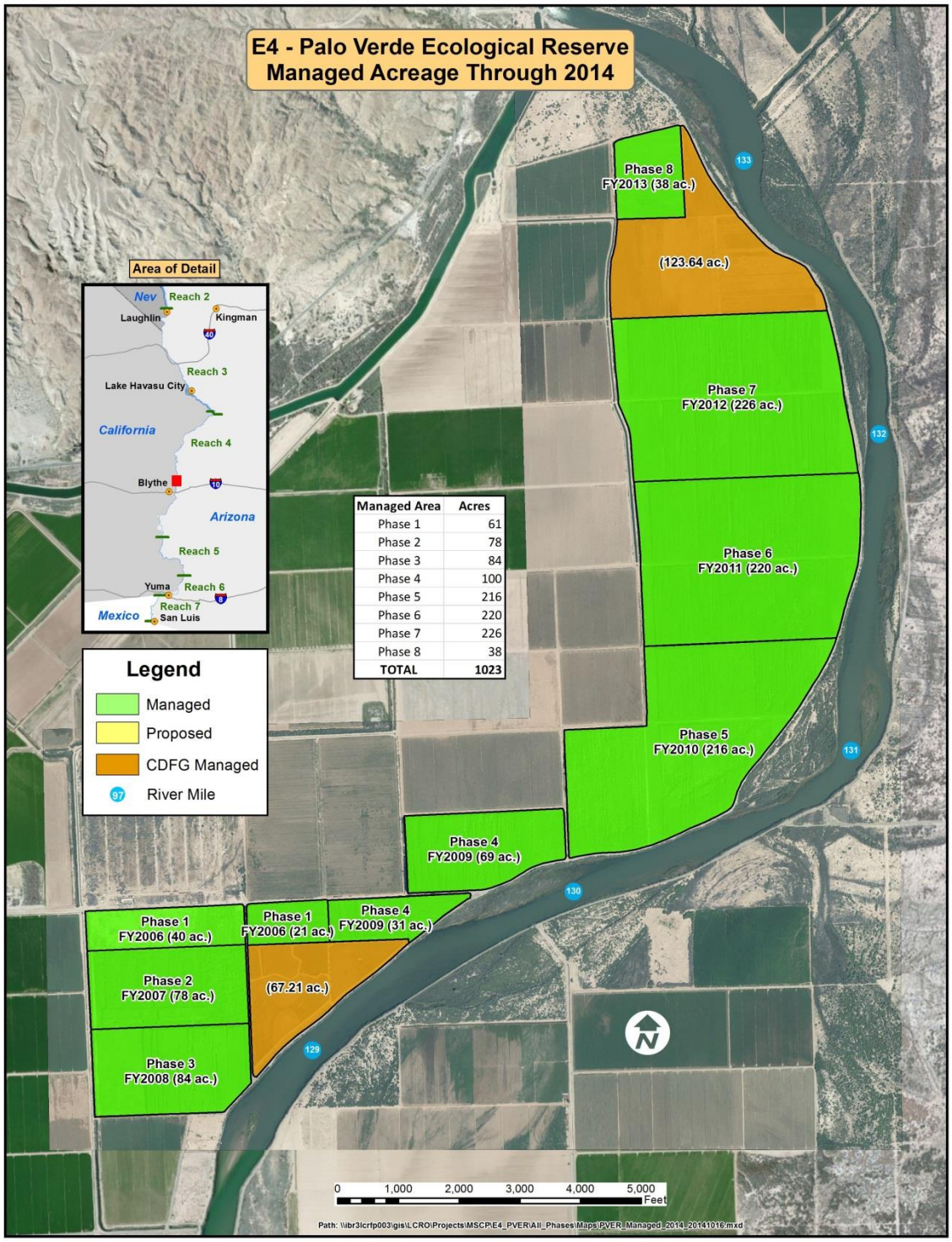


Figure 1-2.—E1 – Beal Lake Conservation Area managed acreage through 2014.



Managed Area	Acres
Phase 1	61
Phase 2	78
Phase 3	84
Phase 4	100
Phase 5	216
Phase 6	220
Phase 7	226
Phase 8	38
TOTAL	1023

Figure 1-3.—E4 – Palo Verde Ecological Reserve managed acreage through 2014.

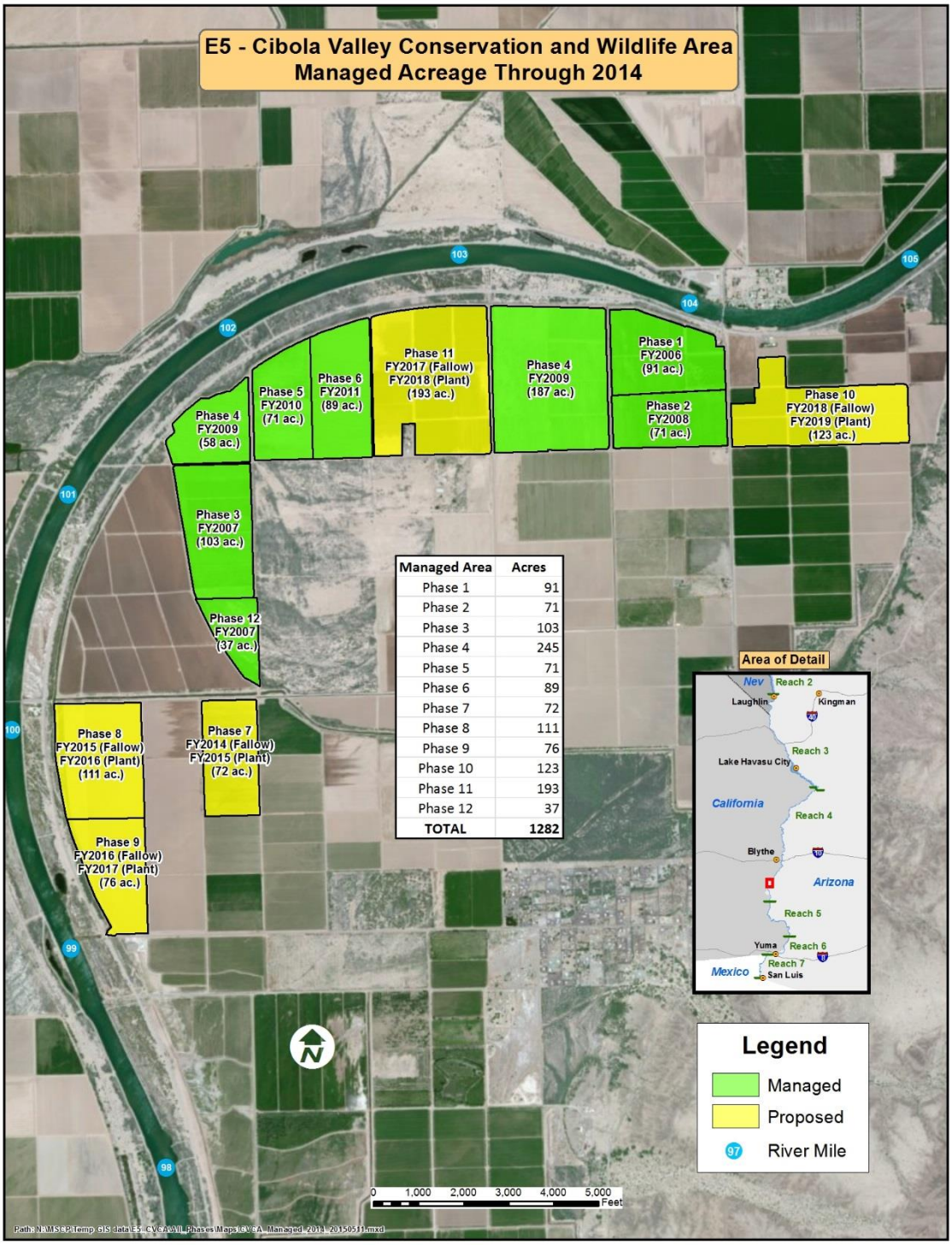


Figure 1-4.—E5 – Cibola Valley Conservation Area managed acreage through 2014.

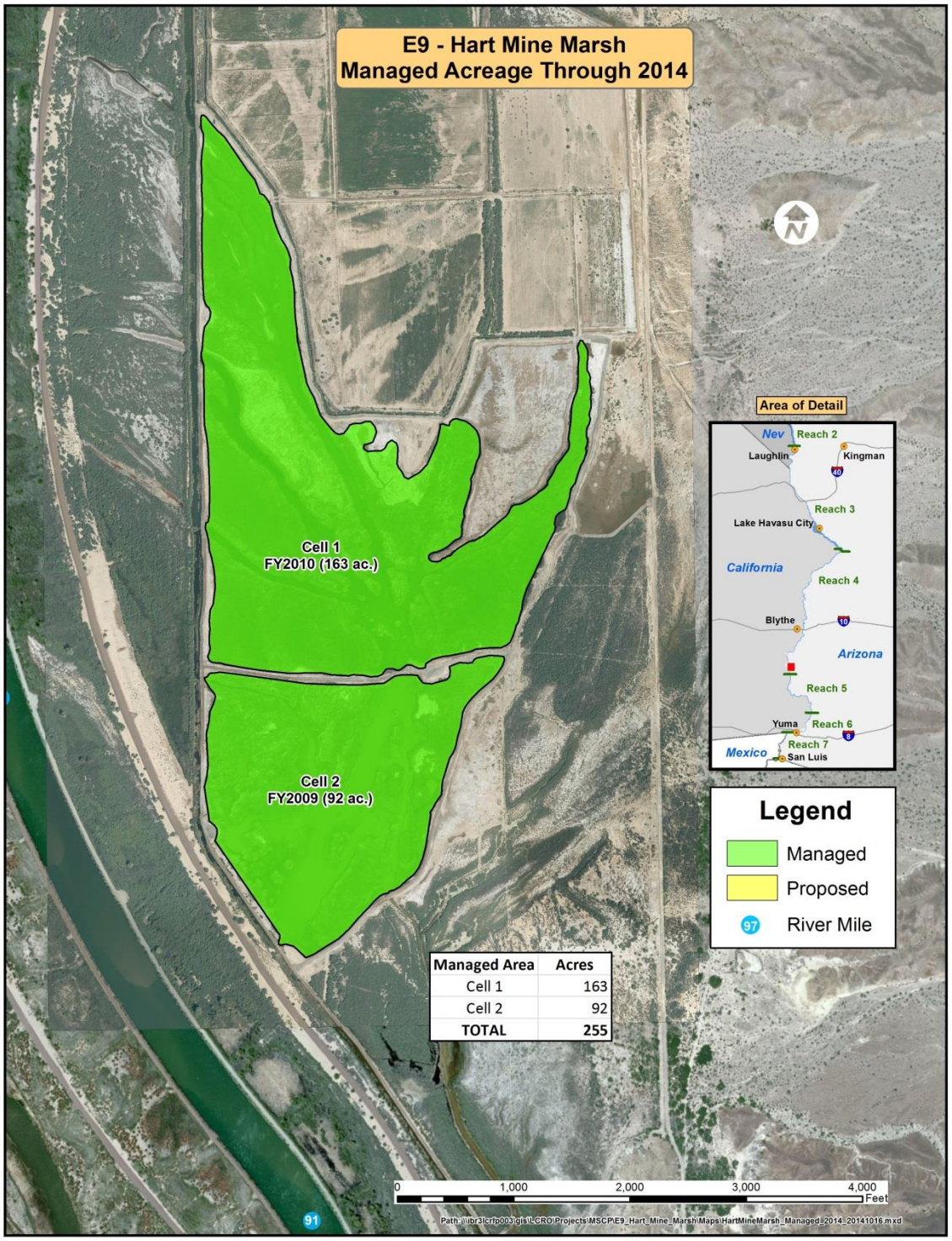


Figure 1-5.—E9 – Hart Mine Marsh managed acreage through 2014.

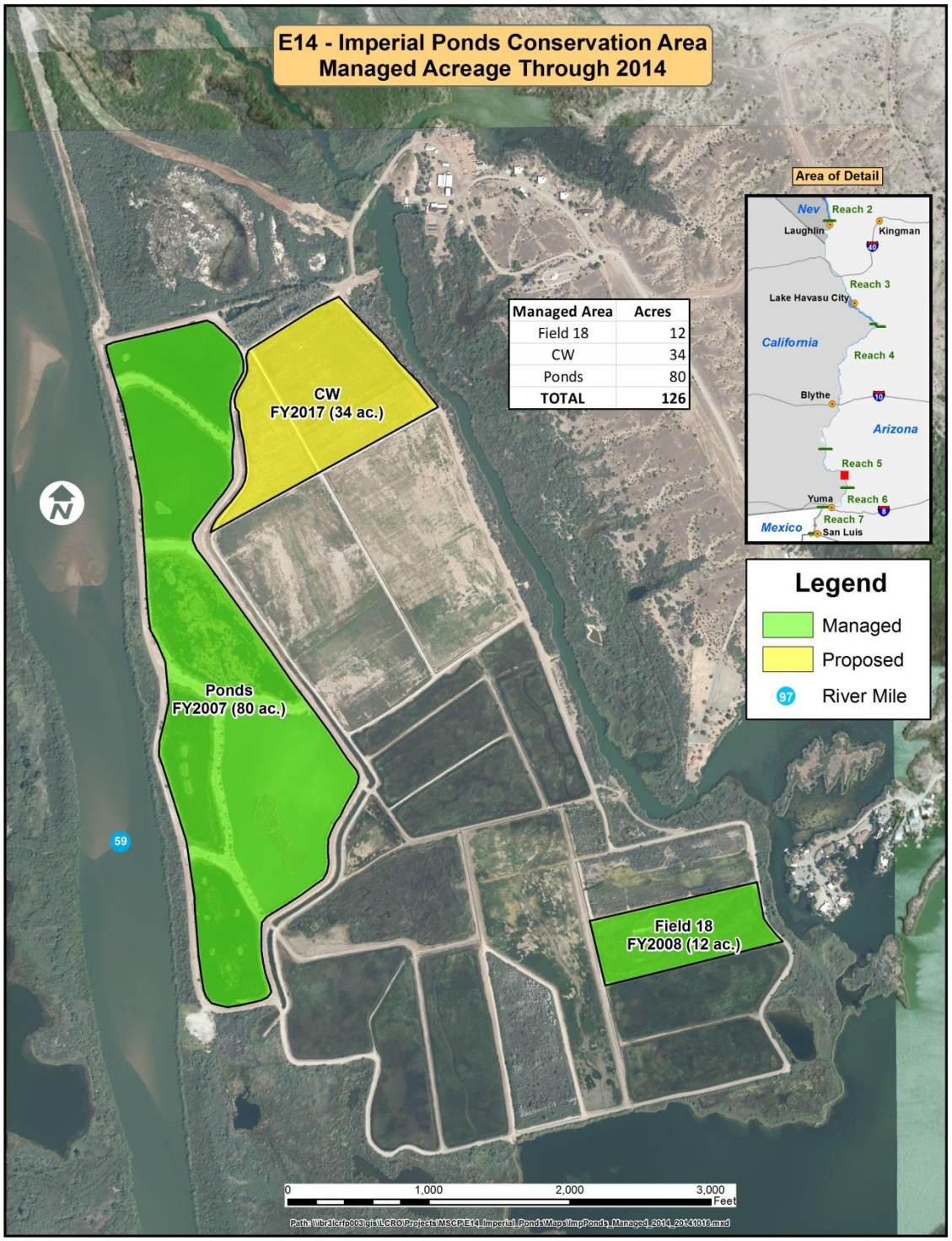


Figure 1-6.—E14 – Imperial Ponds Conservation Area managed acreage through 2014.

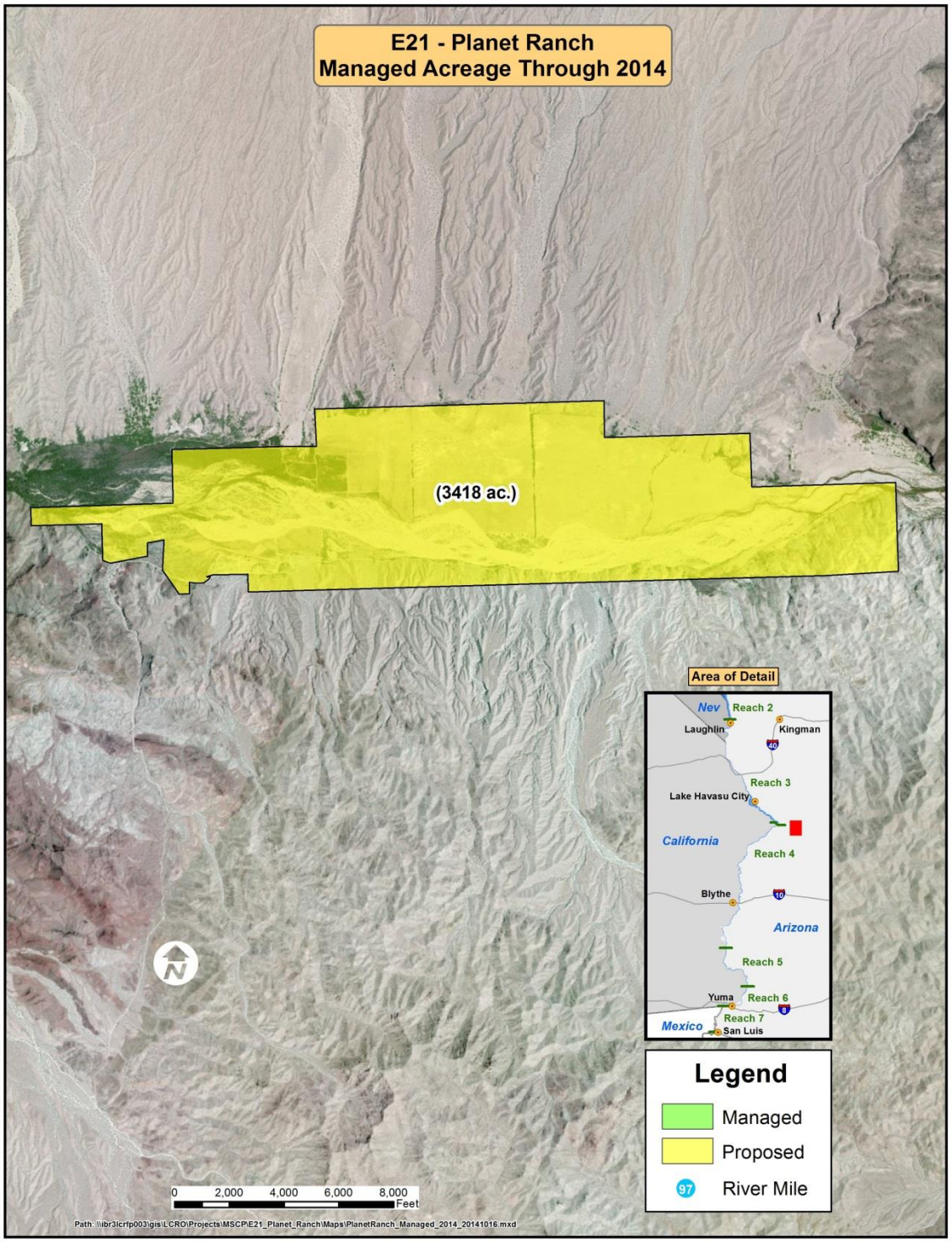


Figure 1-7.—E21 – Planet Ranch, Bill Williams River managed acreage through 2014.

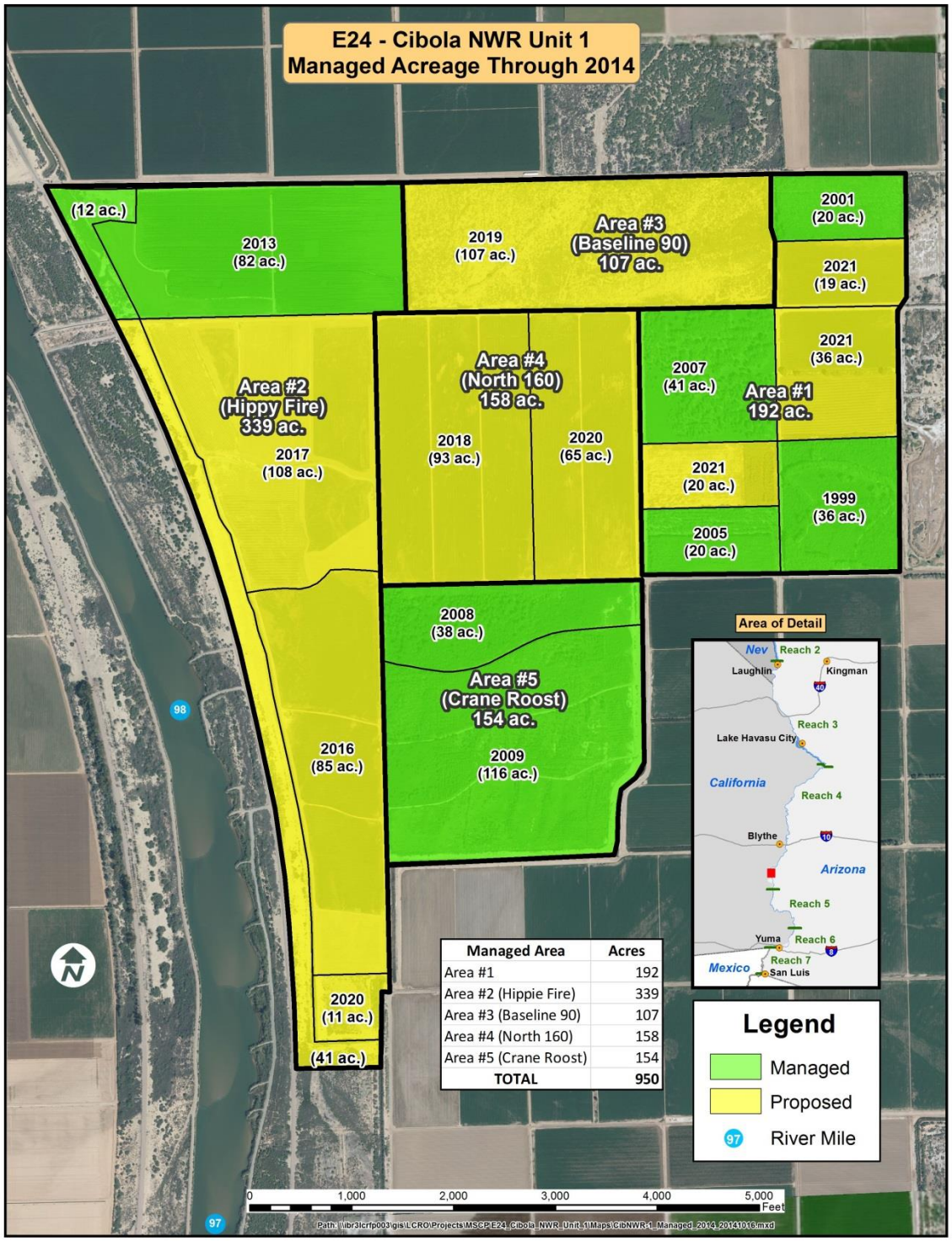


Figure 1-8.—E24 – Cibola National Wildlife Refuge Unit #1 managed acreage through 2014.

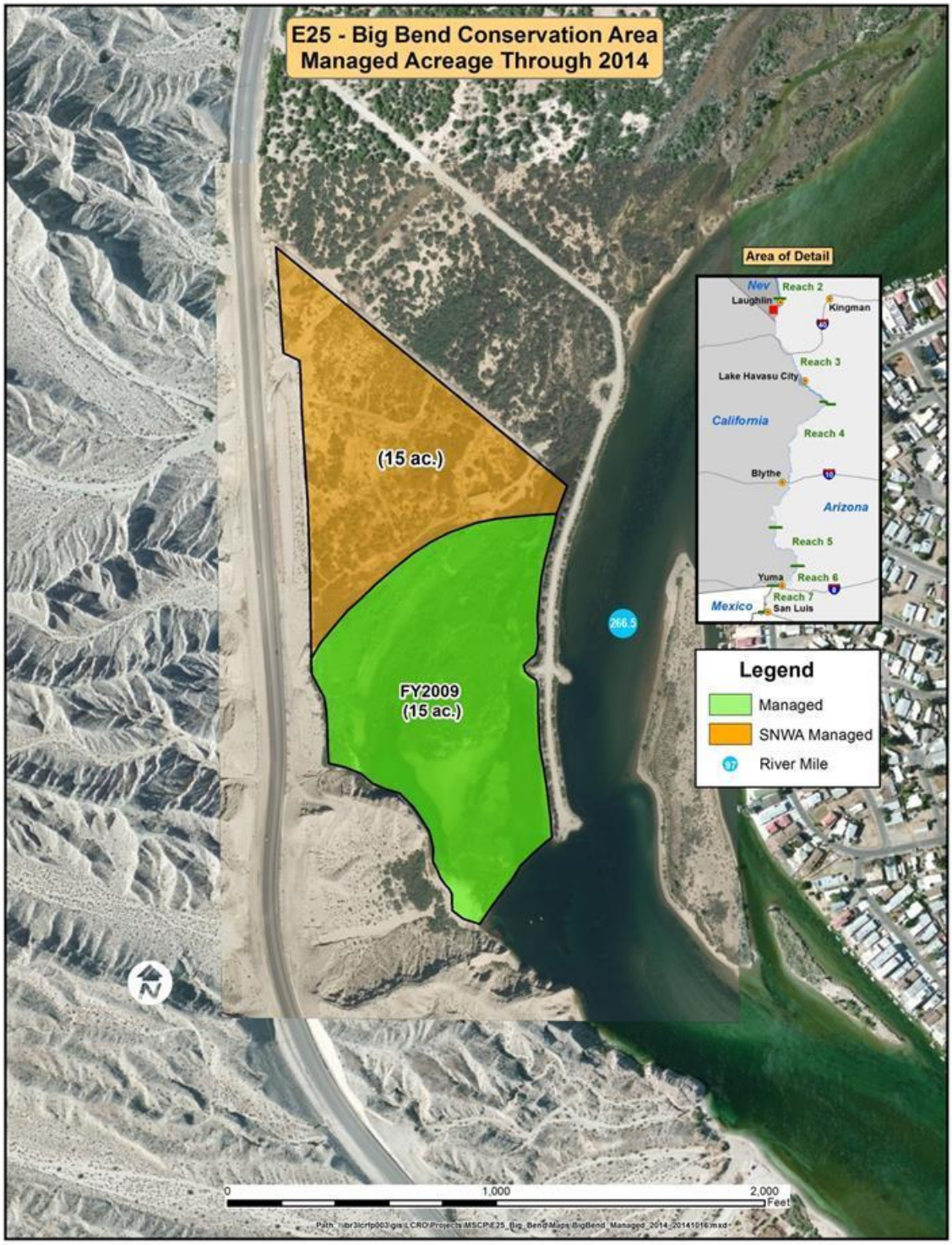


Figure 1-9.—E25 – Big Bend Conservation Area managed acreage through 2014.

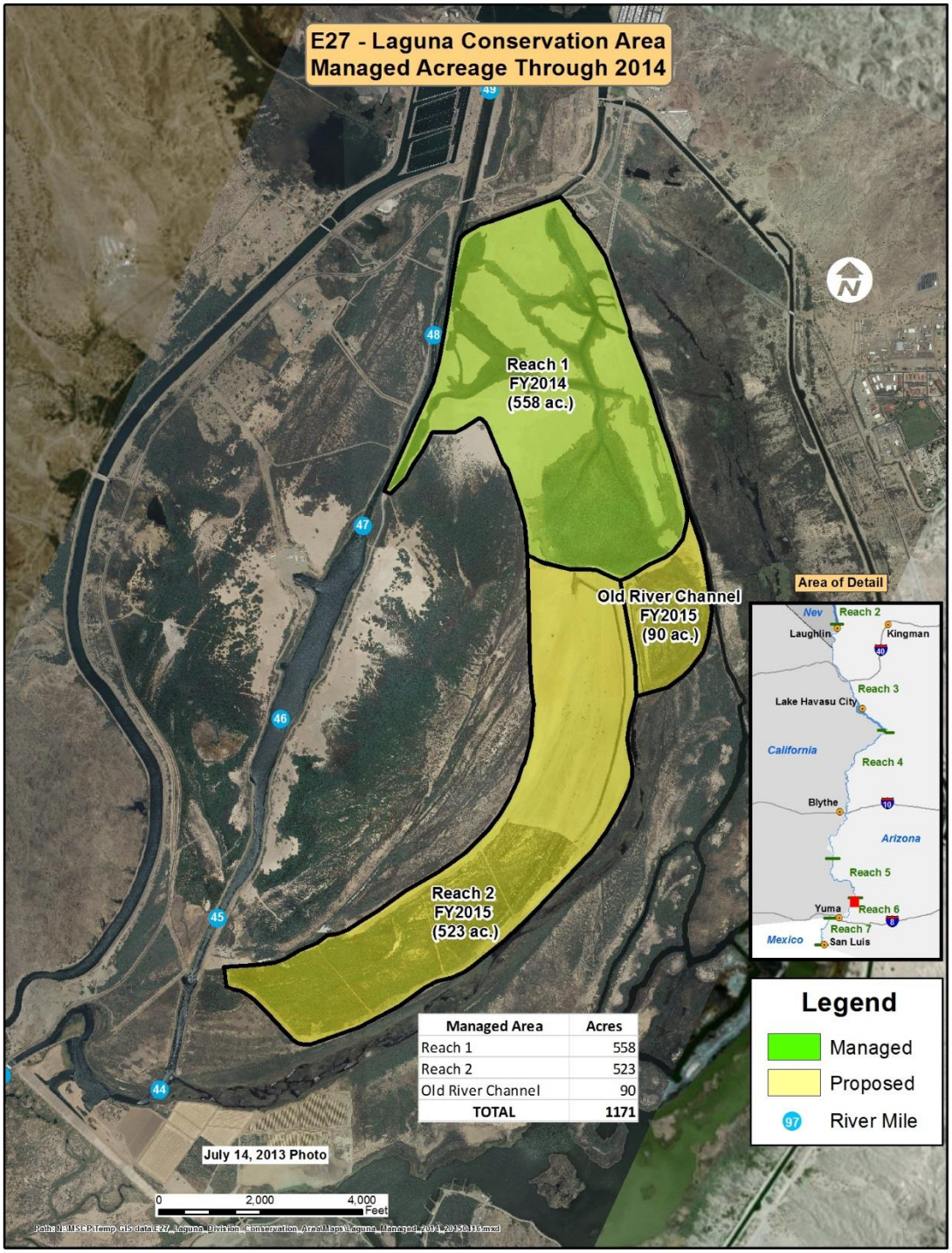
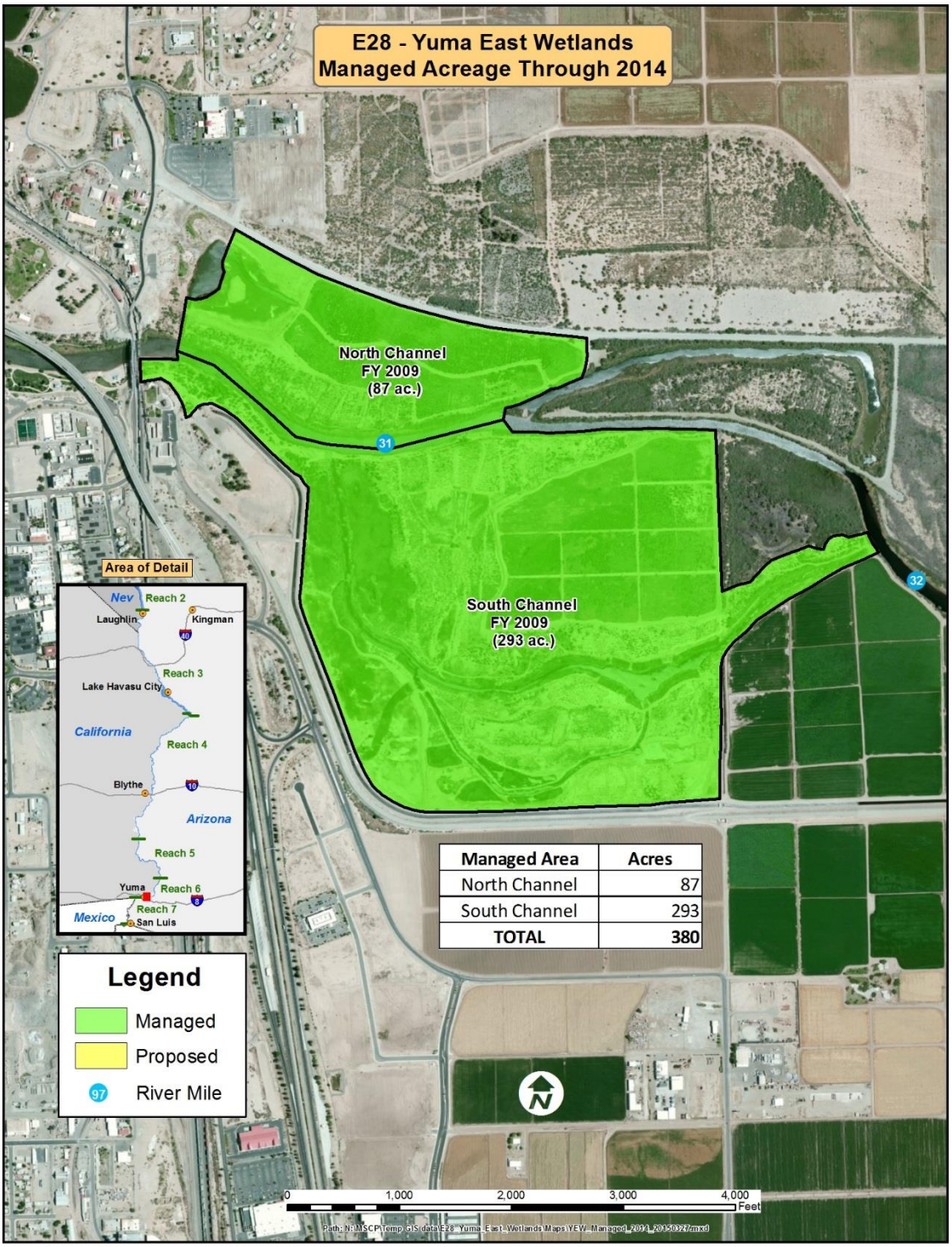


Figure 1-10.—E27 – Laguna Division Conservation Area managed acreage through 2014.



Managed Area	Acres
North Channel	87
South Channel	293
TOTAL	**380**

Figure 1-11.—E28 – Yuma East Wetlands managed acreage through 2014.

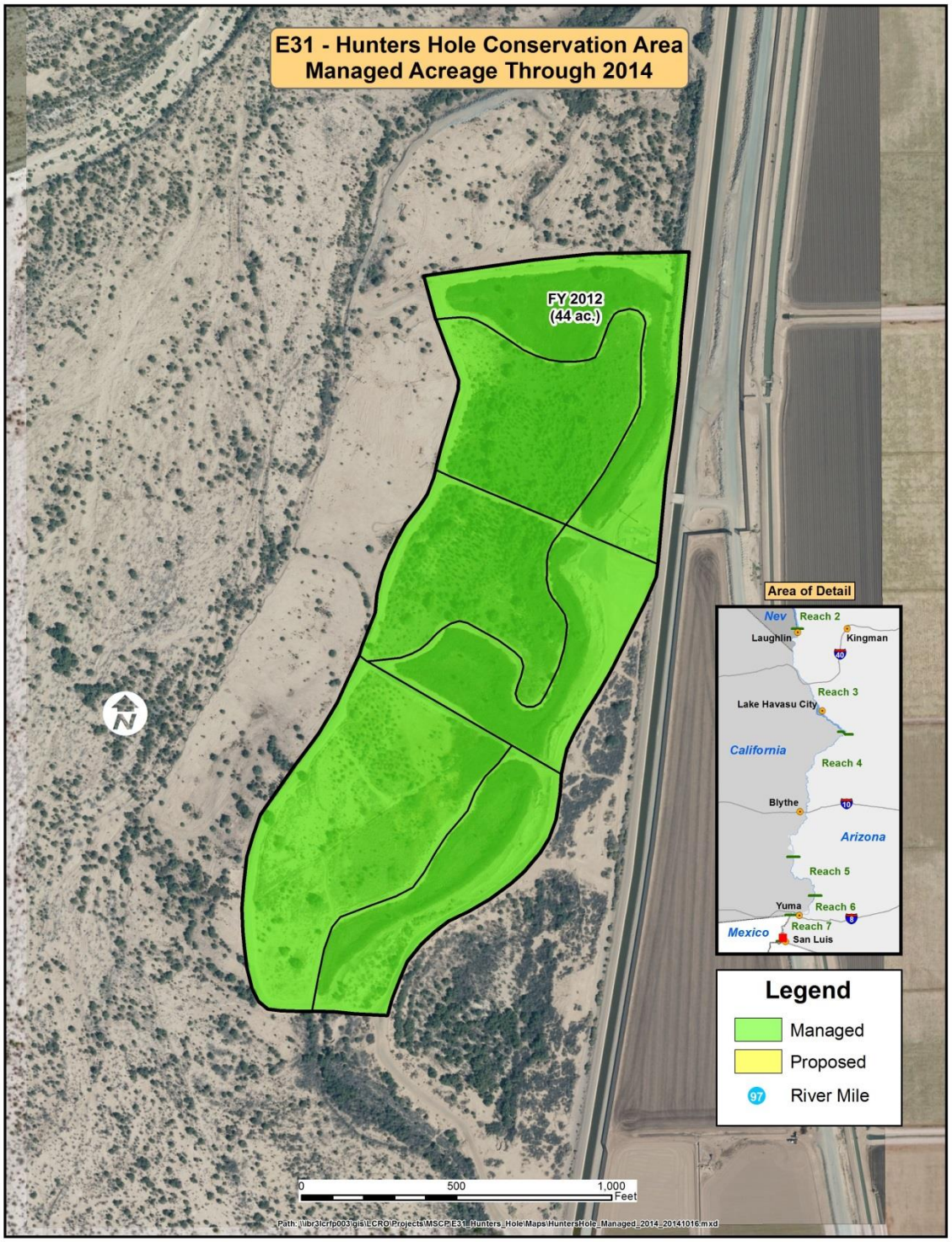


Figure 1-12.—E31 – Hunters Hole Conservation Area managed acreage through 2014.

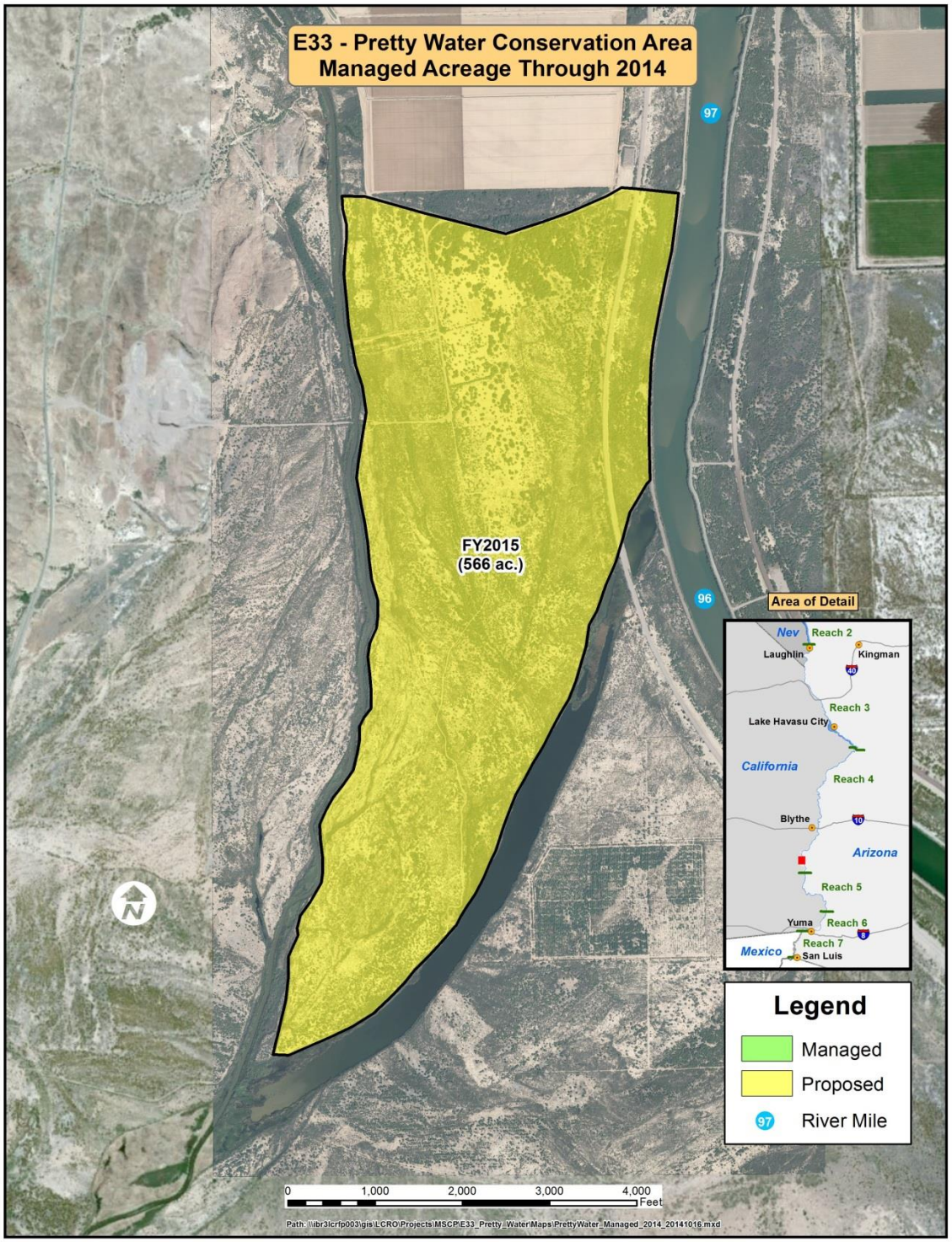


Figure 1-13.—E33 – Pretty Water Conservation Area managed acreage through 2014.

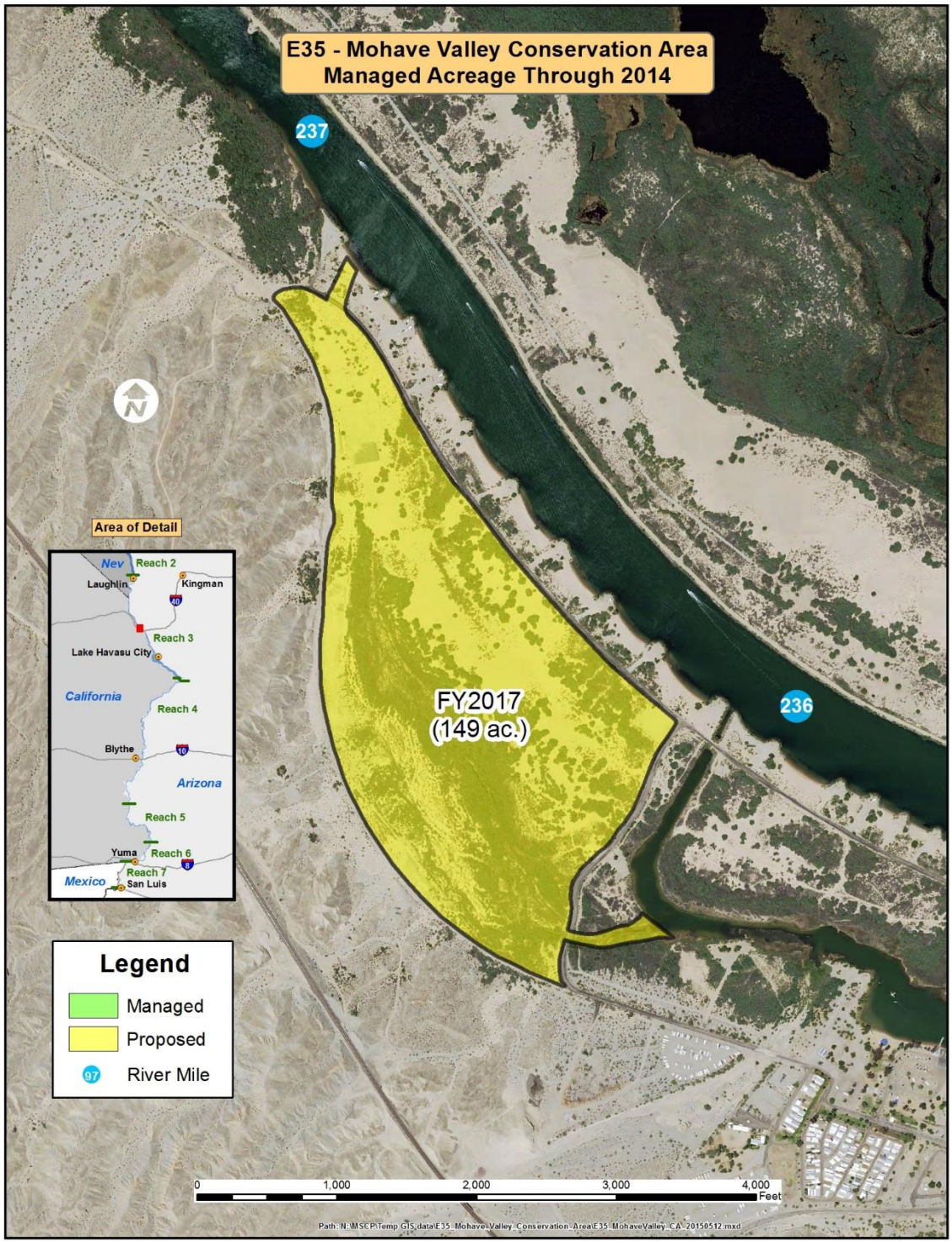


Figure 1-14.—E35 – Mohave Valley Conservation Area managed acreage through 2014.

Each site, whether identified as marsh, backwater, honey mesquite, or cottonwood-willow cover type, will have its own set of site-specific challenges to overcome.

The HCP includes tentative schedules for development of all four land cover types, with a final end date for habitat creation of 2036. However, the funding described in the HCP reflects an end date of 2026 for habitat creation, assuming efficient habitat creation techniques are identified during the first few years of implementation. To balance available resources and ensure progress is being made to complete the habitat requirements under the LCR MSCP, habitat creation is expected to be complete in 2026 in conformance with the funding schedule. Since funding estimates are based on 5-year periods, habitat creation includes both long-term planning and a selection of projects to implement within the next 5 years, which allows time for planning, site evaluation, coordination with partners, design, permitting, and sequencing into the program.

Five-Year Projection. For 2014–19, restoration is expected to occur at the: (1) LDCA, (2) PWCA, (3) Cibola NWR Unit #1, (4) CVCA, (5) MVCA, and (6) PVER-South. However, the LCR MSCP is flexible enough to take advantage of other restoration opportunities and uses the work plan (annual report) to refine short-term restoration projections. The primary focus in FY14 was completion of the LDCA, which reflects the bulk of funding and available plant material.

FY14 Accomplishments

The focus of development in FY14 was planting the LDCA. Cottonwood-willow and honey mesquite was planted in Reach 1 of the conservation area in the spring of 2014. Planting of marsh within Reach 2 of the conservation area followed. Final planting of higher elevations within Reach 2 will be completed in FY15. Reporting of acreage for established land cover types for the LDCA will not be presented until planting of all reaches is complete. This delay in acreage accounting reflects the dynamic nature of the project area and will portray a more accurate accounting of acreage established. The current footprint of the LDCA is 1,171 acres.

The total number of acres being managed by land cover type and by reach and State on established conservation areas is shown in tables 1-13 and 1-14. The LCR MSCP, through 2014, has 5,928 acres (table 1-13) of land available to the program, of which 5,425 acres are being actively managed. Not all acreage can or will be converted into either of the four land cover types due to resource limitations or the habitat creation needs of the program.

Table 1-13.—Managed Acres by Conservation Area Through FY14

Conservation Area	Established Land Cover Types	Managed Acreage	Available Lands
Beal Lake Conservation Area (Arizona)	116	116	116
Palo Verde Ecological Reserve (California)	1,023	1,023	1,023
Cibola Valley Conservation Area (Arizona)[1]	670	779	1,282[2]
Hart Mine Marsh (Arizona)	255	255	255
Imperial Ponds Conservation Area (Arizona)[3]	92	126	126
Big Bend Conservation Area (Nevada)	15	15	15
Cibola National Wildlife Refuge Unit #1 (Arizona)	344	950	950
Laguna Division Conservation Area (Arizona and California)[4]	0	1,171	1,171
Yuma East Wetlands (Arizona)	380	380	380
Hunters Hole (Arizona)	44	44	44
Pretty Water Conservation Area (Arizona)	0	566	566
Total	**2,939**	**5,425**	**5,928**

[1] Includes 72 acres of wheat in Phase 7 to stabilize the ground prior to restoration.
[2] Due to limited water resources, sizable portions of the lands available to the LCR MSCP at the CVCA will be created and managed as buffer areas.
[3] Includes 34 acres of cover crop, which will ultimately be converted to cottonwood-willow.
[4] Due to the dynamic nature of the planting at the LDCA, acreage of land cover types established will be presented upon completion of planting of all reaches.

Of the 5,425 acres being actively managed under the LCR MSCP, the four land cover types have been established on approximately 2,939 acres. Acreages at conservation areas still in the planning phase, or for which there were no signed Land Use Agreements in FY14, such as Planet Ranch, the LDCA, or the PWCA, are not included in the tables 1-13 and 1-14 at this time.

Table 1-14.—Land Cover Type by Reach and State Through FY14

	Cottonwood-Willow	Honey Mesquite	Marsh	Backwaters	TOTAL
ARIZONA					
Reaches 1–2	0	0	0	0	0
Reach 3	107	0	9	0	116
Reach 4	609	405	255	0	1,269
Reach 5	0	0	12	80	92
Reach 6	183	131	66	0	380
Reach 7	44	0	0	0	44
Total	**943**	**536**	**342**	**80**	**1,901**
CALIFORNIA					
Reaches 1–2	0	0	0	0	0
Reach 3	0	0	0	0	0
Reach 4	945	78	0	0	1,023
Reach 5	0	0	0	0	0
Reach 6	0	0	0	0	0
Reach 7	N/A	N/A	N/A	N/A	N/A
Total	**945**	**78**	**0**	**0**	**1,023**
NEVADA					
Reaches 1–2	0	0	0	0	0
Reach 3	0	0	0	15	15
Reaches 4–7	N/A	N/A	N/A	N/A	N/A
Total	**0**	**0**	**0**	**15**	**15**
TOTAL	**1,888**	**614**	**342**	**95**	**2,939**

FY15 Activities

FY15 will include final planting at the LDCA, initial planting of the PWCA, and planting of honey mesquite and upland areas at the CVCA.

LDCA

Planting of Reach 2, cottonwood-willow and honey mesquite, is planned, and when complete, over 1,100 acres of land cover types are expected to have been created.

PWCA

In FY15, 500 acres of honey mesquite are expected to be planted at this site. Temporary irrigation will be provided for 2–3 years.

CVCA

Planting of Phase 7, honey mesquite and upland, is expected to increase the established land cover types at this conservation area by another 72 acres. Annual plantings are projected, with complete development projected of the CVCA in 2019.

FY16 Proposed Activities

Supplemental planting at the LDCA and PWCA will occur if necessary. Planting of cottonwood-willow will be initiated in new phases at the CVCA and Cibola NWR Unit #1.

CVCA

Planting of Phase 8 cottonwood-willow is expected to increase the established land cover types at this conservation area by another 111 acres. Annual plantings are projected, with complete development projected of the CVCA in 2019.

Cibola NWR Unit #1

Planting of cottonwood-willow is expected increase the established land cover types at this conservation area by another 85 acres. Annual plantings are projected; however, the final development date has not yet been projected.

Mohave Valley Conservation Area

Mobilization, clearing, and grubbing of the conservation area to create a backwater for native fish within California is scheduled for the summer of 2016.

Adaptive Management of Conservation Areas

Restoration research and demonstration projects supply new information to adaptively manage habitat creation projects to make them more effective in meeting species-specific habitat requirements and managing costs to meet those requirements. In general, adaptive management research projects are those that have specific research questions and are supported by a robust, replicated study design in which some level of analysis can be conducted and inferences can be made. These projects may include, but are not limited to, research directed at habitat development to meet species needs, improving vegetation growth and survival, testing alternate propagation and habitat establishment techniques, habitat manipulation, determining habitat creation potential at identified sites based on current ecological functions, and evaluating technologies to assist in meeting specific habitat requirements.

Work tasks can address specific research questions or use demonstration projects to assess a particular technique to determine whether the technique might be feasible and effective. Demonstration projects are designed to evaluate techniques, effectiveness, and cost efficiency. These projects may have vegetation that matures into a land cover type that meets the specific criteria for created habitat for the covered species. Until that time, these projects will be referred to as research or demonstration projects. Both of these types of investigations increase knowledge of habitat creation and will be used to inform managers and guide future selection and implementation of habitat creation projects.

FY14 Accomplishments

Soil and Groundwater Salinity Monitoring Network

Implementation of this network is being combined with soil moisture monitoring, and Work Task E34 has been renamed Salinity and Soil Moisture Monitoring Network. The integration has delayed implementation until FY15, but it is expected to provide consistent data collection and more value to the program. In addition to guiding decisions for vegetation establishment and health, the network would document soil moisture levels that are believed to be an important habitat requirement for certain covered species. The soil and groundwater monitoring network will be expanded, and monitoring efforts will be standardized across all applicable LCR MSCP conservation areas. The process of selecting which phases will be monitored and to what level will occur over a period of years. The information gathered through this effort will facilitate decisions about managing soil moisture levels and saline conditions of soils and groundwater and will also ensure the long-term viability of LCR MSCP conservation areas.

Habitat Manipulation

Several covered avian species require habitat with early- to mid-successional stages of native riparian trees. In natural systems where periodic flooding is a component of the system, portions of the habitat can be periodically disturbed and reset to earlier successional stages and associated structural diversity. The LCR MSCP riparian conservation areas are planted densely in order to reduce invasive species competition with native species and provide habitat for covered avian species. Over time, some of the LCR MSCP riparian habitat creation sites may grow out of suitable habitat for some covered species unless management actions are taken.

Without the disturbance events that were once more common in the historic river hydrograph, direct manipulation of portions of these conservation areas may be required. Under this research project, information will be provided to perform assessments and provide protocols to guide deliberate habitat manipulations to enhance structural diversity and produce the appropriate serial stages of habitat for covered species.

Information from the CEMs and foliage height diversity measurements will be incorporated into the development of a protocol. A preliminary protocol was drafted and tested in the field targeting foliage height on the ground measurements. Development began on the foliage height diversity indices tool using light detection and ranging (LiDAR) technology to describe structural diversity at varying scales.

Information from the literature regarding the best approaches for assessing habitat diversity in different structure types may be employed to identify study sites with low structural diversity and/or those with later successional stages of growth.

FY15 Activities

The established Salinity and Soil Moisture Monitoring Network (E34) will be expanded to include additional conservation areas. Data collected are expected to track and support the long-term health and survival of established land cover types. Over the course of 5–7 years, the monitoring network will be expanded to address the needs of all 11 conservation areas. However, given the site-specific nature of each site, the monitoring network will not be uniform; it will reflect the actual site conditions.

Habitat Manipulation

Field method testing will continue. LIDAR-based methods will be tested following acquisition of site data.

FY16 Proposed Activities

Habitat Manipulation

A pilot monitoring protocol will be developed following assessment of the two methods (LIDAR and ground-based vegetation data acquisition) to assess vegetation composition. Potential management tools will be identified for further evaluation. Further research will be conducted on the feasibility of implementing habitat management strategies when conditions within created habitat warrant their use.

Although no specific restoration research activities are planned at this time, research in future years may focus on: (1) the efficient use of Colorado River water, (2) ensuring moist soil conditions are maintained when necessary and practical, (3) planting and/or seeding techniques, and (4) the protection and long-term management of conservation areas for covered species.

WORK TASKS – SECTION A

Program Administration

Work Task A1: Program Administration

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate*	FY17 Proposed Estimate	FY18 Proposed Estimate
$1,298,968	$985,556.40	$9,890,616.58	$1,382,444	$1,411,966	$1,411,966	$1,411,966

Contact: John Swett, (702) 293-8555, jswett@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: Program administration

Conservation Measures: N/A

Location: N/A

Purpose: Program administration

Connections with Other Work Tasks (Past and Future): N/A

Project Description: Under this work task, senior staff and administration receive support to manage implementation of the LCR MSCP. The Program Manager directs functions and activities associated with implementation of the HCP to ensure the completion of activities in accordance with the program documents.

Previous Activities: The LCR MSCP Office was established in Reclamation's Lower Colorado Region in 2005. The Steering Committee was established in accordance with the FMA, and the bylaws for the Steering Committee were approved.

FY14 Accomplishments: Under Program Administration (A1) for FY14, management of the LCR MSCP continued. Ongoing administrative activities included financial, human resources, and support for the program. Due to Federal budget negotiations, a Steering Committee conference call, rather than an October meeting, was held in November 2013. The committee met in April 2014.
A technical work group meeting was held in March 2014 to review upcoming actions of the Steering Committee. The *Final Implementation Report, Fiscal Year 2015 Work Plan and Budget, Fiscal Year 2013 Accomplishment Report* was prepared. Financial tracking for the program continued, and the annual financial work group meeting was held. A tour of the LDCA was conducted for the Steering Committee.

FY15 Activities: Under Work Task A1 for FY15, management of the LCR MSCP will continue. Ongoing administration activities will include financial, human resources, and support of the program. Coordination with the Steering Committee continued with meetings held on October 22, 2014, and April 22, 2015. Technical work group meetings were held 1 month prior to these dates to review upcoming actions of the Steering Committee. The *Draft Implementation Report, Fiscal Year 2016 Work Plan and Budget, Fiscal Year 2014 Accomplishment Report* was prepared. Financial tracking for the program will continue, and the annual financial work group meeting will be held. A 10-year anniversary tour and dedication of the LCDA was conducted in April 2015.

Proposed FY16 Activities: Under Work Task A1 for FY16, management of the LCR MSCP will continue. Ongoing administration activities will include financial, human resources, and support of the program. Coordination with the Steering Committee will continue with biannual Steering Committee meetings, specific work group meetings, and email announcements. The *Final Implementation Report, Fiscal Year 2017 Work Plan and Budget, Fiscal Year 2015 Accomplishment Report* will be prepared. Financial tracking for the program will continue, and the annual financial work group meeting will be held.

Pertinent Reports: The *Final Implementation Report, Fiscal Year 2015 Work Plan and Budget, Fiscal Year 2013 Accomplishment Report* is posted on the LCR MSCP Web site. The *Final Implementation Report, Fiscal Year 2016 Work Plan and Budget, Fiscal Year 2014 Accomplishment Report* will also be posted on the Web site.

WORK TASKS – SECTION B

Fish Augmentation

Work Task B1: Lake Mohave Razorback Sucker Larvae Collections

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$200,000	$193,518.74	$1,952,354.80	$200,000	$200,000	$215,000	$215,000

Contact: Patricia Delrose, (702) 293-8202, pdelrose@usbr.gov

Start Date: FY04

Expected Duration: FY55

Long-Term Goal: Fish augmentation

Conservation Measures: RASU3, RASU5, and RASU8

Location: Reach 2, Lake Mohave, Arizona/Nevada

Purpose: To develop the razorback sucker broodstock in Lake Mohave, maintain the broodstock, and harvest offspring for rearing as needed for the LCR MSCP Fish Augmentation Program

Connections with Other Work Tasks (Past and Future): Work Tasks B2, B3, B4, B5, B6, and B7 are related to this work task, as the razorback sucker to be reared under these work tasks originate from Lake Mohave. Other research related to larvae collection, handling, and genetics include Work Tasks C30 (closed), C31, and C40.

Project Description: The razorback sucker broodstock in Lake Mohave provides a level of genetic diversity found nowhere else in the world. Under this project, wild-born razorback sucker larvae from Lake Mohave are captured and delivered to the Willow Beach NFH for initial rearing. The work involved under this work task includes surveys to locate spawning groups, nighttime larvae collection, and maintaining the boat fleet and field station at Cottonwood Cove. Larvae are captured one at a time, making this a labor-intensive program. Salaries, travel, and fuel represent the majority of the expenditures for this work task.

Work normally commences in January and extends into late April or early May. Equipment is delivered to and staged at Cottonwood Cove, where a field station is established. The lake's shoreline is surveyed, and locations of spawning aggregations of razorback sucker are recorded. Crews of two to four staff meet

at the field stations at sunset, gather batteries, lights, dip nets, and buckets, and set out by boat to the spawning areas. Razorback sucker larvae attracted to submerged lights suspended from the boats are captured by net and counted. The larvae are transferred to the Willow Beach NFH, by either boat or vehicle, where they are logged in by date received, number collected, and location. This work task is repeated three to four nights per week through mid-to-late April.

Previous Activities: This work task is part of a program started by the Lake Mohave Native Fish Work Group in 1989 to rebuild the adult stock of razorback sucker in Lake Mohave so that these fish could be used as brood fish for razorback sucker conservation and recovery. A portion of the larvae collected is used to sustain the broodstock, and the remaining larvae are reared for release into Reaches 3–5 to accomplish the augmentation goals of the program.

FY14 Accomplishments: Twenty eight thousand nine hundred and thirty-seven (28,937) wild larvae were collected from four areas. All larvae were delivered to the Willow Beach NFH for further grow-out. The Willow Beach NFH had a target goal of 25,000 larvae, so once they became fingerling size, the remaining 3,937 larvae were taken to the Lake Mead Fish Hatchery for further rearing. The contribution from each zone of Lake Mohave by month of capture is presented in table 1.

Table 1.—Larval Razorback Sucker Collected from Lake Mohave, 2014

Location	January	February	March	April	May	Total
Nine Mile	33	3,419	5,704	649	0	9,805
Tequila	0	5,694	3,600	199	0	9,493
Yuma	700	5,465	1,572	1,051	0	8,788
Above Owl Point	0	0	237	539	75	851
Total	733	14,578	11,113	2,438	75	**28,937**

Helicopter surveys along the shoreline were not conducted due the suspension of the Reclamation air program. The value of helicopter surveys was assessed, and alternate means of identifying spawning aggregations continue to be explored.

FY15 Activities: A target of 17,000 larvae was established for FY15 in coordination with the Lake Mohave Native Fish Work Group. This change in target number is part of a strategy to produce larger fish for Lake Mohave. These larvae will be delivered to the Willow Beach NFH for rearing, where 11,000 larvae will be kept on station for the stocking program, and the remaining 6,000 larvae will be taken to the Lake Mead Fish Hatchery.

The lower larval target number for FY15 is not expected to result in a reduced cost for this work task; the overall collection effort is expected to be similar. Ongoing research under Work Task C31 has helped to define larvae collection protocols. In order to represent high genetic diversity of razorback sucker larvae used for rearing, collection efforts will continue to be distributed both temporally across the spawning season and spatially among the known spawning areas on Lake Mohave.

Proposed FY16 Activities: Razorback sucker larvae collections will continue. The target level for FY16 is expected to be 15,000–20,000 larvae.

Pertinent Reports: A status report titled *Five-Year Summary of Razorback Sucker (Xyrauchen texanus) Larval Collections on Lake Mohave: 2010–2014* will be posted on the LCR MSCP Web site upon completion.

Work Task B2: Willow Beach National Fish Hatchery

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$300,000	$305,132.56	$2,854,125.46	$325,000	$325,000	$325,000	$325,000

Contact: Ty Wolters, (702) 293-8463, twolters@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: Fish augmentation

Conservation Measures: RASU3, RASU4, RASU5, BONY3, and BONY4

Location: Reach 2, Willow Beach, Arizona

Purpose: To annually contribute razorback sucker and bonytail to the LCR MSCP Fish Augmentation Program

Connections with Other Work Tasks (Past and Future): The Willow Beach NFH receives larval razorback sucker under Work Task B1 and bonytail under Work Task B4. A portion of the fish from the hatchery are reared at the Achii Hanyo Native Fish Rearing Facility (B3). Some fishery research actions described in Species Research (Section C) have occurred at the Willow Beach NFH, including Work Tasks C10 and C30 (closed).

Project Description: The Willow Beach NFH is managed by the USFWS. The hatchery receives program funding to rear razorback sucker and bonytail for the LCR MSCP Fish Augmentation Program. There are three primary tasks at this hatchery:

1. **Receive fish to be reared.** The Willow Beach NFH annually receives wild razorback sucker larvae collected from Lake Mohave and fingerling bonytail (25–75 mm TL) from the SNARRC (B4).

2. **Provide fish to other hatcheries.** Initially, the Willow Beach NFH was to provide fingerling razorback sucker to the Bubbling Ponds Fish Hatchery to be further reared and ultimately stocked into Reaches 3–5, provide fingerling razorback sucker from wild-caught larvae to the SNARRC for further rearing and eventual repatriation into Lake Mohave, and provide juvenile bonytail to the Achii Hanyo Native Fish Rearing Facility for further rearing and ultimately for stocking into Reaches 3–5.

Due to quagga mussel infestations, the Willow Beach NFH is only delivering fish to the Achii Hanyo Native Fish Rearing Facility and the Lake Mead Fish Hatchery.

3. **Annually rear razorback sucker for release into the LCR.** The Willow Beach NFH will rear 8,000 subadult razorback sucker for stocking into Reaches 2–5 and, in addition, rear up to 1,000 razorback sucker greater than 400 mm TL for repatriation into Lake Mohave. All razorback sucker stocked into Reaches 2 and 3 will be a minimum of 300 mm TL. All razorback sucker stocked into Reaches 4 and 5 will be a minimum of 305 mm TL.

Previous Activities: This cold-water hatchery began operation in 1962 to produce rainbow trout for recreational fishing. Between 1994 and 1997, the USFWS and Reclamation cooperatively added solar heating systems to the hatchery, converting 50% of its rearing capacity to warm-water fish production. Each year since 1996, the hatchery has received wild razorback sucker larvae, reared juvenile razorback sucker, and repatriated fish back into Lake Mohave.

During January 2007, the exotic quagga mussel was discovered in Lake Mead and was subsequently found at the Willow Beach NFH. Larval razorback sucker that were to be transferred to the Bubbling Ponds Fish Hatchery were not collected (B1), and no razorback sucker were delivered to waters outside the LCR corridor. Quagga mussels have not severely impacted the maintenance or operation of the Willow Beach NFH; however, they continue to have an impact on the delivery of fish.

FY14 Accomplishments: During 2014, 28,937 razorback sucker larvae were received from Lake Mohave, 755 razorback sucker juveniles were stocked into lake-side rearing ponds (B7), 12,072 razorback sucker were repatriated into Lake Mohave (Reach 2), and 44 razorback sucker were stocked at Deer Island (Reach 4). A total of 713 FY12 razorback sucker and 9,000 FY14 bonytail were transferred to the Achii Hanyo Native Fish Rearing Facility (B3) for further grow-out. The majority of funds were for salaries and consumable materials (fish feed, medicines, chemicals, etc.). Installation of two new wells, along with pumps and associated electrical parts, began at the Willow Beach NFH. In addition, a new pump, with associated electrical parts, was installed on an existing well.

FY15 Activities: The Willow Beach NFH will receive razorback sucker larvae from Lake Mohave and will continue to rear and distribute the razorback sucker and bonytail currently at the hatchery. This includes 1,581 razorback sucker of the 2010 year class, 4,770 of the 2011 year class, 11,463 of the 2012 year class, 20,157 of the 2013 year class, and 19,882 of the 2014 year class.

The installation of two new wells, along with pumps and associated electrical parts, and the installation of a new pump, with associated electrical parts, on an existing well, is expected to be completed in FY15. Well water would supply the Willow Beach NFH with a reliable source of pathogen-free water, thereby helping to eliminate quagga mussels from this facility.

During this fiscal year, the rearing strategy has changed in order to produce larger fish for stocking into Lake Mohave. In addition, genetic samples may be collected at the time of tagging in order to improve data for inference regarding genetic trends of the Lake Mohave broodstock. This change in genetic sampling may also reduce future needs for intense netting efforts during the spawning season. Discussions are ongoing, but depending on any necessary changes in effort, budget estimates may need to be altered in subsequent years. Budget estimates in FY15 and later reflect these potential needs in terms of both new rearing strategies and ongoing improvements in the water supply at the hatchery.

Proposed FY16 Activities: The hatchery will continue to receive razorback sucker larvae from Lake Mohave and to rear and distribute razorback sucker and bonytail for the LCR MSCP Fish Augmentation Program.

Pertinent Reports: Annual administrative reports are available upon request.

Work Task B3: Achii Hanyo Native Fish Rearing Facility

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$150,000	$183,710.01	$1,035,574.15	$160,000	$275,000	$50,000	$160,000

Contact: Ty Wolters, (702) 293-8463, twolters@usbr.gov

Start Date: FY04

Expected Duration: FY55

Long-Term Goal: Fish augmentation

Conservation Measures: RASU3, RASU4, BONY3, and BONY4

Location: Reach 4, Colorado River Indian Tribe (CRIT) Reservation, Parker, Arizona

Purpose: To support operation and maintenance of fish rearing facilities in order to annually contribute razorback sucker and bonytail to the LCR MSCP Fish Augmentation Program for stocking into Reaches 2–5 of the LCR

Connections with Other Work Tasks (Past and Future): This project was previously included as Work Task A1 in FY04, and it is related to Work Tasks B2 and B4, as fish from both the Willow Beach NFH and the SNARRC may be transferred to the Achii Hanyo Native Fish Rearing Facility. Additionally, fish research for razorback sucker and bonytail may be accomplished at this station.

Project Description: This project supports both the development and maintenance of the Achii Hanyo Native Fish Rearing Facility as a grow-out site for razorback sucker and bonytail and the rearing of bonytail for release into Reaches 3–5 of the LCR. The station is primarily used as a grow-out facility for bonytail from the SNARRC, although razorback sucker are occasionally brought on station in response to stocking needs and space limitations at other facilities. Funds are used for staff salaries, facility operation and maintenance, fish feed and chemicals, and fish distribution.

This facility is located on the CRIT Reservation, near Parker, Arizona. There are nine earthen ponds that receive Colorado River water from an irrigation canal. A

metal building was constructed to house 4 flow-through raceways and 3 circular tanks; in addition, 12 circular tanks are housed under an outside canopy, and there is 1 large, outside research tank.

Fish rearing operations are seasonal, producing one crop per year. Bonytail are brought in from the Willow Beach NFH and/or SNARRC in the winter. Fish are fed through the spring and summer. In the fall, the ponds are drained, and fish are harvested, tagged, and stocked. Fish under target size (less than 300 mm TL) are returned to a pond for continued rearing. New fish are then brought on station, and the process is repeated. The annual production goal is 4,000 bonytail for stocking into the LCR.

Previous Activities: In cooperation with the USFWS, upgrades to this facility have occurred since FY04. The work completed includes: (1) the purchase and assembly of a metal building (tank house) and fiberglass fish tanks, (2) an office, (3) a feed storage room, (4) restrooms, (5) electrical upgrades, (6) a backup generator, and (7) upgraded aeration systems for fish tanks in the tank house.

FY14 Accomplishments: At the start of the year, 12,038 bonytail of the 2012 year class and 9,000 bonytail of the 2014 year class were on station. In addition, 713 razorback sucker of the 2012 year class were also on station. In December 2013, fish were harvested and tagged, and 415 razorback sucker were stocked into Reach 2, and 513 bonytail were transferred to Lake Mead Fish Hatchery for 1 month and eventually stocked into Topock Gorge (Reach 3). Approximately 5,850 bonytail of the 2012 year class and 9,000 bonytail of the 2014 year class were held on the Achii Hanyo Native Fish Rearing Facility for additional grow-out.

Obligations in FY14 were greater than the estimated budget. Administrative costs associated with the development and award of new 5-year agreements for both the Achii Hanyo Rearing Station (B3) and Willow Beach NFH (B2), who use the station as a satellite rearing facility, were expended under Work Task B3.

FY15 Activities: In December 2014, fish were harvested and tagged, and 477 razorback sucker were stocked into Reach 2 of the LCR. In addition, 3,170 bonytail were stocked into Reach 3, and 1,998 bonytail were stocked into Reach 4.

Bonytail will be brought on station from the SNARRC to meet production goals. Delivery of approximately 10,000 bonytail from the SNARRC is expected in late winter. Six ponds will be dried, disked, and graded to aid harvest. Levee work will be performed on one pond to repair a leak.

Proposed FY16 Activities: Bonytail left on station from FY15 will be reared to target size, and fingerling bonytail will be delivered from either the Willow Beach NFH or the SNARRC. The estimated FY16 budget incorporates costs associated with raising and stocking native fish for FY16 and FY17. Obligating 2 years of funds reduces administrative costs and allows for flexibility at the hatchery. The FY17 estimated budget has been adjusted accordingly.

Pertinent Reports: Annual administrative reports are available upon request.

Work Task B4: Southwestern Native Aquatic Resources & Recovery Center at Dexter

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$250,000	$606,288.45	$1,989,502.32	$250,000	$260,000	$260,000	$260,000

Contact: Ty Wolters, (702) 293-8463, twolters@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: Fish augmentation

Conservation Measures: RASU3, RASU4, BONY3, BONY4, and HUCH1

Location: Off-river, Dexter, New Mexico

Purpose: To support operation and maintenance at the SNARRC, support maintenance of the bonytail broodstock, and annually provide razorback sucker and bonytail to the LCR MSCP Fish Augmentation Program

Connections with Other Work Tasks (Past and Future): This work task is related to Work Tasks B2, B3, and B5, as fish from the SNARRC will be delivered to the Willow Beach NFH, Achii Hanyo Native Fish Rearing Facility, and Bubbling Ponds Fish Hatchery. In addition, fish rearing research activities outlined in Work Tasks C10, C11, C14, and C30 (closed) may be conducted at the SNARRC. A humpback refugium has been established at the SNARRC as a safeguard in case of catastrophic events in the wild (C14).

Project Description: The SNARRC is managed and operated by the USFWS. The facility maintains the only broodstock for bonytail in the world and also retains a backup broodstock of razorback sucker. Funds provided will be used to maintain extant broodstock, annually produce fingerling bonytail for distribution to other hatcheries, and to annually rear bonytail to 300 mm TL for distribution within Reaches 2–5.

Previous Activities: Reclamation and the USFWS have past and ongoing interagency agreements to support rearing and research for razorback sucker and bonytail at the SNARRC.

FY14 Accomplishments: The SNARRC maintained its Class A (pathogen-free) disease classification. In FY14, as part of clarification to help meet the

CESA requirements, any fish to be stocked in Reaches 4 or 5 had to be reared to 305 mm TL. The SNARRC plans to target a 305-mm TL for all bonytail stocked in FY15–18; however, fish with TLs of 300 mm or larger may be stocked in Reach 3, while fish stocked in Reaches 4 and 5 will be 305 mm TL or larger.

Expenditures exceeding the FY14 budget estimate were a result of major capital improvements made at the SNARRC to expand rearing capabilities. The cost estimate for this work was approximately $400,000 and was not accounted for under the original, approved estimate for FY14. These improvements were necessary in order to meet out-year production goals for bonytail in FY15–18 and were anticipated and detailed in the last year's work plan "FY14 Activities" write-up. Four new approximately 0.25-acre ponds were constructed at the facility. The USFWS performed the initial excavation, grading, and contouring work, and LCR MSCP staff lined the ponds and installed four concrete catch basins. Construction began in March 2014 and was completed by July 2014. The ponds will be tested and operational by the spring of 2015.

Bonytail: The SNARRC maintained a 1,952 adult bonytail broodstock that comprised six year classes of Lake Mohave origin fish. Approximately 53,000 bonytail were maintained on station for future stocking into the LCR. These included 9,000 bonytail of the 2009 year class, 14,000 of the 2011 year class, 10,000 of the 2012 year class, and 20,000 of the 2014 year class. The SNARRC hormonally induced and hand-stripped eggs from 22 adult bonytail females, producing 364,782 eggs. Over 77,500 egg, larval, and juvenile bonytail were transferred to other stations for grow-out and research during FY14. The SNARCC harvested, PIT tagged, hauled, and stocked a total of 6,332 subadult bonytail (300+ mm TL) into Lake Havasu (Reach 3).

Razorback Sucker: The SNARRC maintained a broodstock stock of 1,122 adult razorback sucker that comprised nine year classes of Lake Mohave origin fish. SNARRC hormonally induced and hand-stripped eggs from 24 adult razorback sucker females, producing 643,680 eggs. Approximately 75,000 razorback sucker larvae were transferred to the Bubbling Ponds Fish Hatchery and the Bubbling Ponds Native Fish Conservation Facility for grow-out and future stocking into the LCR.

No razorback sucker were transferred to the SNARRC from the Willow Beach NFH. Beginning in FY14, the SNARRC was not required to provide subadult razorback sucker for stocking into the LCR. The space made available by this action is being devoted to the increase in production of bonytail for the LCR MSCP.

FY15 Activities: The bonytail broodstock will be maintained, and the hatchery will produce approximately 100,000 larvae or fingerling bonytail for distribution depending upon various agency requests (including the Willow

Beach NFH, Achii Hanyo Native Fish Rearing Facility, Lake Mead Fish Hatchery, and Bubbling Ponds Native Fish Conservation Facility). The SNARRC will rear 8,000–10,000 bonytail to 305 mm TL in FY15 for distribution within the LCR.

Proposed FY16 Activities: The bonytail broodstock will be maintained. Up to 100,000 larvae or fingerling bonytail will be produced for distribution to various rearing/research facilities depending upon requests (including Bubbling Ponds Research Facility, Lake Mead Fish Hatchery, Willow Beach NFH, and Achii Hanyo Native Fish Rearing Facility). Approximately 12,000–13,000 bonytail will be reared to 305 mm TL for distribution within Reaches 2–5.

Pertinent Reports: Annual administrative reports are available upon request.

Work Task B5: Bubbling Ponds Fish Hatchery

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$300,000	$300,297.40	$2,410,139.24	$960,000	$315,000	$315,000	$315,000

Contact: Ty Wolters, (702) 293-8463, twolters@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: Fish augmentation

Conservation Measures: RASU3 and RASU4

Location: Off-river, Cornville, Arizona

Purpose: To operate and maintain the fish rearing facility and annually contribute razorback sucker to the LCR MSCP Fish Augmentation Program

Connections with Other Work Tasks (Past and Future): Activities at the Bubbling Ponds Fish Hatchery are related to Work Task B4; the hatchery receives razorback sucker from the SNARRC. A portion of the fish rearing and predator-conditioning research activities outlined in Work Tasks C10 and C11 are also conducted at the hatchery.

Project Description: Bubbling Ponds Fish Hatchery is managed and operated by the AGFD. This is a warm-water rearing facility that is supplied by a continuous, year-round, 10-cubic-feet-per-second (cfs) spring flow of 68-degree Fahrenheit water. The facility has 10 acres of production ponds, a workshop, a storage shed, a small laboratory, and sufficient fish distribution equipment to meet the delivery requirements for the LCR MSCP. Program funds provide for salaries, fish feed and supplies, facility operation and maintenance, and delivery of fish. Production goals are 12,000 razorback sucker of 300 mm minimum TL for release into Reaches 3–5 of the LCR.

Previous Activities: Prior to the LCR MSCP, 70,000 razorback sucker were successfully reared at the Bubbling Ponds Fish Hatchery and delivered to the LCR as required by two Biological Opinions (1997 and 2001).

FY14 Accomplishments: A total of 60,000 fry were received for rearing from the SNARRC in April. During FY14, a total of 11,933 razorback sucker were harvested, PIT/wire tagged, and stocked. A total of 6,000 razorback sucker were stocked into Lake Havasu (Reach 3), and 5,933 were stocked below Parker Dam (Reach 4).

FY15 Activities: The Bubbling Ponds Fish Hatchery began 2015 with approximately 29,247 razorback sucker on station. This total includes 7,047 razorback sucker of the 2011year class, 5,200 of the 2012 year class, and 17,000 of the 2013 year class, all supplied by the SNARRC. They are expected to reach target size in 2015 and 2016.

A new 5-year agreement will be developed to continue and potentially expand native fish production at the Bubbling Ponds Fish Hatchery; this agreement may include additional funding for increased production goals and/or facility maintenance requirements. The first year of the agreement will begin in FY16 but will be supported with funds obligated in FY15 in order to ensure seamless carryover of all year class fish production on station. A Memorandum of Understanding is being discussed with the AGFD to secure long-term production of native fish for the LCR MSCP.

The Bubbling Ponds Fish Hatchery will require a substantial capital investment for infrastructure repair and improvements in order to secure current production goals at this facility. The FY15 budget includes a coarse estimate for some of these major facility improvements. Initially, it was expected that some of these large-scale improvements would occur in FY15; however, late in 2014, the AGFD purchased land adjacent to the hatchery and has expressed an interest in developing a native fish rearing facility on these lands. Discussions are underway with the AGFD to determine how this new facility might accommodate the needs of the LCR MSCP and what investments will need to be provided by cooperating parties. In the meantime, large capital improvements on the existing facility in FY15 will be delayed, and consequently, budget expenditures are expected to be similar to those of the previous years. Support for topographic surveys and assistance with hydraulic surveys and design work in FY15 to help assess the potential capital costs and production capabilities of the proposed new facility will continue.

A number of smaller-scale facility improvements are planned for FY15, including the replacement of some of the deteriorated water supply pipes throughout the hatchery using pipe previously purchased. Other improvements may occur in FY15, but they will be limited to those that are necessary or those that will benefit the LCR MSCP regardless of where production of native fishes on this facility may occur in the future.

Proposed FY16 Activities: Razorback sucker larvae will continue to be received from the SNARRC. Razorback sucker from the 2014 and 2015 year

classes will continue to be reared. Based on the results from the new agreement negotiations in FY15, 12,000 to 14,000 razorback sucker (305 mm TL) will be sorted, tagged, and delivered to the LCR for FY16. This is an increase in the targeted fish numbers previously identified in past agreements, and the budget estimate for FY16 has been adjusted accordingly. Annual administrative progress reports for FY15 activities and production numbers will also be provided by the Bubbling Ponds Fish Hatchery.

More information will be gathered regarding the development of a new native fish rearing facility on the lands adjacent to the Bubbling Ponds Fish Hatchery. A cost-benefit analysis will be performed to determine what the appropriate investment should be under the LCR MSCP in terms of assistance in construction of this facility compared to the long-term benefits that will be gained. If large capital improvements are undertaken, a long-term agreement will be developed and executed to secure the space and water required to continue production at the hatchery for the life of the LCR MSCP. Out-year budget estimates may be revised based on potential future construction at this facility.

Pertinent Reports: Annual administrative reports are available upon request.

Work Task B6: Lake Mead Fish Hatchery

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$125,000	$135,579.70	$579,513.29	$255,000	$240,000	$200,000	$200,000

Contact: Jim Stolberg, (702) 293-8206, jstolberg@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: Fish augmentation

Conservation Measures: BONY3, BONY4, RASU3, RASU4, RASU5, RASU7, RASU8, and FLSU2

Location: Reach 1, Lake Mead, Boulder City, Nevada

Purpose: To support Lake Mead razorback sucker studies and contribute bonytail and razorback sucker to the LCR MSCP Fish Augmentation Program

Connections with Other Work Tasks (Past and Future): Activities at the Lake Mead Fish Hatchery contribute to other LCR MSCP Work Tasks, including B11, C13, C39, C41, C49, C53, C57, C61, and D8.

Project Description: The Lake Mead Fish Hatchery is managed and operated by the NDOW. Reclamation and the NDOW are cooperatively rearing both bonytail and razorback sucker at this facility in support of the LCR MSCP Fish Augmentation Program. Bonytail for this work task are produced and supplied by the SNARRC, and razorback sucker are wild caught individuals from Lakes Mead and Mohave. Funds from this work task are provided for the salaries, equipment, feed, and chemicals necessary to rear these fish. Fish produced through this work task will be used to support research and augmentation in Reaches 1–5.

Previous Activities: In 2005, Reclamation assisted with the installation of a single 500-gallon fiberglass tank for the purpose of rearing razorback sucker collected from Lake Mead. Installation took place in the new native fish room and included plumbing for air and water delivery lines, standpipe and standpipe screen construction, and placement of a central drain line. The native fish room was completed in 2006, with the addition of twenty-five 10-gallon aquaria, four 240-gallon fiberglass troughs, and six 700-gallon fiberglass tanks. Since 2007, larval and fingerling razorback sucker, from Lakes Mead and Mohave

respectively, have been brought into the Lake Mead Fish Hatchery and reared in these tanks. Subsequently, these fish have been transferred to ponds at the Overton WMA for additional grow-out, used for research and monitoring projects in Lake Mead, and stocked into Lake Mohave. Additional rearing space was made available at the hatchery in 2012 in continued support of the LCR MSCP Fish Augmentation Program. This additional rearing capacity will be necessary in future years when the number of fish stocked annually into Reaches 3–5 is expected to increase. This additional space is also currently supporting flannelmouth sucker rearing for research projects occurring in Reach 3.

FY14 Accomplishments: During FY14, the Lake Mead Fish Hatchery continued rearing the approximately 3,400 razorback sucker and 50 flannelmouth sucker that were on station from previous years. The hatchery's razorback sucker stocks were also augmented in FY14 with an additional 100 razorback sucker larvae from Lake Mead and approximately 4,500 razorback sucker fingerlings from Lake Mohave. The Lake Mead Fish Hatchery also received approximately 56,000 fingerling bonytail during FY14, marking the first time that this species has been reared at the facility. Previously, only adult bonytail had been held on station for short durations. The majority of bonytail received in FY14 were donated by the Wahweap State Fish Hatchery (Utah Division of Wildlife), and while it is more fish than originally planned for, staff from the LCR MSCP and NDOW are taking advantage of having these fish for future augmentation and research needs. The additional funding expended in FY14 was in support of rearing this increased number of fish.

A number of small stockings also occurred during FY14 in support of ongoing LCR MSCP work task activities. These stockings have been organized by river reach and include their associated work tasks where applicable. A total of 28 razorback sucker were stocked into Reach 1 during FY14 in support of ongoing research. Ten of these fish were sonic-tagged adult razorback sucker, and 18 were sonic-tagged juvenile razorback sucker. These fish were released in order to investigate habitat use and seasonal movements of adult and immature razorback sucker in the Grand Canyon (C13) and Lake Mead (C57), respectively. The NDOW also stocked 250 Lake Mead razorback sucker into Honeybee Pond at the Overton WMA for additional grow-out. A total of 97 razorback sucker were harvested from Center Pond at the Overton WMA and stocked into Reach 2 during FY14. These fish were from the 2008–09 year class and had an average TL of 500 mm (range 431–586 mm). The Lake Mead Fish Hatchery also provided 749 bonytail that were stocked into Davis Cove in support of research continuing under Work Task C41. A total of 514 bonytail were stocked into Reach 3 during FY14. A portion of these bonytail were sonic tagged for the purpose of investigating post-stocking distribution and survival (C39). The Lake Mead Fish Hatchery also released 30 sonic-tagged, juvenile flannelmouth sucker into Reach 3 in support of other ongoing research (C53). The final stockings of FY14 occurred in Reach 4. A total of 60 sonic-tagged fish (30 bonytail and 30 razorback sucker) were released, with 15 fish of each species

being stocked above and below Headgate Dam. Subsequent monitoring of these fish was used to evaluate post-stocking distribution, habitat use, and survival (C49).

As described above, only minimal stockings of Lake Mohave razorback sucker occurred during FY14. A large portion of these fish were being reared to 500 mm and would require additional time for grow-out. These fish will be stocked into Lake Mohave beginning in FY15, and additional fish brought to the Lake Mead Fish Hatchery in subsequent years are anticipated to be used for Reach 3–5 stockings. Currently, over 47,000 native fish from multiple year classes remain on station. These fish will be stocked or made available for research purposes as needs are identified.

FY15 Activities: The NDOW will continue to operate the Lake Mead Fish Hatchery for bonytail, flannelmouth sucker, and razorback sucker production. Operations will include grow-out and stocking of native fish from the 2010–13 year classes, capture and rearing of up to 500 wild-caught razorback sucker larvae from Lake Mead, rearing of 5,000 additional fingerling Lake Mohave razorback sucker, and rearing of up to 100 juvenile flannelmouth sucker from Lake Mead and Reach 3 for research.

The NDOW will also continue to make improvements to the Lake Mead Fish Hatchery, including an electrical upgrade, which will enhance the ability to flow condition native fish prior to stocking. It is anticipated that the hatchery will begin pre-stocking and flow conditioning native fish. They will stock approximately 2,000 Lake Mohave razorback sucker toward annual fish augmentation goals in FY15. This flow conditioning work was initiated under Work Task C26 (closed), and these experimental alternative stocking trials will be conducted under Work Task C61.

Proposed FY16 Activities: Rearing and stocking of native fish from previous year classes will continue. Lake Mead Fish Hatchery stocks will be augmented with 2016 year class razorback sucker larvae from Lake Mead, and the NDOW will receive and rear up to 6,000 additional fingerling bonytail and razorback sucker from the SNARRC and Lake Mohave, respectively. Adult and subadult Lake Mead razorback sucker will also be delivered to the Overton WMA and additional off-channel grow-out sites as necessary. Bonytail stockings from Lake Mead Fish Hatchery are expected to begin in FY16.

Pertinent Reports: Annual administrative reports are available upon request.

Work Task B7: Lake-Side Rearing Ponds

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$200,000	$223,986.77	$1,878,570.64	$200,000	$200,000	$200,000	$200,000

Contact: Eric Loomis, (702) 293-8519, eloomis@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: Maintain fish rearing capability, provide razorback sucker and bonytail to the LCR MSCP Fish Augmentation Program, and accomplish species research

Conservation Measures: RASU3, RASU4, RASU5, RASU6, BONY3, BONY4, and BONY5

Location: Reach 2, Lake Mohave, Arizona/Nevada

Purpose: To operate and maintain fish grow-out areas along the Lake Mohave shoreline to contribute to razorback sucker broodstock development

Connections with Other Work Tasks (Past and Future): Activities are related to Work Tasks B2, B4, and B5, as fish for grow-out ponds may come from the Willow Beach NFH, SNARRC, and/or the Bubbling Ponds Fish Hatchery. In addition, some of the fish rearing research activities outlined in Work Tasks C10, C11, C34 (closed), C40, C41, and C44 (closed) may be conducted at these ponds.

Project Description: Lake Mohave is operated by Reclamation as a re-regulation reservoir. It fluctuates annually within a 15-foot vertical range, filling by mid-May and lowering to an annual minimum in October. Wave actions redistribute sediment deposits from desert washes and shape these deposits into sandbars or natural berms. In some areas, these sandbars isolate the lower portions of the desert washes from the lake proper, and when the lake is at full pool, lake-side ponds form at many of these washes. Reclamation and its partners in the Lake Mohave Native Fish Work Group have been using these lake-side ponds since 1993 as rearing and grow-out areas for razorback sucker and bonytail. The ponds are stocked with juvenile fish as the reservoir fills (typically stocked in late January). LCR MSCP staff monitor the fish and manage the ponds throughout the growing season. This work includes periodic monitoring of plankton production, removal of weeds and debris, installing and maintaining solar well pumps to mix the water and provide sufficient oxygen levels,

population monitoring through the use of remote sensing technologies, and routine monitoring of physical, chemical, and biological parameters. The ponds are normally harvested in the fall as the lake elevation declines. The fish from these ponds are then released back into Lake Mohave. Reclamation anticipates the need for these ponds to support razorback sucker and bonytail conservation through the life of the program (FY55).

Previous Activities: These ponds have been in use since 1993, and more than 32,000 razorback sucker have been reared and repatriated into Lake Mohave. In an effort to expedite development of razorback sucker broodstock, the target size for repatriation was increased to 500 mm TL during 2007. Since this new target size went into effect, the ponds have been managed to rear larger-size fish for the program. Typically, razorback sucker in excess of 300 mm TL are stocked into the ponds and then harvested in the spring and fall. Beginning in 2012, surplus in situ spawned fish were harvested and fin clipped and/or PIT tagged and transferred to Reach 3 below Davis Dam.

FY14 Accomplishments: Five backwaters were stocked at the beginning of the year with juvenile razorback sucker that were originally collected from Lake Mohave as larvae and then reared at the Willow Beach NFH. All fish were stocked at a size of at least 300 mm TL to fulfill LCR MSCP augmentation goals. While all stockings of the Lake Mohave backwaters supported work under Work Task B7, several of the backwaters were also used to conduct concurrent species research work tasks. Specifically, the North Chemehueve and Willow backwaters were stocked solely in support of Work Task B7. The Arizona Juvenile (AJ), Dandy, and Yuma Cove backwaters were stocked as part of Work Task C40. The backwaters received 210, 52, 197, 198, and 98 razorback sucker, respectively, for a total of 755 razorback sucker credited to the program. The total number of fish repatriated into Lake Mohave from the 2014 stockings was 375. The mean TL for all backwater pond fish at harvest was 422 mm, with a range of 371–468 mm. The year class for all fish stocked in 2014 was 2011, except for North Chemehueve, which was year class 2010. All fish were PIT tagged prior to initial stocking into the backwaters. Fish were scanned at the time of harvest, and a new tag was inserted if the original PIT tag was not detected. A total of 66 stocked adult razorback sucker (mean TL = 514) were netted from the Yuma Cove backwater in May 2014, and all fish were returned to the backwater as part of Work Task C40. A total of five in situ-produced fish greater than 300 mm captured from North Chemehueve were PIT tagged and transferred to Reach 3 to supplement LCR MSCP augmentation initiatives. An additional lot of more than 160 spawned razorback sucker captured from the ponds less than 300 mm TL were PIT tagged and released into Reach 3. Table 1 lists the numbers of fish repatriated into Lake Mohave from the 2014 harvest, excluding the Yuma Cove and Davis backwaters.

Table 1.—2014 Stocked Adult Razorback Sucker Repatriated into Lake Mohave from Lake-Side Rearing Ponds

Backwater		Number Stocked		Mean TL at Stocking (mm)		Number Harvested		Mean TL at Harvest (mm)		Percent Harvested from 2014 Stocking
Yuma Cove*		98		372		0		0		0.0
Willow		52		376		1		N/A		1.9
Dandy		198		373		108		421		54.5
Arizona Juvenile		197		382		156		418		79.2
North Chemehuevi		210		379		110		428		52.4
Davis Cove		0		0		0		0		0.0
Total or overall mean value	**Total**	**755**	**Mean**	**376**	**Total**	**375**	**Mean**	**422**	**Mean**	**49.7**

* Backwater sampled with no repatriates released into Lake Mohave. The Yuma Cove backwater was excluded from the totals due to project goals related to Work Task C40.

A total of 480 year class 2009 adult bonytail provided by the SNARRC were stocked in equal proportions in the North Nine Mile, Nevada Larvae, and Nevada Egg backwaters in 2014 as part of Work Task C40. A total of 154 stocked adults and naturally spawned bonytail were harvested in 2014 and transferred to Davis Cove as part of Work Task C41. The mean TL for all backwater bonytail at harvest was 291 mm, with a range of 240–345 mm. None of the bonytail stocked into backwaters were used to fulfill LCR MSCP augmentation goals.

Expenditures against the FY14 budget were higher than estimated due to additional labor required to assist in reconstruction of a number of the lake-side ponds that were damaged by flooding. These ponds included AJ, Nevada Egg, and North Nine Mile. The NPS assisted in these reconstruction efforts.

FY15 Activities: Lake-side ponds are again being used for razorback sucker broodstock maintenance and development. Genetic and demographic investigations related to Work Task C40 in the AJ, Yuma, and Dandy backwaters will continue to be gathered, and in situ voluntarily spawned fish will continue to be harvested and released into downstream locations in Reach 3 below Davis Dam.

The North Nine Mile and Nevada Egg backwaters will again be stocked with bonytail to quantify genetic and demographic parameters. This work is related to investigations into reproductive success of razorback sucker in the AJ, Yuma, and Dandy ponds (C40). All harvested bonytail will be released into Davis Cove (C41).

Proposed FY16 Activities: Lake-side ponds along the shoreline of Lake Mohave will be operated and maintained for native fish. The ponds will be monitored regularly, with an initial harvest commencing in the spring and concluded in the fall as the lake elevation declines. Fish reared in these ponds will be released back into Lake Mohave for development and maintenance of razorback sucker broodstock. Voluntarily spawned fish from backwaters will continue to be transported downstream from Davis Dam.

Pertinent Reports: N/A

Work Task B8: Fish Tagging Equipment

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$100,000	$102,290.33	$767,737.85	$125,000	$135,000	$135,000	$135,000

Contact: Jon Nelson, (702) 293-8046, jnelson@usbr.gov

Start Date: FY04

Expected Duration: FY55

Long-Term Goal: Acquire and maintain a supply of fish tagging materials and equipment for marking fish to be released for research and for augmentation stockings

Conservation Measures: RASU3, RASU4, RASU5, RASU6, BONY3, BONY4, and BONY5

Location: N/A

Purpose: To mark fish released into the LCR for identification purposes to assess survival and distribution

Connections with Other Work Tasks (Past and Future): Activities are related to all work tasks that result in fish stocking for augmentation, fish research, and fish monitoring.

Project Description: Under the LCR MSCP, more than 1.2 million native fish will be reared and stocked into the LCR. Fish will be marked to assess distribution and survival and for effective research and decisionmaking. Funds provide for both tagging materials and detection equipment needed during monitoring and research. Reclamation anticipates the need for fish tags and tagging equipment throughout the life of the program.

Previous Activities: Fish released into the LCR have been tagged with 400-kHz PIT tags (Lake Mead and Lake Mohave, Reaches 1 and 2), 125-kHz PIT tags (Davis Dam to Parker Dam, Reach 3), and wire tags (Davis Dam to Imperial Dam, Reaches 3, 4, and 5). Recaptured fish below Parker Dam have been retagged with 125-kHz PIT tags. In addition, both radio tags and sonic tags have been implanted in fish used for research on Lakes Mead, Mohave, and Havasu. Fin clipping and floy tags have been used for short-term survival studies in some rearing and grow-out ponds.

In 2006, we began using new 134.2-kHz frequency PIT tags. These new tags have a greater detection range than the previously used tags (12 versus 2 inches away from fish) and will allow for testing and deployment of remote listening stations within spawning areas and other locations on the LCR. Purchase of the new PIT tags, tag readers, and antennae began in 2006. A total of 72,651 razorback sucker and 17,454 bonytail were PIT tagged and/or wire tagged and released into the LCR between 2006 and 2008. More recent stockings have included 24,299 razorback sucker and 6,579 bonytail in 2009, 22,476 razorback sucker and 4,993 bonytail in 2010, and 25,598 razorback sucker and 7,122 bonytail in 2011. In 2012, 27,105 razorback sucker and 7,821 bonytail were tagged and released into the LCR. These reported numbers of tagged fish represent the total number of fish implanted with tags and not the number of fish repatriated and credited under the LCR MSCP Fish Augmentation Program. They include fish used for research, smaller volunteer spawned fish that have been translocated into other areas, and fish that have been retagged due to tag loss or replacement of older frequency tags.

FY14 Accomplishments: PIT tags, tagging equipment, and tag readers were purchased as needed to mark fish for monitoring and research. A total of 24,919 razorback sucker and 8,628 bonytail were tagged (PIT and/or wire) and released into the LCR during 2014.

FY15 Activities: PIT tags, tagging equipment, and tag readers will be purchased as needed to mark fish for monitoring and research. The increase in funding beginning in FY15 reflects the expanded use of and reliance on PIT technology as a means for increasing re-contact probabilities and improving data collection. In addition, augmentation numbers are expected to increase. To prepare for these increases, additional tags will be purchased.

Proposed FY16 Activities: PIT tags, tagging equipment, and tag readers will continue to be purchased as needed to mark fish for monitoring and research. Budget estimates reflect increased fish number goals and the need for additional supplies and equipment to support ongoing tagging and remote sensing research and monitoring efforts.

Pertinent Reports: N/A

Work Task B11: Overton Wildlife Management Area

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$50,000	$50,000.00	$400,290.37	$50,000	$50,000	$20,000	$20,000

Contact: Jim Stolberg, (702) 293-8206, jstolberg@usbr.gov

Start Date: FY06

Expected Duration: FY18

Long-Term Goal: Develop and maintain offsite rearing capability to augment production at State and Federal hatcheries

Conservation Measures: RASU3, RASU4, RASU6, RASU7, and RASU8

Location: Reach 1, Overton, Nevada

Purpose: To provide additional rearing capacity for razorback sucker

Connections with Other Work Tasks (Past and Future): This work task was initiated in April 2006 following approval from the Steering Committee and concurrence by the USFWS. This work task is closely related to the Work Tasks B6, C13, and D8. Ponds at the Overton WMA also receive fish from the Willow Beach National Fish Hatchery (B2) for grow-out and future repatriation.

Project Description: The Overton WMA is located in Clark County, Nevada, at the upper end of Lake Mead at the confluence of the Muddy and Virgin Rivers, 65 miles northeast of Las Vegas. The wildlife area is managed solely for fish and wildlife and their habitats and has limited public access. The Overton WMA covers more than 17,000 acres and includes three primary waterfowl management ponds, all of which are available for native fish culture.

The LCR MSCP activities for this site include receiving Lake Mead and Lake Mohave razorback sucker for grow-out to target size (300+ mm) for future program needs. The Overton WMA may also provide opportunities to conduct species research under the LCR MSCP AMP. As the USFWS nears completion of the Razorback Sucker Recovery Plan for the LCR, in which the Lake Mead razorback sucker will likely be identified as a recovery population, it is prudent to maintain this site as a grow-out location for native fish.

Previous Activities: Designs for site modifications, including repair and improvement to water delivery infrastructure to facilitate managing Honeybee and Center Ponds for native fish culture, were completed in 2006. Improvements to the water delivery infrastructure for Honeybee and Center Ponds were completed in 2007 and followed with stockings of native fish in both ponds. Due to low native fish survival and invasion of non-native fish species, stockings in Honeybee Pond ceased in 2008. Plans to remove non-native fish species and investigate potential means of renovating Honeybee Pond were scheduled for future years. Between 2009 and 2011, a total of 4,615 razorback sucker were stocked into Center Pond. From this time through the present, stocked fish and pond water quality have been monitored on a biannual and monthly basis, respectively. Pond improvements, maintenance, and repairs have also been performed since 2008 and have included the purchase of a chemical spray unit to curtail aquatic vegetation and maintain sufficient open water areas, installation of a new boat ramp in the northeast corner of Center Pond, purchase of a new outlet structure and valves, and renovation of Honeybee Pond.

FY14 Accomplishments: A total of 250 adult, Lake Mead razorback sucker were stocked into Honeybee Pond during the spring of FY14. These fish are being reared in support of Lake Mead razorback sucker conservation efforts and will be harvested and repatriated in future years as needed. No razorback sucker were stocked into Center Pond during FY14 due to the estimated size of the current pond population; however, field work associated with Center Pond was conducted and included monthly monitoring of pond water quality as well as fall and winter sampling events to assess razorback sucker pond stock. Fall and winter sampling events yielded a total of 23 and 115 razorback sucker, respectively. Razorback sucker dominated the catch as expected, accounting for 61% of the total capture. All razorback sucker captured during the winter sampling event were removed from the pond for augmentation or research purposes. A total of 97 razorback sucker with an average TL of 500 mm (range 431–586 mm) were released into Lake Mohave. The remaining 18 razorback sucker from the winter sampling event were release into Lake Mead in support of ongoing research and monitoring efforts (C13 and D8). A portion of FY14 funding was also used to support associated activities at the Lake Mead Fish Hatchery.

FY15 Activities: Pond stocks at the Overton WMA will be augmented in FY15 with additional stockings of Lake Mead and Lake Mohave razorback sucker into Honeybee and Center Ponds, respectively. Razorback sucker in both ponds will be monitored as needed using standards methods such as hoop nets, trammel nets, remote PIT tag scanners, and/or electrofishing. Water quality information will be collected quarterly, as well as in association with all fish monitoring activities, using standardized methods consistent with water quality data collection from

previous project segments. Management of aquatic vegetation and routine maintenance on the existing water delivery infrastructure will be performed as necessary.

Proposed FY16 Activities: The NDOW will continue to manage the Overton WMA ponds in support of LCR MSCP needs. Fish populations and water quality will also continue to be monitored through routine sampling efforts. Site and infrastructure improvements will continue, as needed, in support of future conservation efforts.

Pertinent Reports: Annual administrative reports are available upon request.

Work Task B12: Maintenance of Alternate Bonytail Broodstock

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$0	$0	$0	$0	$50,000	$50,000	$50,000

Contact: Ty Wolters, (702) 293-8463, twolters@usbr.gov

Start Date: FY16

Expected Duration: FY55

Long-Term Goal: Fish augmentation

Conservation Measures: BONY3 and BONY4

Location: To be determined

Purpose: To support maintenance of the alternate bonytail broodstock and potentially provide bonytail to the LCR MSCP Fish Augmentation Program

Connections with Other Work Tasks (Past and Future): N/A

Project Description: Bonytail are federally listed as "endangered" under the ESA and are often referred to as critically endangered; they are considered functionally extirpated from their historical range, and their persistence in the Colorado River Basin now relies entirely on stocking. The SNARRC maintains the only bonytail broodstock in the world and has developed a second broodstock. To guard against a catastrophic event, the second broodstock needs to be moved to another facility to secure the species' genetics. Having redundancy to safeguard this species is not only critical for its conservation, but it has benefits for the LCR MSCP. The maintenance of the current broodstock has provided the source of all the bonytail for the LCR MSCP Fish Augmentation Program. The LCR MSCP will again benefit greatly by having a redundant location to safeguard this species against future events that may limit the ability to meet program augmentation goals.

This work task will partially support the relocation and maintenance of the second bonytail broodstock developed by the SNARRC. Depending on the selected location, its capacity, and degree of development, this new broodstock may also produce bonytail for the LCR MSCP Fish Augmentation Program. Budget

estimates will reflect the LCR MSCP cost share in the maintenance of the new broodstock as well as the amount of fish received for repatriation into the LCR as part of the augmentation program.

Previous Activities: This is a new start in FY16.

FY14 Accomplishments: This is a new start in FY16.

FY15 Activities: This is a new start in FY16. Discussions are ongoing to determine the location of the new bonytail broodstock. If the decision is made to relocate the broodstock in FY15, funds to help support this will need to come from Work Task G3.

Proposed FY16 Activities: Funding will be provided to help support the relocation and maintenance of the new bonytail broodstock.

Pertinent Reports: N/A

WORK TASKS – SECTION C

Species Research

Work Task C2: Sticky Buckwheat and Threecorner Milkvetch Conservation

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$11,000	$21,811.11	$105,177.69	$11,000	$11,000	$11,000	$11,000

Contact: Carrie Ronning, (702) 293-8106, cronning@usbr.gov

Start Date: FY06

Expected Duration: FY30

Long-Term Goal: Support existing conservation programs for covered plant species

Conservation Measures: STBU1 and THMI1

Location: Reach 1, Nevada

Purpose: To provide funding to support existing conservation programs for sticky buckwheat and threecorner milkvetch

Connections with Other Work Tasks (Past and Future): These are stand-alone conservation measures as described in the LCR MSCP HCP.

Project Description: Sticky buckwheat and threecorner milkvetch are covered species within the LCR MSCP. Funding in the amount of $10,000 per year will be provided to an ongoing conservation program or other entity approved by the USFWS to implement conservation activities for these two plant species. Funding may be advanced for up to 5 years, depending on availability, to keep administrative costs at a minimum.

Previous Activities: From 2008 to 2013, the NPS monitored select populations of sticky buckwheat and threecorner milkvetch within the Lake Mead National Conservation Area. Monitoring included presence/absence surveys from 2008 to 2013 and invasive weed removal in 2013 at select sites.

A minor modification to the conservation measures for both plants was written and approved by the USFWS on January 4, 2011, following approval by the Steering Committee. The language was changed to state that funding would go "to an ongoing Conservation Program or other entity approved by the USFWS to implement conservation activities for the threecorner milkvetch and sticky buckwheat."

FY14 Accomplishments: A new 5-year interagency agreement between Reclamation and the NPS was finalized in the amount of $10,000 per year for 5 years (FY14–18) to support conservation activities for these two plant species in accordance with the NPS' *Lake Mead National Recreation Area Resource Stewardship Strategy, November 2014*. Threecorner milkvetch populations at Sandy Cove were monitored. Sticky buckwheat populations located between Lime Cove and Glory Hole were not monitored due to the conflict with the trespass cattle in the area. A total of 63.9 acres of potential sticky buckwheat and threecorner milkvetch habitat were surveyed for the invasive Sahara mustard (*Brassica tournefortii*). Sahara mustard was removed from 5.1 acres of the dunes/sandy areas and surrounding beaches at Sandy Cove, Lime Cove, and Ebony Cove. An annual report was provided to Reclamation that summarized the achievements toward conservation goals for sticky buckwheat and threecorner milkvetch.

FY14 obligations exceeded the FY approved estimate due to increased administrative costs to close out the FY08–13 interagency agreement and establish the new 5-year interagency agreement.

FY15 Activities: Funds in the amount of $10,000 will be transferred to the NPS per the above-described agreement to implement conservation activities for these two plant species. An annual report will be provided to Reclamation that summarizes the achievements toward conservation goals for sticky buckwheat and threecorner milkvetch.

Proposed FY16 Activities: Funds in the amount of $10,000 will be transferred to the NPS per the above-described agreement to implement conservation activities for these two plant species. An annual report will be provided to Reclamation that summarizes the achievements toward conservation goals for sticky buckwheat and threecorner milkvetch.

Pertinent Reports: A report titled *Surveys of Threecorner Milkvetch (Astragalus geyeri* var. *triquetrus) and Sticky Buckwheat (Eriogonum viscidulum) in Fiscal Year 2014 – Lake Mead National Recreation Area* will be posted on the LCR MSCP Web site upon completion.

Work Task C3: Lower Colorado River Multi-Species Conservation Program Covered Species Profile Development

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$15,000	$9,297.76	$278,197.59	$10,000	$0	$0	$0

Contact: Sonja Kokos, (702) 293-8033, skokos@usbr.gov

Start Date: FY05

Expected Duration: FY15

Long-Term Goal: Species research

Conservation Measures: MRM1, MRM2, MRM3, CLRA1, CLRA2, WIFL1, WIFL2, DETO1, DETO2, BONY2, RASU2, WRBA1, WRBA2, WYBA1, WYBA3, DPMO1, CRCR1, CRCR2, YHCR1, YHCR2, LEBI1, BLRA1, BLRA2, YBCU1, YBCU2, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, FTHL1, FTHL2, FLSU1, MNSW1, MNSW2, CLNB1, CLNB2, PTBB1, PTBB2, CRTO1, CRTO2, CRTO3, LLFR1, LLFR2, and LLFR3

Location: System-wide, Arizona, California, Nevada

Purpose: To assess existing knowledge on each LCR MSCP covered species to determine research needs and habitat requirements for current and future habitat creation projects

Connections with Other Work Tasks (Past and Future): Information collected during this literature review is currently being used to develop future work tasks, design monitoring programs, design habitat creation projects, and implement the adaptive management process. Information from this work task will be utilized under Work Task E16.

Project Description: To successfully create habitat for LCR MSCP covered species, species accounts have been developed based on extensive literature searches, and they include the most recent scientific information. These accounts include current information about each species' legal status, life history, distribution, habitat requirements, behavior, and LCR MSCP conservation measures as they relate to the creation and management of the species' habitats, enabling the successful completion of conservation measures.

Species accounts were written for both covered and evaluation species, including known habitat requirements and management concerns. Data gaps were identified to set covered species research priorities. LCR MSCP research and monitoring data needs have been identified for each covered and evaluation species where appropriate. These needs have been prioritized in a 5-year plan and will be completed according to importance, urgency, and cost. Other potential research and monitoring opportunities, either identified through this process or by other scientists or conservation programs, which are outside of the scope and purpose of the LCR MSCP have also been listed in the plan.

Previous Activities: Species accounts for the 25 covered and 5 evaluation species listed in the HCP that utilize terrestrial, marsh, and riparian habitats were completed in 2008. In 2013, new information was incorporated and updated internally into the species accounts. Literature searches, literature acquisition, and data compilation were conducted to update the species accounts. Species accounts for razorback sucker, bonytail, flannelmouth sucker, summer tanager, vermilion flycatcher, western red bat, California leaf-nosed bat, pale Townsend's big-eared bat, and gilded flicker were completed.

FY14 Accomplishments: Updated species accounts for Arizona Bell's vireo, yellow warbler, Yuma clapper rail, California black rail, western least bittern, western yellow bat, relict leopard frog, Colorado River toad, lowland leopard frog, Yuma hispid cotton rat, Colorado River cotton rat, desert pocket mouse, elf owl, Gila woodpecker, desert tortoise, flat-tailed horned lizard, humpback chub, sticky buckwheat, and three-corner milkvetch were completed in FY14.

FY15 Activities: A species account for MacNeill's sootywing will be completed, and updates to species accounts for willow flycatcher and yellow-billed cuckoo will be initiated using information from the CEMs. An updated species account report will be posted on the LCR MSCP Web site upon completion.

Proposed FY16 Activities: This work task is being closed and moved to Work Task G5. CEMs integrate and organize existing knowledge of a species and frame each life stage based on management's needs.

Pertinent Reports: The 2014 report titled *Species Accounts for the Lower Colorado River Multi-Species Conservation Program Covered Species* will be posted on the LCR MSCP Web site upon completion.

Work Task C4: Relict Leopard Frog

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$11,000	$10,846.42	$99,300.80	$11,000	$0	$0	$0

Contact: Allen Calvert, (702) 293-8311, acalvert@usbr.gov

Start Date: FY06

Expected Duration: FY15

Long-Term Goal: Support existing relict leopard frog conservation programs

Conservation Measures: RLFR1

Location: Reach 1, Nevada and Arizona

Purpose: To provide funding to support existing relict leopard frog conservation programs

Connections with Other Work Tasks (Past and Future): This is a stand-alone conservation measure as described in the LCR MSCP HCP.

Project Description: Assistance with and contributions toward existing relict leopard frog research and conservation efforts initiated by the Relict Leopard Frog Conservation Team will be provided under the LCR MSCP. A total of $10,000 per year, for a period of 10 years, will be contributed to the team in order to implement planned, but unfunded, conservation measures.

Previous Activities: Funds in the amount of $10,000 annually, totaling $80,000, were transferred to the NPS to support their relict leopard frog conservation activities.

FY14 Accomplishments: Funds in the amount of $10,000 were transferred to the NPS. Relict leopard frog conservation activities supported by these funds were conducted at 19 sites within southern Nevada and northwestern Arizona. The conservation activities included:

- Releasing tadpoles and juvenile frogs at six experimental sites. Excess individuals were released back to the site from which they were collected.

- Conducting diurnal and nocturnal population surveys year round at 19 natural and experimental sites.

FY15 Activities: Funds in the amount of $10,000 will be transferred to the NPS. This is the final year of funding for Conservation Measure RLFR1, and it will fulfill the conservation measure to support implementation of planned, but unfunded, conservation measures for the relict leopard frog. Concurrence will be requested from the USFWS upon completion of Conservation Measure RLFR1.

Proposed FY16 Activities: This work task was closed in FY15.

Pertinent Reports: The *Relict Leopard Frog Monitoring and Management, 2014 Activity Report* will be posted on the LCR MSCP Web site upon completion.

Work Task C6: Insectivore Prey Base Abundance and Diversity in Conservation Areas

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$265,000	$0.00	$101,441.68	$0	$0	$0	$0

Contact: Barbara Raulston, (702) 293-8396, braulston@usbr.gov

Start Date: FY06

Expected Duration: Closed in FY14

Long-Term Goal: Species research

Conservation Measures: WIFL1, WIFL2, YBCU1, YBCU2, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, WRBA2, WYBA3, CLNB2, and PTBB2

Location: Topock Marsh (Reach 3), BLCA (Reach 3), CVCA (Reach 4), PVER (Reach 4), Bill Williams River NWR (as control), and the LDCA

Purpose: The purpose of this study is to determine the presence of insect and arachnid species at LCR MSCP conservation areas and the Bill Williams River NWR and to estimate abundances by species. Few restoration programs address arthropods as part of habitat development and restoration projects. Wildlife species key in on riparian habitat because of microclimate conditions, canopy cover, and the prey abundance provided. Additionally, healthy riparian habitats are linked to the vital roles arthropods play as pollinators, decomposers, herbivores, seed dispersers, and food sources.

Several LCR MSCP covered species are insectivores and may be selecting breeding habitat based on prey availability. According to the LCR MSCP HCP, created habitat will be specifically managed to ensure production of the LCR MSCP covered species insect prey base.

Several habitat creation sites that are of the correct structure for several covered species are now available as a result of LCR MSCP implementation. Most of these habitat creation sites used mass planting techniques to establish target tree densities similar to known densities of covered species habitat. This technique has been effective and successful for the development of habitat for the LCR MSCP, but it circumvents the typical and gradual stages of plant succession (i.e., changes in species composition over time) that take place as habitats develop slowly over time.

These gradual processes allow for a simultaneous succession of arthropod species. Data are needed to show which arthropod species are currently present or absent at LCR MSCP sites.

LCR MSCP habitat creation sites, in time, are expected to support an abundance and diversity of insects associated with more natural habitats, thus contributing to the availability of prey for LCR MSCP covered insectivorous species (LCR MSCP HCP).

Connections with Other Work Tasks (Past and Future): This is a re-initiation of Work Task C6 (FY06–07), and it was initially developed from Work Task C20 (closed). This work task parallels Work Task C5 (closed).

Project Description: The presence/absence and abundance of arthropods at LCR MSCP sites will be further studied in order to fill in gaps in the knowledge of arthropod species, thereby contributing to the routine evaluation of habitat health and habitat use by LCR MSCP covered species. Surveys will be conducted at existing vegetation monitoring plot locations. Insect species richness and estimates of abundance will be determined at LCR MSCP vegetation monitoring plots. In order to develop a more complete picture of the diversity of insects and arachnids that are using LCR MSCP habitat plus a natural area in the same region, all crawling, leaf-dwelling, and flying insects and arachnids found during the surveys will be identified to species or logged with a unique identifier if identification is not possible.

Previous Activities: We identified insects collected from salt cedar (*Tamarix ramosissima*) flowers during FY06 at Topock Marsh, Arizona, where earlier work identified insects eaten by southwestern willow flycatcher. We also estimated specificities of insects to tamarisk flowers by determining proportions of pollen carried comprised of tamarisk pollen. All insects collected were specific to tamarisk flowers, with pollen loads comprising greater than 86% tamarisk pollen on leaf-cutting bees and the native bee *Melissodes tepida* and greater than 95% on other insects. In FY13, the project was delayed to evaluate the purpose of the study.

FY14 Accomplishments: The study of insectivore prey base and abundance was not implemented following a review of the purpose of the study. Monitoring of insectivore prey may be conducted in the future in Post-Development Monitoring (Section F).

FY15 Activities: This work task was closed in FY14.

Proposed FY16 Activities: This work task was closed in FY14.

Pertinent Reports: Annual reports are posted on the LCR MSCP Web site.

Work Task C10: Razorback Sucker Rearing Studies

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$125,000	$133,266.56	$1,000,660.01	$0	$0	$0	$0

Contact: Andrea Finnegan, (702) 293-8203, afinnegan@usbr.gov

Start Date: FY06

Expected Duration: FY14

Long-Term Goal: Provide information from research to inform managers of ways to improve the efficiency and effectiveness of the LCR MSCP Fish Augmentation Program

Conservation Measures: RASU3, RASU4, and RASU6

Location: Various locations, including hatcheries, rearing ponds, universities, and private research facilities

Purpose: To evaluate factors affecting rearing of subadult razorback sucker to maximize quantity and quality of razorback sucker produced for the LCR MSCP

Connections with Other Work Tasks (Past and Future): This work task is a companion study to Work Task C11 and may share some of the same locations, source data, and testing staff during implementation. Also, investigations carried out may be conducted at hatcheries identified in Fish Augmentation (Section B).

Because of similarities in goals and scope with Work Task C61, this work task will be merged with Work Task C61 in FY15. The proposed activities and corresponding budget estimates for FY15 will likewise be captured under Work Task C61. This is a logical merger of these work tasks, as information from this type of research will allow the development and testing of conditioned fish as experimental stocking treatments. These treatments will then be used to test whether different types of conditioning will translate to improved survival of stocked fish. Additionally, the sharing of overlapping resources is expected to increase efficiency in implementation and reporting, and it may also reduce overall expenditures.

Project Description: Funding provided for this work task is to be used for investigating the rearing and culture practices of razorback sucker. The goal is to investigate ways to accelerate growth and improve post-stocking survival of razorback sucker through manipulation of physical, chemical, and biological attributes of the rearing environment.

Objectives:

- Evaluate factors affecting growth in aquaculture
- Evaluate polyculture techniques to maximize rearing capabilities
- Identify requirements to rear razorback sucker to 500 mm using existing facilities at the Willow Beach NFH
- Evaluate predator recognition and avoidance training

Previous Activities: Literature reviews, site visits to razorback sucker aquaculture facilities, communication with fisheries professionals, and workshops led to the development of hypotheses for single-variable experimental designs.

Factors that affect razorback sucker growth in captivity have been evaluated, and methods to improve growth rates at the Bubbling Ponds Fish Hatchery have been identified. Results showed that growth rates of razorback sucker are 6–9 mm per month; this is consistent among ponds, and all tested densities are temperature independent. Growth may be enhanced by separating fast-growing and slow-growing fish after the first year, substantially reducing fish density, and modifying the water delivery system to eliminate *Ichthyophthirius multifiliis* (Ich) from hatchery source water.

A study of the polyculture of razorback sucker and bonytail was conducted at the Achii Hanyo Native Fish Rearing Facility, which concluded that the polyculture was not detrimental to either species provided densities did not exceed carrying capacity. The study is no longer being conducted at the station due to difficulties with maintaining pond densities with voluntarily spawned bonytail.

Razorback sucker growth studies at the Willow Beach NFH concluded that current production rates prohibited achieving fish growth of 500 mm TL within 4 years. In order to achieve the desired 500 mm TL for all fish, annual production would have to be reduced to a total of 1,600 razorback sucker instead of the production rate of 8,000 razorback sucker (7,000 to 300 mm TL and 1,000 razorback sucker to 400 mm TL).

FY14 Accomplishments: A predator conditioning study was completed at the Bubbling Ponds Native Fish Conservation Facility. Razorback sucker were exposed to the alarm pheromone in the presence of a predator fish that had its jaw

paralyzed using botulinum toxin (making it unable to actively feed) to test if razorback sucker could be conditioned to recognize largemouth bass and channel catfish as a danger. Razorback sucker were exposed to the predator and the alarm pheromone for 5 minutes and then transferred to a tank of actively feeding predators. Conditioned fish had a higher percent of survival than unconditioned fish. For the largemouth bass trials, 52% of conditioned razorback sucker survived compared to 14% of unconditioned razorback sucker. During the channel catfish trials, 86% of conditioned razorback sucker survived compared to 63% of unconditioned razorback sucker. When exposed to both the largemouth bass and channel catfish, 35% of the conditioned razorback sucker survived compared to 16% of unconditioned razorback sucker.

Six ponds were improved to complete predator avoidance trials. Remote PIT scanners were developed to optimize the antenna design for the ponds. A total of 1,000 razorback sucker were grown out for predator conditioning trials.

FY15 Activities: This work task was closed in FY14.

Proposed FY16 Activities: This work task was closed in FY14.

Pertinent Reports: Scopes of work and project reports are available upon request. The reports titled *Effects of Disease Treatments on Growth of Razorback Sucker, Effects of Capture by Trammel Nets on Native Arizona Fishes,* and *Factors Affecting Growth of Razorback Sucker in Captivity: Literature Review and Knowledge Assessment* are available on the LCR MSCP Web site.

Work Task C11: Bonytail Rearing Studies

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$150,000	$153,129.68	$1,010,411.59	$0	$0	$0	$0

Contact: Andrea Finnegan, (702) 293-8203, afinnegan@lc.usbr.gov

Start Date: FY06

Expected Duration: FY14

Long-Term Goal: Provide information from research to inform managers of ways to improve the efficiency and effectiveness of the LCR MSCP Fish Augmentation Program

Conservation Measures: BONY3, BONY4, and BONY5

Location: Various locations, including hatcheries, rearing ponds, universities, and private research facilities

Purpose: To evaluate factors affecting growth of subadult bonytail to maximize quantity and quality of bonytail produced for the LCR

Connections with Other Work Tasks (Past and Future): This work task is a companion to study Work Task C10 and may share some of the same locations, source data, and testing staff during implementation. Also, investigations carried out may be conducted at hatcheries identified in Fish Augmentation (Section B).

Because of similarities in goals and scope with Work Task C61, this work task will be merged with Work Task C61 in FY15. The proposed activities and corresponding budget estimates for FY15 will likewise be captured under Work Task C61. This is a logical merger of these work tasks, as information from this type of research will allow the development and testing of conditioned fish as experimental stocking treatments. These treatments will then be used to test whether different types of conditioning will translate to improved survival of stocked fish. Additionally, the sharing of overlapping resources is expected to increase efficiency in implementation and reporting, and it may also reduce overall expenditures.

Project Description: Funding provided for this work task is to be used for investigating the rearing and culture practices of bonytail. The goal is to investigate ways to accelerate growth and post-stocking survival of bonytail through manipulation of physical, chemical, and biological attributes of the rearing environment.

Objectives:

- Evaluate the species-specific diet for bonytail
- Evaluate predator recognition and avoidance training
- Evaluate predator recognition and avoidance retention

Previous Activities: Five fish feeds were evaluated – four experimental feeds and the currently used feed – to determine if alternative protein sources and/or lipid levels could improve the growth of bonytail. All five diets evaluated performed equally well. It was recommended that bonytail remain on the current diet until further research dictates otherwise.

FY14 Accomplishments: A predator conditioning study was completed at the Bubbling Ponds Native Fish Conservation Facility. Bonytail were exposed to the alarm pheromone in the presence of a predator fish that had its jaw paralyzed using botulinum toxin (making it unable to actively feed) to test if bonytail could be conditioned to recognize largemouth bass and channel catfish as a danger. Bonytail were exposed to the predator and alarm pheromone for 5 minutes and then transferred to a tank of actively feeding predators. Conditioned fish had a higher percent of survival than unconditioned fish. For the largemouth bass trials, 65% of conditioned bonytail survived compared to 34% of unconditioned bonytail. During the channel catfish trials, 98% of conditioned bonytail survived compared to 80% of unconditioned bonytail. When exposed to both the largemouth bass and channel catfish, 70% of conditioned bonytail survived compared to 41% of unconditioned bonytail.

FY15 Activities: This work task was closed in FY14.

Proposed FY16 Activities: This work task was closed in FY14.

Pertinent Reports: Scopes of work and project reports are available upon request. The reports titled *Bonytail Rearing Studies: Literature Review; Passive Integrated Transponders in Gila elegans: Location, Retention, Stress, and Mortality;* and *Stress Inducing Factors of Bonytail Hatchery and Stocking Practices* are available on the LCR MSCP Web site.

Work Task C13: Lake Mead Razorback Sucker Study

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$135,000	$135,247.93	$1,666,002.31	$135,000	$0	$0	$0

Contact: Jim Stolberg, (702) 293-8206, jstolberg@usbr.gov

Start Date: FY05

Expected Duration: FY15

Long-Term Goal: Investigate conditions that allow for natural recruitment of razorback sucker in Lake Mead

Conservation Measures: RASU7

Location: Reach 1, Lake Mead, Nevada/Arizona.

Purpose: To assess the razorback sucker population and recruitment in Lake Mead

Connections with Other Work Tasks (Past and Future): This work task was previously included in the draft FY05 work tasks as Work Task D7. The long-term monitoring portion of this work has now been moved to Work Task D8, and larvae collected through that effort are being reared at the Lake Mead Fish Hatchery (B6) and Overton WMA (B11).

Project Description: Funding and support of the ongoing studies of razorback sucker in Lake Mead will continue. The focus areas of these studies are to:

- Locate populations of razorback sucker in Lake Mead
- Document use and availability of spawning areas at various water elevations
- Monitor potential nursery areas
- Continue aging of captured razorback sucker
- Confirm recruitment events that may be tied to physical conditions in the lake

Previous Activities: In 1995, the SNWA, NDOW, and Reclamation began a monitoring program for razorback sucker in Lake Mead. Between 1995 and 2004, some 200 adult and 30 juvenile razorback sucker were captured. Aging data showed that a low level of recruitment had occurred in at least 22 of the past 30 years. This recruitment has happened in the face of extensive non-native fish populations and declining lake elevations. A summary report of the first 10 years of the study was completed and posted on the LCR MSCP Web site. The general sites identified in that report are now part of the long-term monitoring for razorback sucker in Lake Mead (D8). Research under this work task began focusing on an additional area of Lake Mead, the Colorado River inflow, in FY10, and was further expanded to include the lower Grand Canyon in FY13 as part of a multi-agency cooperative effort. Similar to past research efforts on Lake Mead, this work uses hatchery-reared and wild, sonic-tagged razorback sucker to assist researchers in locating spawning aggregates. Through FY13, 27 hatchery-reared and wild razorback sucker have been sonic or radio tagged as part of this effort. These fish have provided information that assisted in the capture of 82 razorback sucker larvae, 12 flannelmouth sucker larvae, 42 wild adult razorback sucker, and approximately 500 flannelmouth sucker from the Colorado River inflow. All captured adult and subadult native fish were marked with PIT tags for individual identification before being released back into Lake Mead, and all captured razorback sucker have been aged between 2 and 11 years old.

FY14 Accomplishments: Nine adult razorback sucker were obtained from the Lake Mead Fish Hatchery (B6) and surgically implanted with sonic transmitters in March 2014. These fish were stocked into the lower Grand Canyon below Lava Falls and actively or passively tracked throughout the year. An additional two wild razorback sucker captured at the Colorado River inflow during routine sampling were also implanted with sonic tags and tracked throughout the remainder of the study year. In total, habitat use and information pertaining to movement patterns of razorback sucker were obtained from 25 sonic-tagged fish that were contacted during the year. These 25 fish included the 11 released in 2014 as well as an additional 14 fish that were released during prior study years. Some sonic-tagged fish were observed to use both the Colorado River inflow and lower Grand Canyon regardless of where they were released, which may indicate that both areas provide important habitat for this species. Using sonic-tagged razorback sucker contacts to locate potential spawning sites, trammel netting was used to capture adults where concentrations of razorback sucker were suspected. From 1,344 net-hours, 4 razorback sucker, 7 razorback-flannelmouth sucker hybrids, and 251 flannelmouth sucker were captured. Of these fish, 3 razorback sucker and 32 flannelmouth sucker were recaptured fish. A fin ray specimen was obtained from the single newly caught razorback sucker for aging purposes. This fish was determined to be a 3-year-old juvenile, measuring 429 mm TL. Catostomid larval sampling was also conducted throughout the spawning season, resulting in the capture of 167 razorback sucker and 33 flannelmouth sucker larvae.

FY15 Activities: All research actions, including larval sampling, trammel netting, tracking of sonic-tagged fish, evaluating growth rates of recaptured fish, and fin ray sectioning for aging adult and subadult razorback sucker are expected to continue. Data obtained through these continuing actions will help further identify the size, age structure, habitat use, spawning areas, and recruitment patterns of razorback sucker located in the Colorado River inflow and lower Grand Canyon. A final project report will be completed in FY15; however, parts of this research may transition into monitoring and be continued at a reduced effort under Work Task D8 in subsequent years.

Proposed FY16 Activities: This work task was closed in FY15.

Pertinent Reports: A report titled *Razorback Sucker Research and Monitoring in the Colorado River Inflow Area of Lake Mead and the Lower Grand Canyon, Arizona and Nevada* will be posted on the LCR MSCP Web site upon completion.

Work Task C14: Humpback Chub Program Support

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$57,000	$1,949.93	$287,899.90	$57,000	$57,000	$57,000	$57,000

Contact: Ty Wolters, (702) 293-8463, twolters@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: Support humpback chub conservation

Conservation Measures: HUCH1

Location: Grand Canyon, Arizona; Willow Beach, Arizona; Dexter, New Mexico

Purpose: To provide support to the Glen Canyon Dam AMP for conservation of humpback chub

Connections with Other Work Tasks (Past and Future): This work task is connected to Work Tasks B2 and B4, as money will be transferred to the USFWS through an agreement for activities at the Willow Beach NFH and SNARRC.

Project Description: A total of $500,000 over the life of the LCR MSCP (50 years) will be provided for the Glen Canyon Dam AMP, or other programs approved by the USFWS, to support implementation of planned, but unfunded, humpback chub conservation measures.

Previous Activities: In support of the Glen Canyon Dam AMP, funds were provided to the USFWS at the Willow Beach NFH in FY06 for the care of humpback chub from the Little Colorado River being held on station. In an effort to reduce administrative costs and optimize planning, the USFWS requested funding of $10,000 per year for 3 years (FY06–08). During calendar year 2008, additional funds were provided under the LCR MSCP for the development of a refugia broodstock for humpback chub. The agreement for broodstock development was in place for FY09–11. The increased funding for broodstock development in addition to the previous support means that approximately one-half of the original $500,000 commitment to this work task has been spent. The

remaining funds in this work task will likely be allocated when managers of the Glen Canyon Dam AMP, in agreement with the USFWS, identify appropriate maintenance activities or research needs for the funds.

Young-of-the-year fish were transferred from the Little Colorado River to the Bubbling Ponds Fish Hatchery. The fish were treated for parasites and held in quarantine for 30 days, then transferred to the SNARRC. Through the end of 2012, 1,032 humpback chub have been brought on station for establishing the (500–1,000) refuge population at the SNARRC.

A refuge population/captive broodstock of Grand Canyon humpback chub has been established at the SNARRC. In 2014, the SNARRC successfully maintained 1,024 humpback chub from the Little Colorado River, Grand Canyon. This included 274 of the 2008 year class, 202 of the 2009 year class, 174 of the 2010 year class, 200 of the 2011 year class, and 174 of the 2012 year class. The overall survival for the year was 99.2%.

FY14 Accomplishments: No research or support needs were identified for FY14. Expenditures in FY14 were limited to administrative charges.

FY15 Activities: Options for allocation of the remaining funds are being considered. Possible activities could include maintenance of the refuge population/captive broodstock for humpback chub at the SNARRC.

Proposed FY16 Activities: Support will continue for humpback chub conservation in coordination with the USFWS and the Glen Canyon AMP. Remaining funds will be spent according to research needs as agreed to among all cooperating agencies.

Pertinent Reports: The USFWS report titled *Genetic Management Plan for Captive and Translocated Endangered Humpback Chub in the Lower Colorado River Basin* has been completed and will be available on the LCR MSCP Web site. Progress reports are available upon request.

Work Task C24: Avian Species Habitat Requirements

FY14 Estimates	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$300,000	$414,350.46	$1,367,449.53	$310,000	$270,000	$270,000	$270,000

Contact: Beth Sabin, (702) 293-8435, lsabin@usbr.gov

Start Date: FY08

Expected Duration: FY18

Long-Term Goal: Define habitat requirements for covered avian species

Conservation Measures: MRM1 and MRM2 (CLRA, LEBI, BLRA, SWFL, YBCU, ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, and SUTA)

Location: LCR MSCP project area; Bill Williams River; IPCA, Arizona; other river systems in Arizona

Purpose: The purpose of this work task is to evaluate the habitat requirements of covered marsh and riparian bird species, including Yuma clapper rail, least bittern, California black rail, southwestern willow flycatcher, yellow-billed cuckoo, elf owl, gilded flicker, Gila woodpecker, vermilion flycatcher, Arizona Bell's vireo, Sonoran yellow warbler, and summer tanager. Conservation measures within the HCP call for research to better identify habitat requirements (MRM1) and to manage habitat of covered bird species (MRM2). The research under this work task fulfills those goals. Conservation measures to create habitat exist for each of the above species; knowledge of their habitat requirements will assist in habitat creation.

Connections with Other Work Tasks (Past and Future): Information gained from this work task will be used to conduct pre- and post-monitoring at conservation areas in Conservation Area Development and Management (Section E) that target covered bird species and system-wide monitoring of avian species (D2, D3 [closed], D5, D6, D7, and F2).

Project Description: A requirement under the LCR MSCP is the creation of a minimum of 512 acres of marsh habitat for three covered marsh bird species. All 512 marsh acres should provide habitat for the Yuma clapper rail and western least bittern, while 130 acres will provide habitat for the California black rail. The HCP requires the creation of a minimum of 5,940 acres of cottonwood-willow habitat and 1,320 acres of honey mesquite habitat for nine covered riparian obligate bird species. Studies will be conducted to evaluate the habitat

requirements of covered bird species: Yuma clapper rail, western least bittern, California black rail, Sonoran yellow warbler, Arizona Bell's vireo, summer tanager, Gila woodpecker, vermilion flycatcher, gilded flicker, and elf owl. Habitat characteristics for the southwestern willow flycatcher (D2) and yellow-billed cuckoo (D7) are covered under separate work tasks.

Previous Activities:

Yellow-billed cuckoo. A Geographic Information System (GIS)-based model of yellow-billed cuckoo breeding habitat was developed.

Summer tanager, Gila woodpecker, Sonoran yellow warbler, and Arizona Bell's vireo: From FY08 to FY10, habitat data were collected and summarized. More detailed habitat characterizations addressing microclimate for the Sonoran yellow warbler, Gila woodpecker, Arizona Bell's vireo, and the summer tanager were conducted from FY11 to FY13.

Restoration of managed marsh units to benefit black rail and other marsh birds: In 2009, vegetation surveys were conducted, water depth data were monitored at wells, and biweekly marsh bird surveys were conducted throughout the breeding season at the Imperial National Wildlife Refuge (Imperial NWR) in Fields 16 and 18. The locations of all black rails, clapper rails, and least bitterns were mapped in both fields. Black rails were first detected in Fields 16 and 18 in April and July 2009. Yuma clapper rails were consistently detected in Field 16 throughout the summer, with a high of 21 birds. In Field 18, clapper rails were also detected in 2009. In 2011, a final report was prepared, giving recommendations on the creation of marshes for both clapper and black rails. Further research on marsh bird habitat requirements will be conducted under Work Tasks C60 and C66.

Elf owl: A study was initiated to refine survey methods for elf owls in dense habitat and record general habitat characteristics in occupied riparian habitat. The elf owl's responsiveness to call playback at short distances (50–250 m) in obstructed habitat was tested, their use of riparian habitat was recorded, and, on a broad scale, the type of riparian habitat elf owls are using was documented.

FY14 Accomplishments:

Summer tanager, Gila woodpecker, Sonoran yellow warbler, and Arizona Bell's vireo: In FY14, habitat data were collected for the Sonoran yellow warbler, Arizona Bell's vireo, summer tanager, and the Gila woodpecker. Ten use and 10 non-use sites were surveyed per species. The characteristics measured included overstory trees, the shrub and intermediate layer, canopy closure and gaps, total vegetation volume, the herbaceous layer, and microclimate.

Elf owl: Study objectives were refined, and a draft study plan and schedule was prepared.

Additional project expenditures were required in FY14 to obligate funding for FY15 elf owl study activities, including finalization of the study plan, initial development of the MEFFs, and the FY15 site selection surveys.

FY15 Activities:

Summer tanager, Gila woodpecker, Sonoran yellow warbler, and Arizona Bell's vireo: 2011–14 habitat data will be delivered and quality checked. The study report will be prepared and reviewed.

Elf owl: The study plan for the project will be finalized and peer reviewed. Site selection surveys will be conducted at numerous study areas in western and eastern Arizona to determine which ones contain elf owl populations. Study areas will be prepared (flagging, trail clearing, and permits) for the full-scale study. MEFF and database development and testing will be initiated, and queries and reports will be identified.

Marsh birds: Further research on marsh bird habitat requirements will be conducted under other Work Tasks C60 and C66.

Proposed FY16 Activities:

Elf owl: The MEFFS and database will be completed. The first year of data collection will begin at study areas identified in FY15. Elf owl territories will be documented if located during surveys. Responsiveness trials will be conducted on confirmed territories.

Pertinent Reports: The reports titled *Restoration of Managed Marsh Units to Benefit California Black Rails and Other Marsh Birds: An Adaptive Management Approach* and *Development of a GIS-based Model of Yellow-billed Cuckoo Breeding Habitat within the LCR MSCP Area, San Pedro River and Verde River, AZ* are available on the LCR MSCP Web site.

Work Task C25: Imperial Ponds Native Fish Research

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$250,000	$179,807.87	$1,465,017.91	$200,000	$200,000	$200,000	$200,000

Contact: Andrea Finnegan, (702) 293-8203, afinnegan@usbr.gov

Start Date: FY08

Expected Duration: FY18

Long-Term Goal: Inform management and provide ways to improve created backwaters through species research

Conservation Measures: RASU2 and BONY2

Location: Reach 5, Imperial NWR, Arizona

Purpose: To evaluate six ponds created as backwater habitats at the Imperial NWR to assess the efficacy of the ponds for native fish species, specifically bonytail and razorback sucker

Connections with Other Work Tasks (Past and Future): Bonytail and razorback sucker to be stocked into the ponds are provided through Work Tasks B1–B5. Ponds were developed under Work Task E14, and additional monitoring support will be provided through Work Task F5. Data are maintained under Work Task G1.

Project Description: The development of native fish refugia in six constructed ponds on the Imperial NWR will be monitored and evaluated. Incorporated into pond construction were design features such as riprap, spawning gravels, hummocks, and increased depth, which were all thought to provide suitable habitat for life cycle completion by bonytail and razorback sucker. The role and importance of each of these features toward developing self-sustaining native fish populations will be evaluated.

Previous Activities: Habitat use was evaluated for razorback sucker in Ponds 2, 4, and 6. Habitat use for razorback sucker shifted across seasons, but habitat selection in any given season was different for razorback sucker populations in each pond. There were consistently more contacts for both species at night than during the day. During the summer, deep open water areas were selected by both species, and little activity was detected. Bonytail contacts were

few, and habitat associations generally equivocal. Razorback sucker were associated with gravel beds during the nominal spawning season that peaked in late winter/spring.

Bonytail and razorback sucker were implanted with acoustic transmitters to asses distribution. Bonytail were distributed in deep waters along the north, south, and northeast corner during the day, and in open water across the length of the pond, avoiding shallow areas during the night. Razorback sucker used deep waters west of the hummocks during the day. Nighttime monitoring results indicated that razorback sucker concentrated on the boat ramps and on or around the spawning beds. Spatial overlap was minimal between the two species.

A water management study was completed in May 2013 in order to evaluate and compare water quality in Pond 1 (where regular water management was continued) with Ponds 2 through 6 (without a managed water supply). A trend analysis from the physicochemical profiles indicated that temperature had increased over time in all six of the ponds; however, it appeared to be increasing at a slightly higher rate in Pond 1. Specific conductivity levels suggested a gradual increase in all ponds over time as well. The pH levels also indicated a trend of increasing values over time with variation among all ponds. The pH commonly exceeded the management guideline of 9.0 in Ponds 2 through 6 in the summers of 2011 and 2012. The pH levels were lowest in Pond 1. DO varied in all ponds, and recorded levels did not appear to be a cause for concern in the absence of water management.

FY14 Accomplishments: Trammel nets, hoop nets and Oneida traps were deployed to remove bonytail and razorback sucker from Pond 1 in preparation for the renovation of all six ponds. Twenty-six razorback sucker were captured, 17 had previously been PIT tagged, and 9 were untagged. All razorback sucker were stocked into the A-10 backwater near Ehrenberg, Arizona; any razorback sucker that did not have a tag received one prior to stocking. Thirty-three bonytail were captured from Pond 1, and only one was PIT tagged. Three bonytail were transferred to the Imperial NWR display tank, and the remaining bonytail were transported to the Lake Mead Fish Hatchery for later stocking.

Obligations in FY14 were less than estimated. Funds for Work Task C25 reserved for the purchase of rotenone (chemical piscicide) were not used. Rotenone for pond renovations was instead purchased in FY14 under Work Task E14.

FY15 Activities: Efforts have continued to remove razorback sucker and bonytail from Pond 1 prior to renovation efforts that began in December 2014. Beginning in January 2015, the ponds will be monitored on a monthly basis using various sampling gear to detect all life stages of fish. Post-renovation monitoring will occur for up to 2 years or until fish are detected in all of the ponds.

A study plan will be developed to determine a water input schedule for the ponds. The design will include actions to mitigate for pH and specific conductivity.

Water chemistry and quality, as well as zooplankton and phytoplankton samples, will be collected on a quarterly basis. Continuous sampling units will be deployed to record water quality parameters at 6-hour intervals. These parameters will include temperature, pH, DO, and specific conductivity. Downloads will occur monthly.

Proposed FY16 Activities: Post-renovation monitoring and water quality measurements will continue at all six ponds. A draft a report that outlines the successes and lessons-learned from the renovation effort will be developed. A native fish stocking plan, including research questions to be addressed, will be drafted in FY16; implementation of the stocking plan is expected to begin in FY17.

Pertinent Reports: The scopes of work are available upon request. Annual reports are posted on the LCR MSCP Web site.

Work Task C27: Small Mammal Population Studies

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$50,000	$39,890.93	$391,012.43	$50,000	$0	$0	$0

Contact: Allen Calvert, (702) 293-8311, acalvert@usbr.gov

Start Date: FY08

Expected Duration: FY15

Long-Term Goal: Identify distribution, genetics, and habitat requirements, and establish monitoring protocols for covered small mammal species

Conservation Measures: CRCR1, YHCR1, DEPO1, MRM1, and MRM2

Location: Reaches 3–7 from Davis Dam to the Southerly International Boundary with Mexico

Purpose: The purpose of this work task is to implement distribution, habitat, and genetics studies for monitoring of LCR MSCP covered and evaluation small mammal species. These studies are being conducted to clarify the geographic range of the Yuma hispid cotton rat and the Colorado River cotton rat along the LCR, identify ways to differentiate subspecies of desert pocket mouse, and to describe habitat characteristics for these species.

Connections with Other Work Tasks (Past and Future): Data collected as part of Work Task F3 will be analyzed as part of the effort to determine the distribution of the two cotton rat species found along the LCR. Previous presence/absence surveys on small mammal populations were conducted under Work Task D10. This research will inform improvements to the monitoring protocol for small mammals.

Project Description: Studies will be designed to identify the habitat use, genetic differentiation, and distributional range of the covered and evaluation small mammal species. Small mammals will be trapped in various habitat types along the LCR to collect genetic samples, and the samples will be sent to a genetics laboratory for DNA analysis. Genetic differentiation data for animals captured along the LCR will also be compared with data from animals of different subspecies located within Arizona, east of the LCR MSCP planning area, to obtain genetic markers. These data will be used to clarify the distributional range of each species of cotton rat and identify genetic markers that can differentiate subspecies of the desert pocket mouse within the LCR watershed. Habitat use and

population demographics will be estimated with mark-recapture analyses. A population demography study will be implemented to identify habitat at cotton rat capture locations and establish a protocol for monitoring cotton rat presence at conservation areas.

Previous Activities: Cotton rats were captured at seven localities along the LCR, including sites near Yuma, Arizona; Imperial NWR; Cibola NWR; PVER; and Pintail Slough on the Havasu National Wildlife Refuge (Havasu NWR). A study was initiated at the end of FY07 to determine genetic differentiation between covered cotton rat species, distributional range for each species, and habitat use along the LCR (D10 and F3). In FY08, the study was moved under Work Task C27 in which additional efforts were made to identify cotton rat populations, including sampling known populations along the LCR. Distribution and population genetic analyses have been conducted for these covered species.

Population and habitat monitoring began in FY10. From FY11 to FY13, field work for a combined mark-recapture and habitat study was conducted using trapping grids that had different population densities of Colorado River cotton rats at Pintail Slough, Cibola NWR Nature Trail, and the PVER.

FY14 Accomplishments: Work began on the small mammal monitoring plan, and field work for the mark-recapture/habitat study was completed. Data suggest that cotton rats need dense herbaceous vegetation at least 0.5 meter in height, as it provides an important cover for their activities and protects them from predators. Areas with this habitat structure often had better trapping success as well. These results and methods were reviewed, and protocol improvements were identified in vegetation measurements and data analyses. These improvements will be incorporated into future monitoring efforts.

Genetic samples of both cotton rats and desert pocket mouse were submitted for Next-Gen sequencing to identify genetic markers that can be used to differentiate the cotton rat species and the subspecies of the desert pocket mouse, analyze the species' ranges, and, potentially, population connectivity.

FY14 obligations were under budget, as less field work was required this fiscal year.

FY15 Activities: The habitat and population study report and a draft of the small mammal long-term monitoring plan will be completed. Nex-Gen sequencing results will be completed for the desert pocket mouse, Colorado River cotton rat, and Yuma hispid cotton rat. The results will be reviewed to see if additional genetic analyses are needed to inform LCR MSCP conservation efforts.

Proposed FY16 Activities: This work task was closed in FY15.

Pertinent Reports: The report titled *Colorado River and Yuma Hispid Cotton Rat Distribution and Habitat* is available on the LCR MSCP Web site. The habitat modeling and population monitoring study design is available upon request.

Work Task C31: Razorback Sucker Genetic Diversity Assessment

FY14 Estimate	FY14 Actual Obligations	Cumulative Accomplishment Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$130,000	$134,780.01	$576,957.51	$140,000	$160,000	$160,000	$160,000

Contact: Jeff Lantow, (702) 293-8557, jlantow@usbr.gov

Start Date: FY09

Expected Duration: FY18

Long-Term Goal: Maintain genetic quality of razorback sucker utilized in the LCR MSCP

Conservation Measures: RASU2, RASU3, RASU5, and RASU6

Location: Wayne State University, Detroit, Michigan

Purpose: To maintain a sound genetic management program for razorback sucker within the LCR MSCP

Connections with Other Work Tasks (Past and Future): This work task is related to larval razorback sucker collections (B1) and to management of fish habitat restoration sites (e.g., E14, F5, and C40). Larval and adult tissue samples are collected from each reach of the LCR MSCP wherever razorback sucker are captured and includes work accomplished under Work Tasks C13, C33 (closed), C45, C49, and D8.

Project Description: The genetic structure of razorback sucker communities in reservoirs, river reaches, and off-channel habitats within the LCR will be monitored, and the various razorback sucker stocks relative to the founder population from Lake Mohave will be characterized. Under the LCR MSCP Fish Augmentation Program, production of large numbers of fish annually will continue; these large pulses of fish have the potential to change the genetic diversity of a population in a short period of time. It is important to monitor the genetic structure of the various razorback sucker communities over many years in order to detect changes in the genetic diversity as these populations mature.

Larval fish and adult fin clips will be collected and preserved from each stock during numerous annual surveys and the continuing Lake Mohave larvae collections. These samples will be delivered to a genetics research laboratory for analyses. The results will be used to determine the genetic health of

these communities in order to assess the effectiveness of the LCR MSCP Fish Augmentation Program, continue monitoring of the Lake Mohave repatriation effort, and provide guidance on management of razorback sucker populations developing in newly constructed flood plain habitats within the LCR MSCP area.

Previous Activities: Samples of larvae and adult fin clips were obtained on an annual basis from multiple time periods and from various spawning areas, reservoirs, river reaches, and off-channel habitats within the LCR MSCP area. DNA was extracted and samples characterized for mtDNA and microsatellite variation. Analyses of microsatellite data collected over the past 15 years are consistent with those from mtDNA, indicating that the razorback sucker conservation strategy employed in Lake Mohave is maintaining genetic diversity in the nuclear genome as well. Interpretation of the data in the context of effective numbers of breeders and size identifies the importance of increasing the population size in Lake Mohave.

FY14 Accomplishments: Within Lake Mohave, 288 fin clips and 743 larval samples were collected and analyzed for levels of molecular variation in FY14. Findings were consistent with previous years and indicated that, in Lake Mohave, levels of molecular variation (as measured by mtDNA and microsatellites) continue to be maintained by the current management program.

From Lake Mead, 68 adult fin clips and 55 larvae were collected. Samples have been extracted, sequenced, genotyped, and analyzed using genetic software.

FY15 Activities: Razorback sucker genetics will continue to be assessed for the LCR through analyses of razorback sucker fin clips and larvae collected from spawning areas, reservoirs, river reaches, and off-channel habitats within the LCR MSCP area. Beginning in FY15, an attempt will be made to collect genetic samples (fin clips) during the tagging process. This expanded initial effort will have benefits in terms of improved data for providing inference and will potentially reduce the need for extensive netting during the spawning season. Protocol development will be initiated in FY15, and additional supplies will be purchased for storing and processing samples. In order to implement these changes, FY15 expenditures may exceed budget projections.

Proposed FY16 Activities: Collection of larval razorback sucker and fin clips will continue from spawning areas within the LCR MSCP area. Reach 3 razorback sucker augmentation will include fish from the Lake Mohave gene pool. Due to this shift, genetic monitoring efforts of larvae and adults for Reach 3 will increase to provide contrast with razorback sucker genetics of Lake Mohave. These additional samples will provide a genetic baseline for this population from which changes can be monitored as more Lake Mohave fish are stocked into this reach. DNA will be extracted and samples characterized for mtDNA and

microsatellite variation. Due to the small population sizes, future work will continue in order to evaluate potential problems related to the effective number of breeders.

Pertinent Reports: The reports titled *Continuing Studies of Razorback Sucker Genetics: 2008; Interim Report: 2010; Razorback Sucker Genetic Diversity Assessment: Final Project Report 2011*; and *Razorback Sucker Genetic Diversity Assessment: Interim Report 2012* are posted on the LCR MSCP Web site. The report titled *Razorback Sucker Genetic Diversity Assessment: Final Report 2013* is completed and will be posted on the Web site as well.

Work Task C32: Determination of Salinity, Temperature, pH, and Oxygen Limits for Bonytail and Razorback Sucker

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$115,000	$104,611.98	$594,603.61	$115,000	$110,000	$100,000	$0

Contact: Jim Stolberg, (702) 293-8206, jstolberg@usbr.gov

Start Date: FY09

Expected Duration: FY17

Long-Term Goal: To develop and maintain high quality backwater habitats for native fishes

Conservation Measures: RASU2, RASU3, RASU5, RASU6, BONY2, BONY3, and BONY5

Location: LCR MSCP Native Fish Laboratory, Boulder City, Nevada

Purpose: To determine razorback sucker and bonytail early life stage thresholds of survival for salinity, temperature, pH, and DO

Connections with Other Work Tasks (Past and Future): This work task began under Work Task G3 and is related to management of fish habitat restoration sites.

Project Description: Through laboratory testing, the threshold levels of various water quality parameters needed to sustain early life stages of bonytail and razorback sucker in backwater habitats developed under the LCR MSCP will be determined.

Previous Activities: Salinity concentrations evaluated during FY07 and FY08 indicated that upper salinity tolerances ranged from 11,000 to 12,000 µS/cm for razorback sucker eggs and from 23,000 to 27,750 µS/cm for razorback sucker larvae. Observations during larval trials also documented that long-term survival may be possible at salinities as high 23,000 µS/cm when larval razorback sucker are properly acclimated.

During FY09, the results from egg trials indicated that the lower DO limit for this early life stage is in the 2.5 to 3 milligrams per liter (mg/L) range. The limit observed for razorback sucker larvae was slightly lower, with increased mortality occurring at DO concentrations near 2 mg/L.

Research during the FY10 study year was focused on determining the threshold levels of pH for early life stage razorback sucker. The results from egg trials indicated that the threshold levels for successful embryo development are between pH 9 and 10. The pH threshold observed for razorback sucker larvae was slightly higher; 98% survival was observed with short-term exposure (20 days) to pH 10.

Research during FY11 focused on determining the threshold levels of pH for fingerling bonytail and razorback sucker survival. Results from both bonytail and razorback sucker trials indicated that the upper lethal limit for these species is near pH 10 at both 20 and 30 °C. While low levels of mortality were observed at both temperatures during the first 72 hours, mortality increased to 87–93% after 20 days of exposure at 20 °C and to 83–97% after 15 days of exposure at 30 °C. Increased survival was observed in lower pH treatments; bonytail exposed to pH 9 at 20 °C displayed zero mortality over 20 days and only 8% mortality after a 15-day exposure at 30 °C. Survival was also higher for razorback sucker exposed to pH 9.5 and below.

Research during FY12 focused on determining the lower lethal DO concentration for fingerling bonytail. At 20 °C, the short-term, lower lethal DO limit was below 2 mg/L. Only 17% mortality was recorded for bonytail exposed to the 2-mg/L treatment for 15 days. Trials at 30 °C indicated that the lower lethal DO limit is very near 2 mg/L. Sixty-seven percent mortality was observed at 72 hours, and 100% mortality was observed at 18 days. Mortality for the remaining 30 °C treatments decreased incrementally as DO concentrations increased.

Research during FY13 focused on determining threshold DO concentrations for successful bonytail egg development and larval survival. Fertilized eggs were exposed to DO concentrations of 2 to approximately 8 mg/L at 20 °C. While all DO treatments produced swim-up larvae, percent hatch was lowest at 2 mg/L (12%). Percent hatch for the remaining treatments was fairly uniform (39–46%), with the exception of oxygen-saturated tanks (approximately 8 mg/L) in which 57% of eggs produced swim-up larvae. Bonytail larvae were exposed to DO concentrations of 2 to approximately 7.25 mg/L in two separate trials run at 20 and 25 °C for 20 days. The 20 °C trial resulted high survival (93–100%), with little difference observed between treatments. Survival in the 25 °C trial averaged approximately 68% between nearly all treatments (range 46–85%). Results from the FY13 study year indicated that the success of bonytail egg development increased with increased DO concentrations, little to no egg development should be expected below 3 mg/L, and that short-term survival of bonytail larvae can be expected at DO concentrations as low as 2 mg/L at moderate temperatures.

FY14 Accomplishments: Research during FY14 focused on determining threshold salinity concentrations for successful bonytail egg development and larval survival. Fertilized eggs were exposed to salinity concentrations of 1,000 to 12,500 μS/cm in triplicate at 20 °C. All treatments produced swim-up larvae, and percent hatch was similar between treatments (20–31%). Larvae were exposed to salinity concentrations of 12,500 to 20,000 μS/cm in triplicate in two separate trials run at 20 and 25°C for 15 days. Control groups exposed to 1,000 μS/cm were also observed at both temperatures during the 15-day trial periods. Larval mortality increased at higher salinity concentrations during the 20 °C trial. Salinity concentrations of 12,500 and 15,000 μS/cm resulted in larval mortality ranging from 4 to 14%, while observed mortality at higher salinity concentrations (17,500 and 20,000 μS/cm) ranged from 52 to 99%. For the 25 °C trial, mortality increased for all treatments. Larval mortality ranged from 13 to 70% at 12,500 μS/cm, 29 to 88% at 15,000 μS/cm, and from 98 to 100% for the remaining treatments. Larval mortality for control groups was observed to be lower during both trials, ranging from 2 to 6% at 20 °C and 8 to 13% at 25 °C. Results from the FY14 study year indicated that the success of bonytail egg development may not be as limited by increased salinity concentrations as expected. Larval survival does however appear to have a correlation with salinity, with increased survival being observed at lower salinity concentrations. It should also be noted that increases in temperature may reduce larval survival at higher salinity concentrations.

FY15 Activities: Research during this study year will be focused on determining threshold pH levels for bonytail egg development and larval survival. It is anticipated that two trials, each with multiple replicate treatments, will be run to evaluate the combined effects of increased temperature and pH on survival of early life stage bonytail.

Proposed FY16 Activities: Research during the FY16 study year will focus on determining threshold salinity concentrations for bonytail and razorback sucker fingerlings. Two trials will be conducted for each species, one at 25 °C, and one at 30 °C, to mimic natural conditions that this life stage would be exposed to and evaluate the combined effects increased temperature and salinity have on survival. A comprehensive review of available, published literature will continue so that data gaps may be identified.

Pertinent Reports: Annual reports will be posted on the LCR MSCP Web site upon completion.

Work Task C35: Western Red Bat and Western Yellow Bat Roosting Characteristics Study

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$25,000	$28,887.66	$523,627.57	$0	$0	$0	$0

Contact: Allen Calvert, (702) 293-8311, acalvert@usbr.gov

Start Date: FY10

Expected Duration: FY14

Long-Term Goal: To determine roosting characteristics for western red bats and western yellow bats

Conservation Measures: MRM1 (WRBA and WYBA)

Location: Within the LCR MSCP project boundary, Bill Williams River NWR, and other riparian areas where western red bats or western yellow bats are known to occur

Purpose: To better define roosting characteristics for the two species using radio telemetry

Connections with Other Work Tasks (Past and Future): Under Work Tasks D9 and F4, the distribution of each species and the areas in which to capture the target species are determined.

Project Description: Radio transmitters will be attached to both western red bats and western yellow bats. These bats will then be tracked to their roosting sites (in trees) during the day to pinpoint their roosting locations. Vegetation measurements will be collected at both known roost sites as well as random non-use sites to determine whether these bat species have specific roosting characteristics. These data may be used to inform habitat creation projects for these species.

Previous Activities: In FY10, preliminary mist netting was conducted to determine likely areas where western red bats and western yellow bats could be captured both on the LCR and elsewhere. The study began in FY11 by capturing the red and yellow bats at multiple sites across the LCR as well as other riparian areas of Arizona where these bats could be captured. Equipment was purchased for the project. Surveys continued in FY12 and FY13.

Over the course of the 3 years, 18 different sites were surveyed. Western red bats were captured at 10 sites, and western yellow bats were captured at 8 sites. Of the 55 red bats captured, 30 had radio transmitters attached, and roosts were located for 23 of them. Of the 54 yellow bats captured, 32 had transmitters attached, and roosts were located for 22 of them.

The majority of western red bat roosts were found in Fremont cottonwoods, and almost all western yellow bat roosts were in Mexican fan palms. The red bats tended to roost in trees with a larger diameter than nearby non-roost trees, especially in control sites (native dominated natural sites). The red bats captured at treatment sites (native dominated restoration sites) preferred areas where trees were spaced further apart (i.e., nursery areas). The red bats were found to roost more often where trees had a diameter at breast height of at least 28 centimeters and tree spacing was near 20 feet. All of the red bats captured at treatment sites were found to be roosting within the restoration area, often within 500 m of where they were captured. The yellow bat roosts were most correlated to tall fan palms with dead frond skirts. It does not appear that the yellow bats roost in cottonwood-willow dominated habitat, but they do rely on it for foraging habitat.

FY14 Accomplishments: The draft report was submitted for additional recommendations and revisions. The final report will be submitted in FY15, with no additional LCR MSCP expenditures anticipated.

FY15 Activities: This work task was closed in FY14.

Proposed FY16 Activities: This work task was closed in FY14.

Pertinent Reports: The FY11 and FY12 reports are available on the LCR MSCP Web site. The FY13 final report will also be posted on the Web site once finalized.

Work Task C39: Post-Stocking Distribution and Survival of Bonytail in Reach 3

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$250,000	$212,290.69	$1,135,094.18	$0	$0	$0	$0

Contact: Jeff Lantow, (702) 293-8557, jlantow@usbr.gov

Start Date: FY10

Expected Duration: FY14

Long-Term Goal: Maintain effectiveness of the LCR MSCP Fish Augmentation Program

Conservation Measures: BONY3 and BONY5

Location: Reach 3, to include main stem and backwater habitats

Purpose: To determine the distribution and post-stocking survival of bonytail within Reach 3

Connections with Other Work Tasks (Past and Future): This work task is related to Work Tasks B2, B3, and B4, all of which provide bonytail for augmentation stocking. The study results will be added to the database used to complete Work Task D8. Due to the overlap in scope and intent of this work task with Work Tasks C45 and C49, these work tasks will be merged into a single work task in FY15: Work Task C64 (Post-Stocking Movement, Distribution, and Habitat Use of Razorback Sucker and Bonytail). This combination of work tasks will allow sharing of overlapping resources, which is expected to increase efficiency in implementation and reporting, and it may also reduce overall expenditures. Activities under Work Task C64 will be detailed by river reach, and the budget estimates will reflect the effort needed to complete this work.

Project Description: Stocked fish will be followed after they are released into Reach 3 of the Colorado River to design and test ways to improve post-stocking survival. Techniques for monitoring will include marking, tagging, netting, electrofishing, and visual observations. A final report will include recommendations for future bonytail augmentation stockings.

Previous Activities: Initial activities for this work task were focused on the survival and distribution of stocked bonytail with in the Bill Williams River NWR. Small batches of fish were released with 3-month acoustic transmitters and tracked actively and for the expected lifespan of the transmitter. Initial results were promising, as up to 95% of the bonytail survived the 3-month study, and the fish were predominately found near the delta region of the Bill Williams River. This first stocking coincidentally occurred 2 weeks after a large-scale water discharge from Alamo Dam, which increased turbidity.

Several iterations of paired stockings of tagged fish were initiated to determine if the stocking location was the reason fish preferred the Bill Williams River delta. Survival of stocked fish within the Bill Williams River was lower for the first (50%) and second (0%) iteration, and turbidity was significantly less. All 10 fish released in in the Bill Williams River were dead within 65 days. However, bonytail did show a significant preference for the Bill Williams River area regardless of release location. Fish depth was also examined, and bonytail were contacted, on average, at 78 and 79% of the available water column depth; depth was greater during the day.

Based on what had been learned from the first few years of this study, the focus was again on an alternative release location to compare the relative survival to fish being stocked into the Bill Williams River. A riverine release site was selected near Blankenship Bend in Topock Gorge. The habitat within the gorge is diverse, and it supports a different non-native fish community; the gorge has fewer larger predators such as flathead catfish and large stripers. Fish released at Blankenship Bend dispersed over three times further than those released into the Bill Williams River, and 3-month survival of tagged fish was higher (90%) at Blankenship Bend than at the Bill Williams River (60%).

After seeing the relatively poor, but highly variable survival at the Bill Williams River, a new focus became trying to characterize microhabitat use for bonytail at multiple release sites. Fish were surgically implanted with sonic tags and released into the Bill Williams River within the Bill Williams River NWR in April 2013. All acoustic-tagged bonytail were determined dead within 2 weeks post-release. As a result, conclusions were unable to be drawn about post-stocking habitat preference within the reservoir. Snorkeler-assisted underwater PIT scanning was conducted beneath a known cormorant roost, and 11 PIT tags from previous stockings were detected within the substrate.

FY14 Accomplishments: As a continuation of the microhabitat portion of this study, 10 fish were surgically implanted with sonic tags and released in October 2013 at Blankenship Bend. Only one fish released in the autumn survived the 12-week study period. Due to the poor survival in the autumn, monitoring was adjusted to be more intensive for the spring iteration. Fish were tracked intensively for 6 weeks, and five fish were still active at the end of this study period. Fish were located in both backwater and riverine environments and

showed an affinity for bulrush in main channel detections. Daytime detections were limited due to the species use of dense cover. The fish became active after sundown, and the majority of contacts and tracking occurred during the evening and night.

In addition to the survival and habitat use portion of this project, the use of remote PIT scanners to monitor bonytail in a riverine environment were evaluated. PIT tag scanning was initiated for an 8-week period immediately following a release of 500 bonytail in January 2014. These efforts resulted in contacting 321 unique fish, of which 124 were bonytail, 194 were razorback sucker, and 3 were unknown. Of the 124 unique bonytail contacted over the course of the study, 10 fish had been released on October 22, 2013, at Blankenship Bend. Most contacts (89%) occurred within 3 weeks of the second stocking from January 13–17, 2014. Besides release location, 11 PIT-tagged bonytail were contacted in Trampas Cove, and 1 was contacted in Clear Bay. Contact rates were low when compared to similar monitoring for razorback sucker, which was likely due to the low survival and limited knowledge of this species in these environments.

Additional bonytail releases are scheduled for the winter and spring in FY15. This work will be described in the "FY15 Activities" of Work Task C64. The results of the investigations conducted in FY15 and future years will also be reported under Work Task C64.

FY15 Activities: This work task was closed in FY14.

Proposed FY16 Activities: This work task was closed in FY14.

Pertinent Reports: Reports from 2010 to 2014 titled *Distribution and Post-Stocking Survival of Bonytail in Lake Havasu* are posted on the LCR MSCP Web site.

Work Task C40: Genetic and Demographic Studies to Guide Conservation Management of Razorback Sucker and Bonytail in Off-Channel Habitats

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$180,000	$180,030.92	$509,383.69	$190,000	$275,000	$275,000	$275,000

Contact: Jeff Lantow (702) 293-8557, jlantow@usbr.gov

Start Date: FY10

Expected Duration: FY18

Long-Term Goal: Effective fishery management of backwater habitats developed under the LCR MSCP

Conservation Measures: RASU2, RASU6, BONY2, and BONY5

Location: Backwater habitats (Reach 2–5)

Purpose: To quantify genetic and demographic parameters that are necessary for informed, long-term management of razorback sucker and bonytail in off-channel habitats

Connections with Other Work Tasks (Past and Future): This work task is related to Work Tasks B7, C25, C31, C56, and G3.

Project Description: In Lake Mohave and elsewhere, razorback sucker and bonytail demonstrate a group spawning behavior whereby a female will spawn with multiple partners many times over a period of a few weeks. These observations led biologists to believe that all possible genetic crosses were being made during the spawn. However, analyses of adult razorback sucker placed into the Yuma Cove backwater in 1991 and 1992, along with analyses of the larval razorback sucker produced each year, showed that not all of the adults contributed genetic material to the next generation. It is possible that individual adults do not spawn every year, or that even if they do, they do not always contribute genetic material to the next generation. This information needs to be verified in order to model a population structure within these isolated habitats over subsequent generations and to predict at what frequency genetic material needs to be exchanged between habitats to maintain the robustness of the overall razorback sucker and bonytail populations within the LCR MSCP area.

Demographic and genetic information will be collected that will lead to recommendations to optimize long-term management of off-channel habitats for these two critically endangered fishes. Genetic data will be captured from larval, juvenile, and adult razorback sucker and bonytail from at least two replicate groups from off-channel habitats. Characterization of microsatellite and mitochondrial DNA variation will be used to assign the parentage of individual larvae to specific adults. These data can then be compared and contrasted to determine the actual number of individuals that participate in annual spawning activities, census the populations, and quantify patterns of survivorship.

There are three phases to the study: field observations, laboratory analyses of genetic materials, and modeling of population dynamics. The study will require multiple years of data collection and analyses; final recommendations are anticipated by 2018. Numbers of samples will be fewest during the first 2 years of the study, but estimated costs are initially high to cover the purchase of specialized, analytical equipment.

This project requires stable populations for both razorback sucker and bonytail to allow for multiple years of censusing. These stable populations are currently unavailable for razorback sucker, and bonytail will be incorporated into the study as habitats and populations of bonytail become available.

Previous Activities: Adults, larvae, and juveniles have been genotyped, and multiple iterations of in situ spawning have been completed in the AJ, Dandy, and Yuma Cove backwaters along Lake Mohave. Collections from FY10 to FY13 were analyzed, identifying considerable variability in individual reproductive success within and especially among different lake-side ponds.

FY14 Accomplishments: The AJ backwater has typically produced offspring that remained viable into the autumn, with little change in the proportion of individuals contributing to larval production across years. This year was similar to FY13, as the proportion of the original individuals contributing to larvae was reduced. There were also fewer juveniles captured this fall; however, a pond breach in the summer may explain this result. There were no larvae or juveniles obtained from the Dandy backwater. This was the second year of sampling from the Yuma Cove backwater; larvae were readily captured, with parental contributions to larvae reduced and similar to AJ for this year. Despite high survivorship of remaining resident adults, nearly 85% of individuals stocked into the Yuma Cove backwater died shortly after stocking. Furthermore, only two of the newly stocked males contributed to larval production. This pattern was unexpected, as individuals from the same lot stocked into the AJ and Dandy backwaters at the same time did not exhibit similar patterns of mortality.

Despite the high level of contribution of different stocked individuals to the larval pool, a small proportion of individuals seemed to be contributing a relatively large number of larvae in any given year. This variation needs to be quantified in order to effectively generate a management strategy for backwater ponds.

Three Lake Mohave backwater ponds were no longer being used for razorback sucker production, so they were dedicated to bonytail genetic experiments. The North Nine Mile, Nevada Egg, and Nevada Larvae backwaters were all stocked with equal numbers of male and female adult bonytail. Spawning was successful in the North Nine Mile and Nevada Egg backwaters. From these backwaters, 397 and 593 genetic samples of larvae and age-0 fish samples were collected from North Nine Mile and Nevada Egg, respectively. Parentage was determined for almost all larvae and age-0 fish samples produced within the North Nine Mile and Nevada Egg backwaters. Reproductive success was high for both sires (fathers of the progeny) and dams (mothers of the progeny) in both backwaters. Reproductive success differed dramatically between backwaters. Allelic diversity declined between the parental and progeny collections although this decline was not statistically significant.

FY15 Activities: The addition of the two bonytail backwaters has resulted in an increased effort for the backwater genetic work and is expected to impact budgets in subsequent years. Razorback sucker and bonytail spawn at different times of the year, and this limits the amount of cost sharing while collecting larvae. Sample collections and analyses similar to previous years will continue for both razorback sucker and bonytail dedicated backwaters.

In the Yuma Cove backwater, the relative survival of the newly stocked razorback sucker verses the surviving razorback sucker from previous years will be monitored. Additional augmentation to this population may be required to maintain an adult population in excess of 150 individuals. The AJ and Dandy backwaters will be used to provide replication that will allow the assessment of stability of life history parameters. Data suggest that these patterns are fluctuating regularly over time.

Proposed FY16 Activities: Efforts will be expanded in FY16 to evaluate additional research questions about razorback sucker and bonytail and to address challenges encountered in previous study years. Budget estimates in FY16–18 correspond to these changes and additional efforts. Stocking densities will be reduced in the AJ and Dandy backwaters (100 individuals per location) to assess the impact of reduced density on life history parameters. Additional genetic tools will be used to assess the differences in parental contributions among backwaters and attempt to identify the factors contributing to these differences. The adult razorback sucker population at the Yuma Cove backwater will also need to be augmented again to re-establish the population there; reproduction and survivorship will also continue to be monitored. Additional years of sampling

and analyses will be required to be able to draw inference regarding the long-term genetic management of these backwaters. Protocols for collections and analyses will continue, similar to previous years.

Pertinent Reports: Two interim reports (2011 and 2012) titled *Genetic and Demographic Studies to Guide Conservation Management of Bonytail Chub and Razorback Sucker in Off-Channel Habitats* are posted on the LCR MSCP Web site, and a final report is completed and will be posted on the Web site as well. An additional report titled *Development and Characterization of Microsatellite PCR Primers for Bonytail Chub for Use in Assessing Relatedness of Fishes Produced in Off-Channel Habitats* was completed under Work Task G3 and will also be posted on the Web site.

Work Task C41: Role of Artificial Habitat in Survival of Razorback Sucker and Bonytail

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$65,000	$59,605.33	$186,171.39	$0	$0	$0	$0

Contact: Jeff Anderson, (702) 293-8216, jranderson@usbr.gov

Start Date: FY10

Expected Duration: FY14

Long-Term Goal: Maintain effectiveness of the LCR MSCP Fish Augmentation Program

Conservation Measures: BONY3, BONY5, RASU3, RASU5, and RASU6

Location: Reach 2, Davis Cove

Purpose: To assess the use and role of artificial reefs and structures as cover by native fishes released under the LCR MSCP

Connections with Other Work Tasks (Past and Future): This work task is related to all work tasks in Fish Augmentation (Section B) that provide razorback sucker and bonytail for augmentation stocking, specifically Work Tasks B7, C23 (closed), and F5. The study results will be added to the database and used to complete Work Task D8. Due to the strong overlap in scope and purpose of this work task with Work Task C58, it will be merged into a new work task in FY15: Work Task C63. Specific activities and corresponding budget estimates for subsequent fiscal years will be detailed in this new work task.

Project Description: Approximately 800 acres of artificial fish habitat have been constructed and deployed in Lake Havasu over the past 15 years. Prior to FY10, similar structures were placed into coves in Lake Mohave. Razorback sucker have been periodically observed by scuba divers in and around these structures along with numerous species of exotic fishes. The frequency at which these structures are selected by native species will be recorded

Davis Cove, a 2.7-acre backwater rearing pond along Lake Mohave, was used to monitor and assess razorback sucker and bonytail responses to the deployment of artificial habitat. Davis Cove has supported razorback sucker and bonytail communities since 2005. Previously stocked bonytail contribute young-of-the-year fish after every spawning season. The backwater is dominated by rock

and sand shorelines with little emergent vegetation, and it is devoid of large submerged habitats. During this study, a variety of constructed habitat types will be placed into Davis Cove to attempt to determine which types of structures are selected by native species. The information may be used to guide current habitat projects in Reaches 2 and 3 as well as facilitate the design and development of LCR MSCP backwater habitats. It may also be used to suggest future stocking locations in Reaches 2 and 3 (e.g., if certain types of structures are known to be used as cover by native fishes, fish could be released in the vicinity of these structures to potentially increase post-stocking survival).

This study is conducted to inform managers of the selection and use of created structure as habitat. The first part of the study will attempt to determine if artificial habitats are used by native species and what the frequency of use is relative to other available artificial habitats, natural habitats, and areas with no cover. If use of these structures is confirmed, the frequency of use should indicate the relative importance of these features as habitat for cover and may also suggest a higher value for a particular type of cover. This information may be used to enhance created backwaters that may have a need for additional habitat features to provide cover for native fish. The next part of the study will attempt to determine the effectiveness of these features at impacting post-stocking survival through expansion of study areas. If constructed habitats are consistently selected and used by either native species, an attempt to assess the benefit of these habitats as protection and concealment from predators can be made. The impact that these structures have on survival of native fishes could also be suggested by deploying these habitats in other locations that have resident populations of non-native fishes.

Previous Activities: In FY11, 380 PIT-tagged razorback sucker (mean TL = 218 mm) were stocked into Davis Cove. Brush habitat was deployed within 3–5 m of a single antenna (control) at three different locations in the cove for 5 weeks. Polyvinyl chloride (PVC) pipe was deployed in the same locations near control antennas for 7 weeks. Open water (control antennas) received more contacts than either habitat. When habitats were removed from Davis Cove in October 2011, young-of-the-year bonytail were discovered to be residing inside the pipe that comprised the frame of the habitat.

In FY12, 372 PIT-tagged razorback sucker (mean TL = 258 mm) were stocked into Davis Cove. Brush and PVC pipe were deployed simultaneously with a single antenna (control) within 3–5 m. Similar to 2011, the open water (control antenna) received more contacts than both habitat types. Five sonic-tagged razorback sucker were released in Davis Cove and tracked over the battery life of their tags, 21 days. Fish movements were followed at early morning, mid-day, and early evening time intervals. Razorback sucker were not detected within 5 m of the habitat designs over the 21 days. At the end of FY12, it was decided to

stock PIT-tagged bonytail into Davis Cove for the future dates of the study since it appeared that razorback sucker did not select either habitat variety over the control.

In FY13, 745 PIT-tagged bonytail (from the Achii Hanyo Native Fish Rearing Facility) were stocked into Davis Cove. In March 2013, 52 PIT-tagged razorback sucker (from the Lake Mead Fish Hatchery) were also stocked. On April 1, 2013, brush habitat, pipe habitat, and a single antenna (control) were deployed along the western shoreline in Davis Cove, similar to FY12. Pipe habitat received more contacts than brush habitat but still fewer than the control antenna.

FY14 Accomplishments: On February 18, 2014, 450 PIT-tagged bonytail (from the Achii Hanyo Native Fish Rearing Facility) were stocked into Davis Cove. Mean TL and weight of 25 bonytail sampled were 137 mm and 20.6 grams, respectively. On May 14, 2014, 299 PIT-tagged bonytail (from the Achii Hanyo Native Fish Rearing Facility and Wahweap National Fish Hatchery) were stocked into Davis Cove. Mean TL and weight of 22 bonytail sampled were 121 mm and 17.9 grams, respectively. Mean lengths at stocking were lower than previous years due to a shortage of > 250-mm bonytail at the SNARRC. Perforated drainage pipe (4-inch diameter; 5-foot length) was used as habitat for FY14. On March 3, 2014, the brush and 10-inch diameter pipe habitats from FY13 were removed, and two drainage pipe habitats were deployed in separate locations. One habitat was deployed within 3–5 m of a single antenna (control) on the eastern shoreline of Davis Cove. A second habitat and control antenna were deployed in a similar manner at the north central shoreline. On June 25, 2014, a third pipe habitat and associated antenna were deployed on the southwest shoreline. The single habitat type (4-inch pipe) was deployed in different areas of Davis Cove to increase replication of the study. A total of 11 scanning intervals were completed between March 3 and September 29, 2014. Razorback sucker (stocked prior to 2014) and/or bonytail were contacted at each habitat and control antenna site during each of the scanning intervals, with few technical issues.

The Chapman modification of the Lincoln-Peterson Model was used to develop razorback sucker and bonytail population estimates throughout the course of the study. Deployed habitat and supplemental remote sensors were used to record all PIT tag numbers used for the population estimates.

No sonic telemetry with bonytail was used this year due to a lack of appropriately sized fish available at the SNARRC.

Over two stocking events (June 26 and July 2, 2014), 132 bonytail reared from 3 other Lake Mohave backwater ponds were delivered to Davis Cove. Fish from these stockings were contacted throughout the remainder of the study year. Data analyses has been initiated; preliminary data indicated that contact frequencies were higher for artificial habitats compared to open water control sites for 12 out of 24 pairings. This work task is being continued in FY15 under Work Task C63.

FY15 Activities: This work task was closed in FY14.

Proposed FY16 Activities: This work task was closed in FY14.

Pertinent Reports: All findings and statistical analyses will be presented in a report titled *Role of Artificial Habitat in the Survival of Razorback and Bonytail: 2014* and will be posted on the LCR MSCP Web site upon completion.

Work Task C42: Experiments and Demonstration of Soil Amendments for Use in Restoration Sites

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$200,000	$6,542.58	$458,429.71	$0	$0	$0	$0

Contact: Barbara Raulston, (702) 293-8396, braulston@usbr.gov

Start Date: FY10

Expected Duration: Closed FY14

Long-Term Goal: To assess the feasibility of using soil amendments to improve water retention of restored habitat and assess management options for irrigation of habitat restoration sites

Conservation Measures: MRM1 (WIFL, YBCU, ELOW, SUTA, GIWO, GIFL, VEFL, YWAR, and BEVI)

Location: BLCA on the Havasu NWR

Purpose: The purpose of this work task is to explore the use of soil amendments, alternative site preparation, and irrigation methods to maintain moist soils and/or standing water within habitats created for the southwestern willow flycatcher and improve germination of willow seed. Habitat conditions for other covered species will also be improved by maintenance of moist soil conditions. Improving low-quality soils will also improve water conservation and lower irrigation costs. This work will parallel species habitat and hydrology studies. The information will be used by Project Managers during site preparation and by land managers to create and maintain habitat with enough standing water and/or moist soils to replicate the structural characteristics of vegetation and microclimate found at occupied flycatcher habitat.

Connections with Other Work Tasks (Past and Future): Initial literature searches and laboratory studies were conducted under Work Task G3. A seed feasibility study was conducted under Work Task E24, and outcomes from that research will be used in conjunction with the soil amendment to determine if the amendment will bolster willow production from seed.

Project Description: The soil amendment Lassenite Pozzolan was identified as a possible product for improving water retention and irrigation practices of sandy soils after a review of soil amendments and their associated costs, availability, and water retention capabilities. Although the material has been

tested for use on golf courses in desert environments, there are several differences in the use proposed by Reclamation that require further examination. Application demonstrations are being conducted onsite at the BLCA, where sandy soil conditions exist.

The purpose of the field study is to determine if the addition of Lassenite Pozzolan to sandy soils has a positive effect on germination, survival, and growth of dense willow habitat from seed. The field study describes how smaller plots will be treated with higher percentages of the soil amendment to determine if the product increases soil moisture retention between irrigations. Both dense willows and moist soils may be used by nesting southwestern willow flycatcher.

Previous Activities: In 2007, under Work Task G3, a literature and product search was conducted to gather information on soil amendments for use in habitat restoration projects. This information was provided in a report finalized in 2007. In 2008–09, additional information was gathered on Lassenite Pozzolan, and a study proposal was written.

In FY10, laboratory work was completed to test the feasibility of Lassenite Pozzolan for restoration purposes, including movement of the product through a soil profile, application rates and soil moisture retention, and facilitation of water movement. Laboratory testing showed the product was useful in increasing water movement and moisture retention.

In FY12, the experimental design and study plan was finalized to further test the soil amendment under field conditions at BLCA on the Havasu NWR. Goodding's willow seed was collected for hydroseeding 8 acres, and 179 Fremont cottonwoods were acquired to establish a windbreak around the study site.

In FY13, the fields at the BLCA were prepared for planting by flushing salts from the soils, clearing vegetation, tilling, leveling, and furrowing. All instrumentation was installed to monitor irrigation. The fields were hydroseeded with Goodding's willow in April 2013. Monitoring of vegetation and soil moisture was conducted throughout the growing season. Vegetation monitoring results showed that willow seed germination was not significantly improved by high percentages of Lassenite Pozzolan added to the soils. However, soil surface moisture was retained longer in plots with at least 25% of the soil amendment. This product is no longer commercially available, so the remaining study objectives could not be completed.

FY14 Accomplishments: A final report was completed, and this work task was closed in FY14.

FY15 Activities: This work task was closed in FY14.

Proposed FY16 Activities: This work task was closed in FY14.

Pertinent Reports: A final report will be posted on the LCR MSCP Web site upon completion.

Work Task C43: Population Demographics and Habitat Use of the California Leaf-Nosed Bat, a Genetic Evaluation

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$50,000	$57,873.82	$83,294.29	$25,000	$40,000	$0	$0

Contact: Allen Calvert, (702) 293-8311, acalvert@usbr.gov

Start Date: FY11

Expected Duration: FY16

Long-Term Goal: Assess the population demographics and habitat use of an LCR MSCP evaluation species, the California leaf-nosed bat

Conservation Measures: CLNB1 and CLNB2

Location: Reaches 3–5

Purpose: To investigate the genetic variation in California leaf-nosed bats at roost sites along the LCR to inform program managers about the connectivity of the species' populations and level of rarity. This will include an analysis of the genetic history of California leaf-nosed bats in the LCR watershed and adjacent areas, including geographic structuring, evolutionary history, and other population demographic parameters.

Connections with Other Work Tasks (Past and Future): A portion of the roost site data and tissue samples collected from bats netted at restoration sites will be contributed from that collected under Work Tasks D9 and F4 .

Project Description: The genetics of California leaf-nosed bats along the LCR will be described. Genetic samples from each of the known roost sites near the LCR and from individuals captured during system monitoring will be collected, and DNA sequencing and microsatellite analyses will be performed. This will document the genetic structuring of bats at roost sites and allow various population analyses, including the connectivity of the species' populations and level of rarity, and demographic parameters to be estimated such as population size, previous population expansion or contraction, and dispersal between roosts, which may suggest which roost sites or areas along the river the bats netted at LCR MSCP conservation areas are coming from.

Previous Activities: Genetic samples were gathered, and mitochondrial sequencing for samples collected prior to FY12 were conducted under Work Task G3. Additional samples were collected at roosts. A total of 917 base pairs of the mitochondrial cytochrome B gene have been sequenced, and these sequences were used to create haplotype networks and neighbor joining trees to explore diversity and relatedness among roosts.

FY14 Accomplishments: The majority of the sampling effort has been completed. A total of 99 samples from the LCR and other areas within the species' range have been collected. In FY14, samples from two localities away from the LCR, Picacho Peak and the Sawtooth Mountains, were collected to fill gaps in the range of California leaf-nosed bats in Arizona. In addition, representative samples were submitted for Next-Gen sequencing to identify specific genetic markers that will best contribute to the full-scale analysis of the genetic diversity and relatedness among roosts.

FY15 Activities: Additional samples will be collected or obtained from other researchers in order to make comparative assessments on the relative uniqueness and diversity of California leaf-nosed bat colonies along the LCR. Next-Gen sequencing will be completed, and genetic analyses of all the samples will begin.

Proposed FY16 Activities: Genetic analyses and the analysis of the population demographics and habitat use of California leaf-nosed bats based on the genetic results will be completed.

Pertinent Reports: A report titled *Genetic Characterization of Macrotus californicus Populations along the Lower Colorado River—2010 Annual Report* is available on the LCR MSCP Web site. The research design is available upon request.

Work Task C45: Ecology and Habitat Use of Stocked Razorback Sucker in Reach 3

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$200,000	$145,520.50	$698,298.83	$0	$0	$0	$0

Contact: Jeff Lantow, (702) 293-8557, jlantow@usbr.gov

Start Date: FY11

Expected Duration: FY14

Long-Term Goal: To assess survival and habitat use of stocked razorback sucker

Conservation Measures: RASU6

Location: Reach 3 from Davis to Parker Dam

Purpose: To assess the ecology and distribution of habitats available to stocked razorback sucker in Reach 3 and evaluate the overall effectiveness of the LCR MSCP Fish Augmentation Program

Connections with Other Work Tasks (Past and Future): This work task is related to Work Tasks C33 (closed), D8, and G3. Due to the overlap in scope and intent of this work task with Work Tasks C39 and C49, these work tasks will be merged into a single work task in FY15: Work Task C64 (Post-Stocking Movement, Distribution, and Habitat use of Razorback Sucker and Bonytail). This combination of work tasks will allow sharing of overlapping resources, which is expected to increase efficiency in implementation and reporting, and it may also reduce overall expenditures. Activities under Work Task C64 will be detailed by river reach, and the budget estimates will reflect the effort needed to complete this work.

Project Description: Approximately 6,000 razorback sucker per year are reared and released into Reach 3 under the LCR MSCP Fish Augmentation Program, and roughly 30,000 more razorback sucker were stocked prior to the LCR MSCP. We regularly contact several hundred of these fish each year through annual surveys and associated work tasks. The contacted fish appear to be in excellent health, with little to no signs of parasites or disease, and they demonstrate growth rates comparable to other populations of repatriated razorback sucker. In the winter and spring, fish are located at known spawning areas near Needles, California, and Laughlin, Nevada. During the summer and

fall, stocked fish are found throughout the main channels and in numerous off-channel lakes and ponds within Topock Gorge. During this 5-year study, the availability of physical, chemical, and biological fish habitats within Reach 3 will be evaluated to help identify habitat limitations to survival and will allow assessment of possible habitat saturation.

Previous Activities: A group of select backwaters (Park Moabi, Pulpit Rock, Sand Dunes, Blankenship, Castle Rock, Clear Bay, and two small unnamed backwaters) were used to study razorback sucker habitat use in Reach 3. Razorback sucker use of these backwaters was quantified through catch per unit effort (CPUE) data of fish captured with trammel nets. Park Moabi had the highest catch rate (106 fish per 1,000 square meters [m^2]). The remaining backwaters had catch rates less that 8 fish per 1,000 m^2. The catch rates from 2012 were calculated for all species and compared to data collected prior to 2005. The results were similar, with the exception of increases in redear, bluegill, yellow bullhead, and smallmouth bass, to a lesser degree. Limnological data continued to be collected and will be compared once several years of data have been obtained. Water chemistry and the zooplankton, phytoplankton, and macroinvertebrate communities within the backwaters were sampled quarterly. Aquatic plant communities were sampled monthly during their growing season.

Beginning in February 2013, remote PIT tag scanners were used to quantify razorback sucker usage of the backwaters on a monthly basis. The scanning CPUE mirrored that of the trammel netting results, and razorback sucker in Park Moabi continue to be contacted at significantly higher rates. Park Moabi had an estimated 138 fish per 1,000 m^2 of trammel net compared to 0–14 fish per 1,000 m^2 in the other seven backwaters. All eight backwaters were stocked with razorback sucker at a rate of 20 fish per acre in February and March 2013. Results indicate most of these fish left the backwaters fairly quickly after their release. Scanners deployed at the mouths of some of the backwaters showed 35–70% of stocked fish leaving within a day. Additionally, very little movement among backwaters was detected; only 13 of the 3,018 (0.4%) fish were detected in a backwater other than the one they were stocked into. Monitoring for all limnological and peripheral ecological variables continued at frequencies similar to previous years.

FY14 Accomplishments: Razorback sucker were once again stocked into the select backwaters and monitored via trammel nets and PIT tag scanners. Scanning results were similar to previous years. The peripheral data that has continued to be collected suggest that available cover in backwaters is the primary characteristic for determining razorback sucker use; this includes turbidity and/or vegetation type. Not all of the FY14 funds were expended due to fewer equipment repairs/replacement and shared labor costs with other projects in the area.

This work will continue in FY15 under Work Task C64. The results for these investigations conducted in FY15 and future years will also be reported under Work Task C64.

FY15 Activities: This work task was closed in FY14.

Proposed FY16 Activities: This work task was closed in FY14.

Pertinent Reports: A report summarizing the results of this work task through 2012 titled *Ecology and Habitat use of Stocked Razorback Suckers in the Colorado River between Davis and Parker Dams (Reach 3 of the LCR-MSCP)* is completed and will be posted on the LCR MSCP Web site. A 2013 report is being prepared and will be posted on the Web site upon completion.

Work Task C47: Genetic Monitoring and Management of Recruitment in Bonytail Rearing Ponds

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$250,000	$236,065.29	$379,526.73	$0	$0	$0	$0

Contact: Andrea Finnegan, (702) 293-8203, afinnegan@usbr.gov

Start Date: FY12

Expected Duration: FY15

Long-Term Goal: To maintain an effective LCR MSCP Fish Augmentation Program

Conservation Measures: BONY3, BONY4, and BONY5

Location: Offsite rearing stations (the SNARRC and Achii Hanyo Native Fish Rearing Facility)

Purpose: To assess the effects of volunteer spawning by bonytail in holding ponds on the genetic integrity and goals of the captive management plan for this species

Connections with Other Work Tasks (Past and Future): This work task is related to Work Tasks B2–B4 and C11.

Project Description: There is concern regarding the genetic integrity of pond-reared bonytail due to spawning events that commonly occur in grow-out ponds. During this 3-year study, the genetic diversity of inadvertently spawned bonytail in ponds at the Achii Hanyo Native Fish Rearing Facility, SNARRC, and Uvalde National Fish Hatchery will be characterized and then compared to the founder population of bonytail broodstock at the SNARRC. The average diversity of pond recruitment at the SNARRC will be quantified, and the utility of using a biological control, in this case an appropriate piscivore (fish-eating fish), to reduce or eliminate inadvertent spawns in grow-out ponds at the SNARRC will be assessed.

Previous Activities: Bonytail tissue samples have been collected from the Uvalde National Fish Hatchery, Achii Hanyo Native Fish Rearing Facility, and SNARRC. All genetic samples have been genotyped for these tissue samples. Piscivorous fish were obtained and quarantined before being stocked into nine research ponds with bonytail in 2013.

The ponds were harvested in the fall of 2013. The pond without piscivores had a significant amount of recruitment where recruitment was controlled in ponds with piscivores.

FY14 Accomplishments: The second year of bonytail rearing in the presence of piscivorous fish was completed. A no-cost time extension was granted because FY14 funding was not awarded until July 2014. This work task has been extended through September 2015 so ongoing research can be completed.

FY15 Activities: Bonytail will be harvested from the study ponds. All fish will be counted and a subsample of fish from each pond will be weighed and measured. The density/biomass data collected in 2013 will be compared to the 2014 data. A final report will be submitted in September 2015. All funds were obligated in FY14, so no additional funds will be obligated in FY15.

Proposed FY16 Activities: This work task was closed in FY15.

Pertinent Reports: Scopes of work are available upon request. A final report will be posted on the LCR MSCP Web site upon completion.

Work Task C49: Investigations of Razorback Sucker and Bonytail Movements and Habitat Use Downstream from Parker Dam

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$150,000	$111,069.75	$224,143.99	$0	$0	$0	$0

Contact: Jeff Lantow, (702) 293-8557, jlantow@usbr.gov

Start Date: FY12

Expected Duration: FY14

Long-Term Goal: To maintain an effective LCR MSCP Fish Augmentation Program

Conservation Measures: BONY3, BONY 4, BONY5, RASU3, RASU4, and RASU6

Location: Reach 4, Colorado River, between Parker and Palo Verde Diversion Dams

Purpose: To assess distribution and habitat use of stocked razorback sucker

Connections with Other Work Tasks (Past and Future): This work task is related to Work Tasks C8 (closed) and D8. Due to the overlap in scope and intent of this work task with Work Tasks C39 and C45, these work tasks will be merged into a single work task in F15: Work Task C64 (Post-Stocking Movement, Distribution, and Habitat Use of Razorback Sucker and Bonytail). This combination of work tasks will allow sharing of overlapping resources, which is expected to increase efficiency in implementation and reporting, and it may also reduce overall expenditures.

Project Description: Under this 3-year study, post-stocking survival, movement, and habitat use of razorback sucker and bonytail released between Parker and Palo Verde Diversion Dams will be evaluated. Both species have been stocked into the river below Parker Dam, and both species show low levels of survival. Most of this reach occurs on CRIT land and has not previously been examined under the LCR MSCP.

Previous Activities: Research conducted under Work Task C8 will continue. Razorback sucker and bonytail have been stocked below Parker Dam since 2005.

An agreement was finalized in FY12 with the USFWS. In FY12, a study plan and literature review were completed, and a Memorandum of Understanding for project activities on CRIT lands was signed.

Prior to the release of telemetered fish, six electrofishing surveys were conducted from October through November between Parker Dam and Headgate Dam. These efforts resulted in the capture of 15 razorback sucker and 16 bonytail. The wire tag location indicated that the bonytail were released at River Island State Park on October 4, 2012, and the razorback sucker were from two different releases within the past 10 months.

Over 5,000 razorback sucker and 5,000 bonytail were released into several backwaters within CRIT lands, specifically Moovalya Lake, ‘Ahakhav Tribal Preserve, and Lost Lake. These fish were released as part of the LCR MSCP Fish Augmentation Program and represent the first stockings of razorback sucker and bonytail from the LCR MSCP on CRIT lands. These releases were made possible through the Memorandum of Understanding, between the CRIT and USFWS.

Per the study plan, 60 sonic tags were surgically implanted into 30 razorback sucker and 30 bonytail. Fifteen of each species were stocked into two different reaches separated by Headgate Dam (Blue Water Lagoon and River Island State Park). Both razorback sucker and bonytail showed variable dispersal patterns, which is common for hatchery-reared fish. Survival of telemetered fish was poor; over 75% of the fish were presumed dead within 6 weeks of release and 100% dead after 4 months. These mortality rates are similar to those observed in other projects within Reach 4 and have been documented in reports associated with Work Task C8 (closed). Predation continues to be the major suspected reason for mortality; a large number of these telemetered fish were presumably consumed by avian predators, specifically cormorants. Numerous tags from fish released below Headgate Dam were later detected above the dam at a cable crossing, which is frequently occupied by cormorants. An additional tag was recovered in Lake Havasu above Parker Dam, also likely due to an avian predator.

Trammel netting and remote PIT scanning were conducted in the backwaters where native fish were previously stocked. Contact rates were low for both types of surveys; only 18 razorback sucker and 1 bonytail were captured with trammel nets in the Moovalya backwater, and an addition 14 unique contacts were made via remote PIT tag scanners. Electrofishing proved equally ineffective throughout the majority of the river and backwaters. An exception was the area located within the discharge canal below Lost Lake; 10 unique (untagged) and 2 recaptured razorback sucker were recorded, and both originated from the 2013 Lost Lake stocking.

The results from the first year of this study were not entirely unexpected. This area ,the CRIT lands below Parker Dam, has not been previously stocked or surveyed, and little is known about these two species habitat use within this

section of the LCR. The large numbers of fish released this year, combined with future releases and additional telemetry, should begin to provide more resolution about long-term survival, the habitats used by native fishes, and areas that may suggest improved stocking success.

FY14 Accomplishments: Bonytail of sufficient size were not available in time for FY14 study purposes. Due to the general lack of knowledge for any native fish in this reach (primarily in areas on CRIT lands), we instead sonic-tagged additional razorback sucker. Paired releases of razorback sucker from two different rearing environments, hatchery and backwater, were released in order to monitor dispersal and relative survival. The average net movement of all backwater razorback was 15% greater than hatchery razorback. Mortality of backwater razorback as a whole (36%) was greater than hatchery razorback (32%) but varied based on stocking location.

Due to the inability to draw meaningful inference form these data because of few re-contacts of released fish, work in this section of Reach 4 will not be continued in FY15. A new strategy and new set of research questions may be evaluated in this area at a future time. Any future work will be described under Work Task C64.

FY15 Activities: This work task was closed in FY14.

Proposed FY16 Activities: This work task was closed in FY14.

Pertinent Reports: A study plan and a literature review have been completed and are available upon request. A report summarizing the first year's activities is in draft and will be posted on the LCR MSCP Web site upon completion.

Work Task C51: Vermilion Flycatcher Detectability and Distribution Study

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$150,000	$0	$42,560.10	$0	$0	$0	$0

Contact: Barbara Raulston, 702-293-8396, braulston@usbr.gov

Start Date: FY12

Expected Duration: FY14

Long-Term Goal: Monitor distribution and abundance of vermilion flycatcher on the LCR and identify habitat characteristics for the species in LCR MSCP habitat creation areas

Conservation Measures: VEFL1, MRM1, MRM2, MRM4, CMM1, and CMM2 (VEFL)

Location: LCR MSCP system-wide and habitat creation sites

Purpose: To identify the best field method for monitoring population abundance and locations of vermilion flycatcher within the LCR MSCP planning area.

Connections with Other Work Tasks (Past and Future): Information obtained through this work task will be used in conjunction with data collected during post-development monitoring of habitat conservation areas (F2) and system-wide surveys conducted under Work Task D6. Information obtained through this work task will also be used in association with Work Task C24 to help define habitat requirements for riparian obligate bird species.

Project Description: The vermilion flycatcher is highly visible when present due to its bright coloration, active behavior, and distinct vocalizations. However, general bird surveys conducted under Work Task D6 in habitats previously occupied by vermilion flycatcher (Bill Williams River NWR) have not detected them in the numbers expected. Surveys for cuckoos (D7) and willow flycatchers (D2) are also lacking in incidental reports of this species. Vermilion flycatcher may begin courtship as early as February, much earlier than many other species on the LCR; thus, a presence/absence survey protocol is needed specifically for this species and should begin in February. A literature review will be conducted, and a preliminary, system-wide search for the species will be used to develop a site list and survey protocol.

Previous Activities: A review was conducted of the 1980–2012 literature and historical records on vermillion flycatchers along the LCR. Based on this information, sites visits were conducted in 2012 at areas on the LCR where vermilion flycatchers were documented previously. Site visits involved casual observations (not structured surveys). Data collected included a general description of the site, location, and, if birds were located, additional information such as evidence of breeding, behavior, age, and sex of individuals.

A total of 40 sites from Yuma, Arizona, to Needles, California, were visited between February 2 and April 19, 2012. Vermilion flycatchers were documented at nine locations between Yuma and Lake Havasu City, Arizona, and nesting was documented at five locations. The site visits confirmed the existing knowledge regarding the habitat the species uses. Vermilion flycatchers are found foraging and breeding in broad-leaf riparian woodlands, mesquite bosques, along the margins of agricultural fields, and in other open grassy areas near accessible water (including irrigated areas) and includes golf courses, cemeteries, and park-like habitats in urban areas.

Following confirmation of the habitat used by vermillion flycatchers along the LCR, it was determined that no research was necessary to inform habitat requirements for this species. Habitat created, which included scattered honey mesquites with an understory of grass adjacent to cottonwood and willow and agriculture, and accessible water (the river channel or irrigation) will be similar to habitat being used by vermilion flycatcher currently or in the recent past on the Bill Williams River NWR and at restored habitat at the ‘Ahakhav Tribal Preserve.

FY14 Accomplishments: This work task was closed in FY14.

FY15 Activities: This work task was closed in FY14.

Proposed FY16 Activities: This work task was closed in FY14.

Pertinent Reports: The report titled *Vermilion Flycatchers on the LCR: A Summary of Data from 1970–2012* is available on the LCR MSCP Web site.

Work Task C52: Gilded Flicker Riparian Habitat Use and Seasonal Movement Research

FY14 Estimates	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$300,000	$290,368.44	$333,727.06	$160,000	$300,000	$300,000	$0

Contact: Beth Sabin, (702) 293-8435, lsabin@usbr.gov

Start Date: FY12

Expected Duration: FY17

Long-Term Goal: Evaluate current distribution and abundance of gilded flicker on the LCR by conducting species-specific, non-random surveys

Conservation Measures: GIFL1 and MRM1

Location: The LCR MSCP planning area and other areas in Arizona where gilded flicker are located

Purpose: The purpose of this work task is to: (1) evaluate year-round habitat use, seasonal movements, and size of the breeding home range of the gilded flicker; (2) determine how often gilded flicker are using riparian habitat as nesting or roosting cavities; and (3) determine approximate dates of pair formation, incubation, nestling, and fledgling stages.

Connections with Other Work Tasks (Past and Future): Information obtained through this work task will be used in conjunction with data collected during post-development monitoring of habitat conservation areas (F2) and system-wide surveys conducted under Work Tasks D6 and D13 (closed). Information obtained through this work task will also be used in association with Work Task C24 to help define requirements for riparian obligate bird species.

Project Description: General bird surveys conducted under Work Task D6 have not detected gilded flicker breeding in riparian habitat within the LCR MSCP planning area or the western portion of the Bill Williams River. However, there have been incidental observations of gilded flicker using the riparian habitat in this area as family groups during the fall and winter months and occasionally during the summer months.

Additional research and monitoring is needed to understand how and when the gilded flicker is most likely to use riparian habitat within its range. This study will: (1) estimate time periods of breeding and post-breeding stages and

document breeding season behaviors to help interpret results of sightings, (2) document gilded flicker travel distances during and after nesting season to document if it is possible that birds nesting in saguaro habitat may also utilize disconnected riparian habitat, (3) help define habitat use (Anderson and Ohmart structural types) of the gilded flicker during the breeding and non-breeding season.

Previous Activities: The existing species profile and annotated bibliography were updated, and historical and recent reports and accounts were examined for detections within the LCR MSCP planning area and along the Bill Williams River. In FY12, preliminary surveys to locate breeding gilded flicker within the LCR MSCP planning area and adjacent areas were conducted. Areas where gilded flickers were observed include a family group in mesquite habitat along the Bill Williams River north of Mineral Wash Road; a pair of gilded flickers at McIntyre Park in Blythe, California; an incidental sighting of a gilded flicker at Yuma East Wetlands; and numerous gilded flickers readily detected in the saguaro habitat adjacent to the LCR MSCP planning area in Arizona.

In FY13, a study was initiated to document the breeding chronology, seasonal movement and breeding home range size, and year-round habitat use (Ohmart and Anderson structural types) of the gilded flicker. Existing methods to document species movements needed to be tested to ensure reliable study results before animals in riparian areas could be used in the study. An upland ephemeral wash study area was selected south of Quartzite, Arizona. Capture and radio telemetry tracking methods were tested, and information on the breeding chronology of the gilded flicker was collected. Four male gilded flickers in the study area were captured, fitted with backpack-mounted radio transmitters, and banded. Two male reference gilded flicker were captured and banded.

FY14 Accomplishments: In FY14, the study continued at the FY13 study site south of Quartzite. Testing continued on capture and radio telemetry tracking. Additional information on the breeding chronology of the gilded flicker also continued to be gathered.

Males and females were captured, banded, and outfitted with backpack-mounted radio transmitters; reference females were also captured and banded only to allow for comparisons. Different year-round tracking techniques were employed to allow for comparison to determine which was the most effective and cost efficient. Three males were fitted with GPS locators to test feasibility of tracking with this method. The feasibility and best techniques to capture juveniles post-fledge were explored, and two juveniles were outfitted with smaller retrix-mounted radio transmitters and monitored for 3 months to provide information on their tracking feasibility, habitat use, average home range size, and behavior while in family group formation. Due to various technical difficulties with the

backpack-mounted radio transmitters, not enough were functioning during the summer months to warrant tracking by plane to look into family group movements.

To document the timing of the different breeding stages, eight active nest cavities were monitored on a regular basis until nestlings fledged using the methods developed in FY13. The types of vocalizations made during different activities and time periods were also documented in FY14 using the same methods as in FY13.

FY15 Activities: Testing of tracking methods will be completed. This will involve tracking birds during the spring. Information on the gilded flickers gathered at the upland site will be summarized: (1) time periods of breeding and post-breeding stages and breeding season behaviors, (2) gilded flicker travel distances during and after nesting season, and (3) habitat use (Anderson and Ohmart structural types) of the gilded flicker during the breeding and non-breeding season.

It is anticipated that the reduced field effort in FY15 will require fewer funds.

Proposed FY16 Activities: Surveys will be conducted on gilded flickers in riparian habitat along the LCR and, if necessary, other Arizona watersheds. Flickers will be fitted with approved tracking equipment to: (1) estimate time periods of breeding and post-breeding stages and document breeding season behaviors to help interpret results of sightings, (2) document gilded flicker travel distances during and after nesting season to document if it is possible that birds nesting in saguaro habitat may also utilize disconnected riparian habitat, (3) help define habitat use (Anderson and Ohmart structural types) of the gilded flicker during the breeding and non-breeding season.

Pertinent Reports: The report titled *Literature Search and Exploratory Surveys for the Gilded Flicker along the Lower Colorado River, 2012* is posted on the LCR MSCP Web site. The 2013 and 2014 annual reports will be posted on the LCR MSCP Web site upon completion.

Work Task C53: Sonic Telemetry of Juvenile Flannelmouth Sucker in Reach 3

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$120,000	$117,501.56	$249,405.81	$120,000	$120,000	$100,000	$100,000

Contact: Jeff Lantow, (702) 293-8557, jlantow@usbr.gov

Start Date: FY12

Expected Duration: FY18

Long-Term Goal: Support flannelmouth sucker conservation

Conservation Measures: FLSU1 and FLSU3

Location: Reach 3, Arizona/Nevada/California

Purpose: To evaluate habitat selection and use for juvenile flannelmouth sucker in Reach 3 and provide recommendations to enhance juvenile flannelmouth sucker habitats as a requirement of LCR MSCP habitat creation goals

Connections with Other Work Tasks (Past and Future): Work conducted under this task is related to Work Tasks C15 (closed) and C45.

Project Description: Flannelmouth sucker were reintroduced into the Colorado River below Davis Dam by the AGFD in 1976 by transfer of fish captured at the confluence of the Colorado and Paria Rivers at Lee's Ferry, Arizona. This stock has persisted for three decades and now represents the only known population of this native species in the Colorado River downstream from Davis Dam.

Five years of research on this population of flannelmouth sucker were completed under the LCR MSCP. All life stages of this species were contacted, and telemetry of adults provided insight on the movements and habitat use of adult flannelmouth sucker. Inference may be limited, as only nine juvenile flannelmouth sucker > 100 mm and < 350 mm TL were contacted during this study. Similar difficulties contacting juveniles were encountered during studies undertaken by the U.S. Geological Survey in the 20 river miles above Lake Havasu, but it was found that, while flannelmouth sucker contacts were rare, the majority (85%) of flannelmouth sucker captured consisted of these smaller size classes. The habitats used by these younger fish will be better defined, and a complete life history of flannelmouth sucker within Reach 3 will be provided.

Previous Activities: A surrogate population of flannelmouth sucker from the Colorado River at the Lake Mead inflow was utilized to initiate telemetry work in FY13. In March 2013, 20 subadult fish were surgically implanted with a 90-day sonic transmitter, held at the Lake Mead Fish Hatchery and observed until determined healthy, then released downstream from Laughlin, Nevada. Manual tracking was initiated immediately following release accompanied by SURs to help determine fish locations. Fish were tracked and habitat data were recorded until mid-June. Fish proved difficult to track with manual equipment, and the majority of detections were from SURs. Seven fish were either mortalities or never detected, and the majority of active tags (10 of 13) were only detected by SURs. Fish were detected in a mix of backwater and riverine habitats. We also recorded at least one instance of continuous backwater use at the BBCA; this fish was contacted in the backwater repeatedly for 10 days.

FY14 Accomplishments: Subadult flannelmouth sucker surrogates were collected from the Lake Mead inflow. Thirty subadult flannelmouth sucker were surgically implanted with 90-day sonic tags, and eight were implanted with 100-day very-high-frequency radio transmitters. Tagged fish were released downstream from Laughlin, Nevada, in late February 2014. Manual tracking was initiated immediately following release accompanied by SURs to help determine fish locations. Tracking and habitat data collections continued until mid-June. More SURs were deployed this year and were placed strategically to help bracket fish locations and increase detectability in backwater habitats. Sonic and radio tags were both effective, and habitat data were collected on 5 radio- and 13 sonic-tagged fish. In lower turbidity environments (i.e., main channel and select backwaters), fish were associated with stands of bulrush. Fish remained concealed during daylight hours and moved out during the evenings and night, presumably to forage, and then returned to the same bulrush stand each day. This association with emergent vegetation was not seen in habitats with higher turbidity; fish in these environments remained stationary in the open water of the backwater. Multiple fish were detected within the backwater at the BBCA; a radio-tagged fish was detected in the dense bulrush stand in the center of the backwater for multiple weeks.

FY15 Activities: Due to the success with radio tags from FY14, tracking and habitat data collection will be repeated for FY15. Up to 12 fish will be outfitted with this technology. Additional time and emphasis will be dedicated to detailing individual fish movements throughout the day and night.

Proposed FY16 Activities: Activities will be similar to those from FY15; however, release locations will differ greatly. The study site will be shifted, and fish will be released into the large backwater/marsh habitats found in the 20 river miles immediately upstream of Lake Havasu in Topock Gorge. Age-0 flannelmouth sucker have been detected in seine hauls within this area, and subadults have sporadically been captured during other research and monitoring. Based on recent telemetry research and available habitats, this section of river

presumably serves as nursery habitat for the Reach 3 flannelmouth sucker population. We expect that this will be a multi-year effort and have estimated budgets through FY18. Budgets after FY16 have been reduced to reflect anticipated increases in efficiency resulting from combining these efforts with other ongoing monitoring in the area (D8 and C64).

Pertinent Reports: A study plan was developed in FY11 and is available upon request. A report summarizing the previous year's findings will be completed and posted on the LCR MSCP Web site.

Work Task C54: Techniques to Establish Native Grasses and Forbs

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$200,000	$0	$9,110.44	$0	$0	$0	$0

Contact: Carrie Ronning, (702) 293-8106, cronning@usbr.gov

Start Date: FY13

Expected Duration: FY14

Long-Term Goal: Develop techniques to establish native grasses and herbaceous perennial forbs while suppressing the establishment of invasive species

Conservation Measures: MRM2, CRCR2, YHCR2, and CMM1

Location: Cibola NWR Unit #1

Purpose: The purpose of this work task is to develop successful planting techniques and research alternative methods of native grass and forb establishment while suppressing weed species establishment. Typically, grass and forb species can be difficult to establish when competition from weed species is high. Additionally, invasive plant species can modify riparian plant communities, degrade wildlife habitat, and increase the risk of fire.

Connections with Other Work Tasks (Past and Future): Post-development habitat monitoring will be conducted at habitat creation sites detailed in Work Tasks F1–F4.

Project Description: The HCP requires the creation of over 8,100 acres of various land cover types to provide habitat for targeted LCR MSCP covered species. Currently, ground cover being utilized includes non-natives such as alfalfa. Native herbaceous grass and forb species can be difficult to establish especially in areas with an abundance of weed species. Yet, once natives are established, they typically become effective competitors and may be able to keep weed presence down to a minimum. In this way, native grasses can be used in place of the non-native ground covers, which may provide better habitat for covered species such as cotton rats.

Effective planting techniques that may increase the survival of native plants will be determined while testing different methods of weed suppression and control.

Previous Activities: Seed bank samples were collected in February and May 2012 in both control and experimental fields. The experimental field was plowed and watered several times to encourage weed seed germination. Seed bank samples were grown at a University of Nevada, Las Vegas, greenhouse and identified to species. One additional seed bank sample was collected in FY13. It was also sent to the university, and samples were grown out and identified to species. The work plan for FY13 was canceled due to sequestration.

FY14 Accomplishments: The project was discontinued, and funds were distributed to higher-priority projects.

FY15 Activities: This work task was closed in FY14.

Proposed FY16 Activities: This work task was closed in FY14.

Pertinent Reports: A final report titled *Seed Bank Study at Cibola National Wildlife Refuge* describes the results of the greenhouse grow-out, and it is posted on the LCR MSCP Web site.

Work Task C55: Techniques to Increase Leaf Litter Decomposition Rates

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$75,000	$0	$0	$0	$0	$0	$0

Contact: Carrie Ronning, (702) 293-8106, cronning@usbr.gov

Start Date: FY13

Expected Duration: FY14

Long-Term Goal: Develop techniques to reduce litter biomass

Conservation Measures: MRM2 and CMM1 (WIFL, YBCU, ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, and SUTA)

Location: PVER

Purpose: The purpose of this work task is to: (1)evaluate whether a reduction in accumulated leaf litter and fuel load is needed, (2) develop tools to reduce the accumulated litter, and (3) determine if a reduction in litter improves irrigation efficiency.

Connections with Other Work Tasks (Past and Future): Post-development habitat monitoring will be conducted at habitat creation sites detailed in Work Tasks F1–F5, a fire management plan under Work Task E18, and creation and management of a mosaic of native land cover types under Work Task E4.

Project Description: In many of the LCR MSCP habitat creation sites, there is a buildup of dead vegetation and leaf litter that contributes to fuel loads, which could eventually become a fire hazard. Additionally, the accumulation of litter may impede the movement of irrigation water across the site.

At habitat creation sites, the cottonwood-willow habitat type is planted in high densities. The canopy closure varies as well as the density and cover of understory shrubs, forbs and grasses. A reduction of fuel loads, including the accumulation of litter, may be a necessary management action. It is also necessary to determine whether excess litter hinders water movement across a field, which is important for managing irrigation at habitat creation sites.

The objectives of this study were to evaluate the effectiveness of adding a biological compost tea to habitat creation areas with an excess accumulation of litter and determine whether a reduction in litter improves irrigation water distribution across the gradient of a field.

Previous Activities: The work plan for FY13 was canceled due to sequestration.

FY14 Accomplishments: The project was evaluated, and it is not known whether leaf litter decomposition rates are a problem. This project was defunded and closed, with no expenditures and no accomplishments.

FY15 Activities: This work task was closed in FY14.

Proposed FY16 Activities: This work task was closed in FY14.

Pertinent Reports: N/A

Work Task C56: Characterization of Lake Mohave Backwaters to Evaluate Factors Influencing Spawning Success

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$100,000	$0	$22,208.29	$0	$0	$0	$0

Contact: Andrea Finnegan, (702) 293-8203, afinnegan@usbr.gov

Start Date: FY13

Expected Duration: FY14

Long-Term Goal: To help facilitate future design and management of created backwater habitats

Conservation Measures: RASU3, RASU6, BONY3, and BONY5

Location: Lake Mohave, Reach 2

Purpose: To characterize Lake Mohave backwater rearing ponds to include, but not be limited to, AJ, Dandy, and Yuma Cove where stocked juvenile razorback sucker have been observed to spawn at different rates in order to determine which factors are most influential in promoting spawning and subsequent survival of razorback sucker larvae.

Connections with Other Work Tasks (Past and Future): This work task was related to Work Task C40 (closed). Continued baseline monitoring of Lake Mohave backwaters will be captured under Work Tasks B1, B7, and C40 as appropriate. Additional findings related to this work task may be undertaken under Work Task C63 (new in FY15): Evaluation of Habitat Features that may Influence Success of Razorback Sucker and Bonytail in Backwater Environments.

Project Description: Disconnected backwater ponds on Lake Mohave are used for rearing razorback sucker in support of the LCR MSCP Fish Augmentation Program. Subadult fish are currently PIT tagged at 300 mm TL, fin clipped for genetics, and stocked into these ponds during the winter or spring. The ponds are harvested in the fall, as the backwaters are drawn down with the seasonally declining water level of Lake Mohave.

Over the past 2 years, genetic analyses of larvae that were spawned from stocked razorback sucker in the AJ and Dandy backwaters showed differences in reproductive success. In the AJ backwater, a minimum of 52% of the stocked fish contributed to the larvae sampled, while in the Dandy backwater, a minimum of 33% contributed in 2010. In 2011, only larvae were captured from the AJ backwater; a minimum of 68% of the adults contributed to the larvae sampled.

A detailed characterization of selected Lake Mohave backwaters will be provided to determine which factors are most influential toward successful razorback sucker spawning and subsequent larval survival. The research will begin with a narrow focus on the AJ and Dandy ponds, two ponds with different spawning success at Lake Mohave, but the research may be expanded to include other backwaters or other known razorback sucker spawning areas.

Previous Activities: A reduced amount of funds was expended on this work task in FY13 due to budget constraints, including budget reductions caused by sequestration. Activities were confined to determining if there was indeed a marked difference in spawning rates among Lake Mohave backwaters compared to the relative sampling efforts. Larval sampling at the AJ, Dandy, and Yuma Cove backwaters was completed biweekly. The AJ and Dandy backwaters were sampled five times each and the Yuma Cove backwater four times. The AJ backwater had the greatest catch-per-unit-effort (CPUE) of 0.64, and the Dandy and Yuma Cove backwaters had similar CPUEs of 0.20 and 0.22, respectively.

These results suggest that spawning rates among these backwaters varied, but it did not indicate any pattern outside the regular spectrum of variation observed across the backwaters at Lake Mohave. In addition, there appears to be wide variation in physical and chemical parameters among these backwaters and year-to-year differences in other life stage success. Because of likely interacting affects, potentially confounding variables, and the inability to suggest any particular causal links, this work task will be closed in FY14.

FY14 Accomplishments: This work task was closed in FY14. No expenditures were incurred under this work task in FY14.

Additional baseline data on these backwaters will continue to be collected in FY14 within the scope of other appropriate work tasks, including Work Tasks B1, B7, and C40, which will include larval sampling at the AJ, Dandy, and Yuma Cove backwaters on Lake Mohave (Arizona/Nevada) on a biweekly basis to obtain a second year of CPUE data. If longer-term standardized monitoring reveals more consistent patterns centered on particular variables that may be important in influencing success, a study plan will be developed, and with Steering Committee approval, investigations will commence under Work Task C63.

FY15 Activities: This work task was closed in FY14.

Proposed FY16 Activities: This work task was closed in FY14.

Pertinent Reports: N/A

Work Task C57: Sonic Telemetry of Lake Mead Juvenile Razorback Sucker

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$250,000	$229,689.31	$312,391.65	$250,000	$0	$0	$0

Contact: Jim Stolberg, (702) 293-8206, jstolberg@usbr.gov

Start Date: FY13

Expected Duration: FY15

Long-Term Goal: Support RASU conservation

Conservation Measures: RASU 6

Location: Reach 1, Lake Mead, Arizona/Nevada

Purpose: To investigate habitat use of immature razorback sucker and evaluate conditions that allow for natural recruitment of Lake Mead razorback sucker

Connections with Other Work Tasks (Past and Future): This work task is related to Work Tasks C13 and D8.

Project Description: From 1996 to 2011, 95 sonic-tagged adult razorback sucker have aided researchers in locating spawning populations of this species in Lake Mead and in understanding the habitat use and spawning preferences of the adult population. Trammel netting efforts during this time also provided valuable information on Lake Mead razorback sucker demographics and included the capture of over 100 juvenile/subadults. Limited effort has been expended trying to capture this young life stage, which is an important element in understanding why razorback sucker recruitment is occurring in Lake Mead. The habitat use of immature razorback sucker will be investigated through the use of sonic telemetry, and an attempt will be made to capture additional wild, immature razorback sucker through traditional fisheries techniques.

Previous Activities: This study builds upon work conducted on the Lake Mead adult razorback sucker population (C13 and D8).

Sonic telemetry of juvenile, Lake Mead razorback sucker was initiated in FY13. Eighteen juvenile razorback sucker were surgically implanted with 3- or 12-month sonic transmitters in May and released as three groups into Las Vegas Bay, Echo Bay, and the Muddy River/Virgin River inflow area. Following the

release of sonic-tagged fish, 3 months of intensive fish community sampling was conducted in an effort to capture wild, juvenile razorback sucker. Active and passive sonic surveillance were also used throughout the year to characterize the movements and habitats occupied by these juvenile fish as well as to provide locations for sampling efforts. Contacts resulting from active sonic surveillance allowed for quantification and assessment of 74 habitat replicates. Individual fish were observed to use similar habitat throughout the lake regardless of location or season, associating with shallow, densely vegetated habitat in the spring and deeper habitats with no apparent cover other than turbidity in the summer and early fall.

FY14 Accomplishments: An additional 18 juvenile razorback sucker were obtained from the Lake Mead Fish Hatchery (B6) and surgically implanted with sonic transmitters in 2014. Fish were again selected from two separate size classes of juveniles and received sonic tags with either a 3- or 12-month battery life. Twelve fish received 12-month sonic tags and were released into Lake Mead in March. These fish were released in cohorts of four fish at Las Vegas Bay, Echo Bay, and the Muddy River/Virgin River inflow area. This group allowed for sonic surveillance and habitat assessments to be conducted throughout the year. The remaining six fish received 3-month sonic tags and were released in pairs at Las Vegas Bay, Echo Bay, and the Muddy River/Virgin River inflow area in September. This group allowed for an increased presence of sonic-tagged fish during the fall intensive community sampling effort.

Active and passive sonic surveillance were used throughout the year to characterize movements and habitat(s) occupied by these juvenile fish. In association with sonic surveillance efforts, electrofishing, minnow traps, hoop nets, trammel nets, fyke nets, and seines were also used to sample the fish community in areas where sonic-tagged fish were located. At the end of the 2014 calendar year, active sonic surveillance had resulted in a total of 120 contacts among all 18 individuals. These contacts allowed for the quantification and assessment of over 300 habitat replicates, which showed that individuals associated with inshore, shallow habitat characterized by varying amounts of inundated cover and high turbidities during the spring and early summer; offshore, deeper habitat following mid-summer increases in water temperatures; and a shift back to shallower habitats with cover during the fall. In addition to cover and depth, general water quality parameters and substrate samples were also collected. While no additional wild, juvenile razorback sucker were contacted during the study year, 11 adult razorback sucker were captured in direct association with sonic-tagged juvenile razorback sucker in Echo Bay and Las Vegas Bay during the September and November intensive community sampling efforts. Nine of these fish were new, wild captures. Although these individuals were relatively large in comparison to their sonic-tagged counterparts,

similarities in behavior and habitat selection were observed. This discovery also highlighted the continued success in using sonic-tagged razorback sucker to locate additional wild individuals.

FY15 Activities: As 12-month sonic tags from the FY14 field season near the end of their expected battery life, an additional 18 juvenile razorback sucker will be implanted with sonic transmitters. Twelve of these fish will again receive 12-month sonic tags and be stocked at the start of the FY15 field season (May). The remaining six fish will receive 3-month sonic tags, but these fish will be stocked in December 2015 to observe any seasonal variation in habitat use for this smaller class of fish. Sonic surveillance, habitat assessment, and collection of physicochemical data will again occur throughout the year, and intensive sampling of the conspecific fish community is anticipated to begin with the December 2015 stocking. Funds were obligated in FY15 to complete this effort; therefore, no additional costs are anticipated in FY16.

Proposed FY16 Activities: This work task was closed in FY15.

Pertinent Reports: The *Sonic Telemetry and Habitat Use of Juvenile Razorback Suckers in Lake Mead: 2014–2015 Annual Report* will be posted on the LCR MSCP Web site following review.

Work Task C58: Investigating Shoreline Habitat Cover for Bonytail

FY14 Estimates	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$60,000	$0	$30,179.14	$0	$0	$0	$0

Contact: Andrea Finnegan, (702) 293-8203, afinnegan@usbr.gov

Start Date: FY13

Expected Duration: FY14

Long-Term Goal: To facilitate future design and management of created backwater habitats

Conservation Measures: BONY5

Location: Reaches 3–4, Achii Hanyo Native Fish Rearing Facility, Parker Dam Pond, and Cibola High Levee Pond

Purpose: To determine the size and depth preference of cavity cover in riprap shoreline habitat for bonytail

Connections with Other Work Tasks (Past and Future): Bonytail used in this study would be provided through Work Tasks B3, B4, and C41. Due to the strong overlap in scope and purpose of this work task with Work Task C41, it will be merged into a new work task in FY15: Work Task C63. Specific activities, accomplishments, and coreresponding budget estimates for subsequent fiscal years will be detailed in this new work task.

Project Description: Bonytail have been documented using open water and shoreline cover in Lake Mohave backwater ponds and at the Cibola High Levee Pond. Shoreline habitat will be investigated, specifically cavities within riprap shorelines, for bonytail at multiple life stages. Cavities of multiple size and depth will be created, and bonytail selection will be tested at the Achii Hanyo Native Fish Rearing Facility. The investigation of preferred water depth of these cavities is to be completed at Parker Dam Pond. The results may facilitate the design and development of riprap shorelines for LCR MSCP backwater habitats.

Previous Activities: A study designed to evaluate cavity selection by bonytail was initiated in FY13. Funds were expended for equipment and setup; however, no trials were conducted in FY13 because of scanner interference at the selected study location. A new location was identified for the trials, and the study was to commence in FY14.

FY14 Accomplishments: The cavity selection trials were to begin in October 2014; however, the trials could not be completed as a result of the Government shutdown. The testing interval was to begin on October 1, which would have allowed for the use of hatchery-reared fish prior to stocking. The start date and a large portion of the time window of the trial were missed, and as planned, the fish reserved for this study were stocked as part of the augmentation program. In April, hatchery space was not available for the trials due to the arrival of approximately 60,000 bonytail from the Wahweap State Fish Hatchery in November. No additonal work was completed in FY14, and no funds were expended. Any future research targeting habitat features will be identified and described under Work Task C63.

FY15 Activities: This work task was closed in FY14.

Proposed FY16 Activities: This work task was closed in FY14.

Pertinent Reports: N/A

Work Task C59: Selenium Monitoring in Created Backwater and Marsh Habitat

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$250,000	$23,637.54	$45,168.21	$250,000	$200,000	$200,000	$200,000

Contact: Jim Stolberg, (702) 293-8206, jstolberg@usbr.gov

Start Date: FY13

Expected Duration: FY25

Long-Term Goal: To develop a long-term selenium monitoring plan for the LCR MSCP

Conservation Measures: MRM2 and MRM5 (BONY, RASU, CLRA, and BLRA)

Location: BBCA, Hart Mine Marsh, and the IPCA

Purpose: To evaluate the selenium levels within created backwater and marsh habitats and establish a selenium monitoring plan as required by the HCP

Connections with Other Work Tasks (Past and Future): Monitoring for selenium will be conducted for habitat created through Conservation Area Development and Management (Section E) work tasks (E1, E9, E14, E15 [closed], E16, E25, E27, and E28) and will be incorporated into Post-Development Monitoring (Section F) work tasks (F1, F3, F5, and F7).

Project Description: As described in the HCP conservation measures, the LCR MSCP is developing 512 acres of marsh and 360 acres of backwaters as part of its habitat creation goals. These created habitats will be monitored over the term of the program to ensure that they maintain their function for all associated covered species. Sampling efforts will be implemented or continued at designated project sites for the purpose of determining baseline or changes in selenium concentrations. The initial sampling phase is expected to provide a representative baseline sample and assessment of variability across each site. Once this information is known, a long-term selenium monitoring plan can be recommended for each specific conservation area to be carried out under the appropriate Post-Development Monitoring (Section F) work task. Subsequent years' sampling may be reduced as appropriate. Multi-year sampling can then be used to develop a larger dataset on which management decisions can be based

through the adaptive management process. As new conservation areas are developed, this exploratory sampling phase will continue to be accomplished under this work task.

Previous Activities: Limited funds were expended under this work task in FY13 due to budget constraints, including budget reductions due to sequestration. Implementation of this project will be evaluated as funding becomes available.

FY14 Accomplishments: A draft study design for sampling three LCR MSCP conservation areas was completed in FY14. Sites identified included the BBCA, Hart Mine Marsh, and Imperial NWR. A small amount of FY14 funding was expended for the purchase of sampling supplies in preparation of this work. Implementation of this project is scheduled for FY15.

FY15 Activities: Water and substrate samples will be collected at the BBCA, Hart Mine Marsh, and Imperial NWR (multiple water bodies). Laboratory analyses of water and substrate samples will be compared to selenium thresholds suggested by the USFWS for aquatic species, and an annual report detailing methods, results, and recommendations will be prepared. The results from the first study year will be used to inform sampling intensity and frequency in subsequent years.

Proposed FY16 Activities: Selenium monitoring will continue at identified LCR MSCP conservation areas. Baseline sampling will be expanded to the LDCA and Yuma East Wetlands. Specific work proposed will be similar to the previous year and will include collecting water and sediment samples from each site, analyzing collected samples, comparing extant selenium levels to known thresholds, and providing an annual report. Additional sites may also be included for pre- and/or post-development sampling as they are identified. Individual site evaluations will be conducted for each new site in order to determine sampling locations, number of samples, and expected level of effort.

Pertinent Reports: N/A

Work Task C60: Habitat Manipulation

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$100,000	$64,680.00	$71,952.56	$100,000	$225,000	$225,000	$200,000

Contact: Sonja Kokos, (702) 293-8033, skokos@usbr.gov

Start Date: FY13

Expected Duration: FY20

Long-Term Goal: Develop cost-effective management techniques and determine timing and extent of management actions necessary for maintaining structural diversity in riparian habitats

Conservation Measures: MRM2, WIFL, YBCU, CLRA1, BLRA1, and LEBI1

Location: All current and future riparian LCR MSCP conservation areas

Purpose: The purpose of this work task is to identify riparian habitat areas in need of structural diversity enhancement and develop protocols to manage portions of LCR MSCP habitat creation sites. The intent is to use the results of this research to appropriately manage these successional stages of riparian habitat that are required by several covered riparian avian species and thereby meet established management guidelines.

Connections with Other Work Tasks (Past and Future): Research and monitoring data obtained from Work Tasks D1, D2, D3, F1, F2, F7, G3, and G4 are used.

Project Description: The LCR MSCP riparian habitat creation sites are planted densely in order to reduce invasive species competition with native species and provide habitat for covered avian species. In natural systems where periodic flooding is a component of the system, portions of the habitat can be periodically disturbed and "reset" to earlier successional stages and increased structural diversity. Several covered avian species require as habitat early to mid-successional stages of native riparian trees. Over time, some of the LCR MSCP riparian habitat creation sites may grow beyond suitable habitat for some covered species unless management actions are taken.

Without the disturbance events that were once more common in the historic river hydrograph, direct manipulation of portions of these conservation areas may be

required. Information will be provided to not only perform assessments but to provide protocols, which will guide the deliberate manipulation of these habitats to enhance structural diversity and produce the appropriate seral stages for covered species.

The objectives of this study are to:

1. Provide a protocol for assessing areas for structural diversity and target areas that may require enhancement to meet management objectives. This will typically result in identifying areas that have at least 8 years of growth and that comprise more monotypic stands of riparian trees; however, the protocols that are developed may indicate longer or shorter durations based on measures of structural diversity.

2. Provide a protocol to guide cost-effective and appropriate manipulations of identified riparian habitats in order to reset portions of these areas to the earlier successional stages. Protocols that may be established could include, but are not limited to: locations within stands for thinning, numbers or percent of trees per stand to be removed, height at which trees should be cut to encourage stump sprouting, and potential for in-planting in thinned areas to encourage species diversity as well as longer-term structural diversity.

3. Determine the timing and extent of manipulation necessary for maintaining multi-successional riparian habitat at the appropriate scale. Based on the collected data from this research, potential areas and extent of manipulation for future areas may be predicted so that proper timing and budgeting for management can be more controlled and proactive. The funds for actual management action for conservation areas will be provided through each specific conservation area's work plan.

Previous Activities: Since the conservation areas are relatively young and undergoing rapid changes, manipulation of the habitat may be premature at this time; however, development of tools for future use to maintain structural diversity is recommended.

In FY13, a literature review was completed on riparian stand thinning/ manipulations to determine the best approaches for achieving the desired habitat structure and determine the measured parameters needed to indicate success. The best approaches for assessing habitat diversity in different structure types were tested to identify study sites with low structural diversity and/or those with later successional stages of growth. A supplemental literature review was conducted on the habitat requirements and limitations for the southwestern willow flycatcher and yellow-billed cuckoo. The addition of species habitat parameters was needed to assist in defining what vegetation parameters could be manipulated.

Following the literature review, two avenues were investigated to assess structural diversity: (1) field-based methods and (2) the analyses of remote sensing (LiDAR) data. Both methods yielded measures of the number of vegetation layers and their relative heights at one point within the plot. Additionally, statistical tools have been developed to assess the diversity of this vegetation data at multiple spatial scales (e.g., plot, patch, restoration area, etc.).

FY14 Accomplishments: Following the literature review from FY13, a pilot assessment was conducted to evaluate structural diversity with a field-based method and the analysis of LiDAR data. Both methods yielded measures of the number of vegetation layers and their relative heights at one point within a plot. The field-based method was tested with the collection of vegetation (layer) heights within various areas of high density vegetation. These plots were located in a stratified random pattern within each restoration area. The evaluation of LiDAR data began in FY14 and is expected to continue in FY15.

FY15 Activities: Field method testing will continue, and following testing, the data collected will be used to investigate the power of the developed indices to describe structural diversity. A pilot monitoring protocol will be developed following assessment of the field-based and LiDAR methods. Statistical geographic tools continue to be developed to assess the diversity at multiple spatial scales (e.g., plot, patch, restoration area, etc.) of these vegetation data.

Proposed FY16 Activities: The pilot monitoring protocol will be tested following assessment of the field-based and LiDAR methods. Potential management tools will be identified for further evaluation. Additional research will be conducted on the feasibility of implementing habitat management strategies when conditions within created habitat warrant their use.

Changes in the hydrologic regime along the LCR have reduced the likelihood of marsh habitat being refreshed though active periods of flooding and removal of the vegetation structure. The covered marsh bird species thrive in marshes that function with ephemeral flooding and resetting of the habitat. Without flooding, active restoration and management of these marsh habitats is expected throughout the life of the program. The current literature suggests that burning of the marshes' decadent dry material allows for new habitat to emerge.

Like the proposed riparian habitat manipulation study that began in FY13, in FY16, literature searches will begin, and a study plan will be developed to address the following objectives:

1. Provide a protocol for assessing areas at various spatial scales that are no longer providing the optimum habitat for the covered marsh birds

2. Provide a protocol to guide cost-effective and appropriate manipulations of marsh in order to reset portions of these areas to the earlier successional stages

3. Determine the timing and extent of the manipulation necessary for maintaining a mosaic of a functioning marsh

Pertinent Reports: N/A

Work Task C61: Evaluation of Alternative Stocking Methods for Fish Augmentation

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$150,000	$118,472.41	$15,602.82	$425,000	$200,000	$200,000	$200,000

Contact: Jim Stolberg, (702) 293-8206, jstolberg@usbr.gov

Start Date: FY14

Expected Duration: FY18

Long-Term Goal: Maintain effectiveness of the LCR MSCP Fish Augmentation Program

Conservation Measures: RASU3, RASU5, RASU6, BONY3, and BONY5

Location: The LCR within the LCR MSCP planning area, including reservoirs and connected channels from Lake Mead downstream to Imperial Dam

Purpose: To evaluate the effects alternative stocking methods have on survival of razorback sucker and bonytail stocked within the LCR MSCP planning area

Connections with Other Work Tasks (Past and Future): Related work tasks include B2, B3, B4, B5, B6, C10, C11, C26 (closed), C31, C33 (closed), C39, C46 (closed), D8, and G3. In FY15, Work Tasks C10 and C11 will be incorporated into this task due to similarities in purpose, scope, and out-year implementation. Specific activities will be detailed in this work task, and the proposed FY budgets will reflect the work that is to be undertaken. This is a logical merger of these work tasks, as information from this type of research will allow the development and testing of conditioned fish as experimental stocking treatments. These treatments will then be used to test whether different types of conditioning will translate to improved survival of stocked fish. Additionally, the sharing of overlapping resources is expected to increase efficiency in implementation and reporting, and it may also reduce overall expenditures.

Project Description: Extensive monitoring of Colorado River native fish is a commitment under the program, and in accordance with the HCP, several monitoring and research elements have been included as part of the LCR MSCP Fish Augmentation Program. Two of these research elements will be addressed, including: (1) understanding and minimizing adverse effects of stocking and (2) understanding post-stocking distribution and survival. Alternative stocking methods will be evaluated for razorback sucker and bonytail within the

LCR MSCP Fish Augmentation Program boundaries and may include stocking during different seasons, stocking at night, stocking cohorts of various quantities, and stocking at specific locations. These alternative methods will generally be evaluated through multiple iterations of paired stockings, with one group representing the more traditional stocking and one representing the alternative method being investigated.

In addition to these alternative stocking methods, fish reared by alternative means may also be evaluated through these efforts. To test the effectiveness of these alternate rearing treatments, stockings would be completed in paired groups and may include fish that have been either flow conditioned or trained to recognize predators. Information regarding post-stocking distribution and survival will be obtained through ongoing research and monitoring work tasks. As information on these stockings becomes available, different combinations of these alternative stocking methods and treatments may also be evaluated.

Previous Activities: Previous research related to this work task was conducted under Work Task C26 in FY09–11. Feeding rates, efficiency of food conversion, growth, swimming performance, and physical condition of razorback sucker reared in flowing raceways at the Lake Mead Fish Hatchery were evaluated. The results from multiple iterations of this research showed that razorback sucker reared at the highest velocity flows evaluated, 38 and 39 centimeters per second, exhibited the most growth, highest food conversion efficiency, and best swimming performance. Additional rearing of native fish under flowing conditions will be conducted as part of the current work task, and future monitoring efforts will be used to evaluate how the benefits of this rearing strategy relate to post-stocking survival of native fish.

In preparation of this work task, 11,930 razorback sucker were repatriated into Lake Mohave during FY13 as 5 paired cohorts released in day and night stocking events. This number was previously reported incorrectly as 13,116 razorback sucker but has been revised to remove an additional stocking of 1,186 razorback sucker that were unrelated to the paired day and night stockings. All efforts associated with these stocking events were captured under Work Task B2. Contact data for these cohorts will be obtained through FY14 and future year monitoring efforts and evaluated under this work task to determine the effectiveness or benefit of night stockings as compared to traditional day stocking events.

FY14 Accomplishments: Razorback sucker capture and contact data collected through ongoing monitoring efforts were analyzed during FY14 to evaluate the results from FY13 day/night paired releases. Through FY14, approximately 2% of these releases had been captured or contacted through monitoring efforts. This figure represents a similar contact rate as that observed for traditional stockings, and at present, little difference has been observed between the numbers of fish contacted from day or night releases. Lake Mohave

monitoring data collected through Work Task D8 have demonstrated that stocked fish are often not contacted for up to 3 years post release. For this reason, these cohorts will continue to be tracked in future years, as it may require multiple years of data to evaluate this alternative stocking method.

During FY14, the Willow Beach NFH repatriated 11,321 razorback sucker into Lake Mohave as 6 paired cohorts released in day and night stocking events. The time of year and locations of stockings were similar to those of FY13; however, cohort sizes were slightly reduced due to the inclusion of an additional stocking replicate. Capture and contact data for these cohorts will be obtained through ongoing monitoring efforts and evaluated under this work task in future years to determine the effectiveness or benefit of this alternative stocking method.

A portion of FY14 funding was also used to upgrade electrical capabilities at the Lake Mead Fish Hatchery in preparation of future flow conditioning efforts. This upgrade will support the operation of submersible propeller pumps, which will allow for controlled flow in ten 40-foot raceways. It is anticipated that flow-conditioned and static-reared native fish will be stocked in paired cohorts during FY15. Contact data for these cohorts will be analyzed under this work task to evaluate differential survival.

FY15 Activities: An additional 14,483 razorback sucker will be repatriated into Lake Mohave as 7 paired cohorts released in day and night stocking events. A portion of contact data for these cohorts will be collected under this work task, and data will be analyzed as they become available.

Paired stockings of flow-conditioned and static-reared razorback sucker will occur in FY15 pending completion of the Lake Mead Fish Hatchery electrical upgrade. Cohort sizes may be small during the initial study year due to availability of suitably sized fish; however, they are expected to increase in future years as additional fish are brought on station.

Work Tasks C10 and C11 have been incorporated into this work task beginning in FY15. The resulting increase in the budget estimate corresponds to the addition of this work. Predator recognition conditioning that was previously carried out in a hatchery setting in FY14 will transition into field research during FY15. These mesocosm-based, post-training survival trials will be completed to determine if the frequency of avoidance training influences bonytail and razorback sucker survival in the presence of predators. Remote PIT scanners will be installed in November 2014 as part of this effort, and depending on weather variables, field trials are expected to begin shortly thereafter or in early spring.

Proposed FY16 Activities: Data collected through this and other efforts will continue to be analyzed to assess the effectiveness or benefit of night stockings.

Pre-release flow conditioning of razorback sucker and stocking of flow-conditioned and static-reared cohorts will continue. In addition, it is anticipated that flow conditioning of bonytail will be initiated in FY16. Other alternatives to traditional stockings will be evaluated during the year, and potential opportunities to implement these alternatives will be assessed as fish become available. Additional mesocosm-based, post-training survival trials will also be completed during FY16 in an effort to determine if the time between predator avoidance training and stocking influences bonytail and razorback sucker survival in the presence of predators.

Pertinent Reports: N/A

Work Task C62: Lowland Leopard Frog and Colorado River Toad Habitat and Ecology Study

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$200,000	$192,514.27	$40,205.32	$180,000	$180,000	$25,000	$0

Contact: Allen Calvert, (702) 293-8311, acalvert@usbr.gov

Start Date: FY14

Expected Duration: FY17

Long-Term Goal: To gather data on the ecology and habitat of the lowland leopard frog and Colorado River toad to evaluate the feasibility of implementing a pilot introduction into unoccupied habitat

Conservation Measures: LLFR1, LLFR2, LLFR3, CRTO1, CRTO2, and CRTO3

Location: LCR MSCP planning area and the Bill Williams River, Agua Fria River, and Verde River watersheds

Purpose: To document lowland leopard frog and Colorado River toad habitat characteristics and measurable ecological factors that may limit each species' distribution. This will inform future decisions on the feasibility of establishing lowland leopard frog and Colorado River toad in unoccupied habitat.

Connections with Other Work Tasks (Past and Future): Preliminary data collected under Work Task D12 will be expanded upon in this study.

Project Description: Surveys for the lowland leopard frog and Colorado River toad in the past have located very few populations in the LCR MSCP planning area, and habitat requirements are not well documented. Surveys for both species will be conducted to find breeding areas. Presence of the lowland leopard frog and Colorado River toad, their breeding sites, egg mass locations and measurable habitat parameters at their breeding sites will be documented, including non-native predators, minimum and maximum water depth and temperature, substrate type (e.g., gravel and sand), water temperature, pH, turbidity, stream discharge, and vegetation composition. As the Bill Williams River is the only known occupied area for either species within the LCR MSCP planning area, other similar river systems may be surveyed so the sample size will be statistically robust to support research findings.

Previous Activities: This is a new start in FY15.

FY14 Accomplishments: Field work began in July to locate occupied breeding habitat for the Colorado River toad at study sites within the watershed of Bill Williams River and also along the Aqua Fria and Verde River watersheds, as a sufficient sample size of sites was not available on the Bill Williams River. Breeding was confirmed in all three watersheds, with the majority occurring within one site (Adobe Dam) in the Agua Fria River watershed. Habitat data were collected where egg masses were discovered.

FY15 Activities: Monitoring continued for the Colorado River toad into the fall of 2014 and will resume at the start of the next breeding season in the summer of 2015. Starting in February, lowland leopard frog breeding sites along the Bill Williams River and its tributaries will be surveyed. Surveys may also be conducted within the Aqua Fria and Verde River watersheds if sample sizes along the Bill Williams River are too small.

When egg masses are discovered, they will be recorded, and the following habitat data will be collected: non-native predators, minimum and maximum water depth and temperature, substrate type (e.g., gravel and sand), water temperature, pH, turbidity, stream discharge, and vegetation composition.

Proposed FY16 Activities: Field work will continue in the same manner as previous years, focusing on the different breeding seasons of each species. This will be the final year breeding/egg mass data will be collected for the Colorado River toad.

Pertinent Reports: The *Ecology and Breeding Habitat of Colorado River Toads 2014 Annual Report* will be posted on the LCR MSCP Web site upon completion.

Work Task C63: Evaluation of Habitat Features that May Influence Success of Razorback Sucker and Bonytail in Backwater Environments

FY14 Estimate	FY14 Actual Obligations	Cumulative Accomplishment Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$0	$0	$0	$125,000	$135,000	$150,000	$100,000

Contact: Jeff Anderson, (702) 293-8216, jranderson@usbr.gov

Start Date: FY15

Expected Duration: FY18

Long-Term Goal: To inform future design and management of created backwater habitats

Conservation Measures: BONY3, BONY5, RASU3, RASU5, and RASU6

Location: Reaches 2–5

Purpose: To provide information on how natural and artificial habitat features are used by razorback sucker and bonytail and their relative importance for influencing survival and long-term success

Connections with Other Work Tasks (Past and Future): This work task represents the merger of two previously funded work tasks: C41and C58. This work task is related to all work tasks in Fish Augmentation (Section B) that provide razorback sucker and bonytail for augmentation stocking, specifically Work Tasks B7, C23 (closed), and F5. Future work may occur under Work Task C25, and the results may indicate that modifications in future stocking treatments are needed (C61).

Project Description: The activities covered under this work task both consolidate and build on the work that has been undertaken and accomplished under Work Tasks C41 and C58. These tasks represent a logical merger because of their similarities in scope and intent and potential overlap in ongoing experimental investigations.

Habitat features are important to success (growth, survival, and reproduction) of fish in aquatic environments. In particular, structural features such as submerged woody debris, reefs, rock cavities, and submerged vegetation can provide cover for multiple life stages of fish. Cover allows fish to hide and rest and can be vital to survival by allowing fish to avoid predation through concealment and direct

protection. The types of features (both artificially constructed and those that are existing/natural) that may be used by native fishes and which are selected with greater frequency will be investigated. The use of other forms of cover, such as aquatic vegetation and turbidity, may also be investigated to determine which of these types of features plays a more important role as cover for razorback sucker and bonytail; by including these features, both immediate and long-term survival and success may improve. Determining these features is important, especially in created backwater environments where they may not be present or may not be in sufficient quantities, to promote the success of these species. This work task was created to:

- Inform managers of habitat structures to include when designing and creating backwaters

- Help improve existing created backwaters by providing options for adding structural elements (both "natural" and artificial) to afford adequate cover

- Potentially assist in improving post-stocking survival by suggesting stocking sites with adequate cover or adding features to stocking locations to provide cover from predatory fish and/or piscivorous birds

Previous Activities: Detailed accounts of work and accomplishments covered under Work Tasks C41 and C58 have been reported under these tasks and in their associated technical reports. This work includes monitoring the use of artificial habitat features in Davis Cove (on Lake Mohave) by both razorback sucker and bonytail. Investigations have also been ongoing to characterize the existing riprap shoreline at High Levee Pond because of documented frequent use of its cavities by bonytail. Preliminary investigations suggested that bonytail regularly used both artificial (constructed and installed) and more "natural" existing structures (riprap) as cover. No difference has been detected in the use of these features by razorback sucker, and this suggested that this species may use other forms of cover; aquatic vegetation and/or turbidity have been speculated as potential cover used by razorback sucker.

FY14 Accomplishments: This is a new start in FY15.

FY15 Activities: Investigations of the selection and use of artificial structures in Davis Cove will continue with an emphasis on habitat use by bonytail. These investigations will be similar to work begun under Work Task C41.

Cavity selection studies were initiated under Work Task C58. A refinement of cavity selection by bonytail will take place with repeated trials. If sufficient space and other resources become available, then alternate cavity sizes will be tested with bonytail at the Lake Mead Fish Hatchery. The proposed budget estimate for FY15 reflects the combination of the FY15 estimates from Work Tasks C41 and C58.

Proposed FY16 Activities: Cavity selection trials will continue at Lake Mead Fish Hatchery. These data may help with the refinement of constructed artificial habitats. Depending on the results and analyses of FY15 habitat selection trials at Davis Cove, the artificial habitat selection study may be expanded to include tests in environments occupied by non-native fish predatory species. Investigations will expand to identify other types of cover habitats that may benefit razorback sucker, including vertical structures and turbidity, if deemed practical. Budget estimates for FY16 reflect this study expansion.

Pertinent Reports: All findings and statistical analyses will be presented in a report titled *Evaluation of Habitat Features that may Influence Success of Razorback Sucker and Bonytail in Backwater Environments: 2015*, and it will be posted on the LCR MSCP Web site upon completion.

Work Task C64: Post-Stocking Movement, Distribution, and Habitat Use of Razorback Sucker and Bonytail

FY14 Estimate	FY14 Actual Obligations	Cumulative Accomplishment Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$0	$0	$0	$700,000	$700,000	$700,000	$700,000

Contact: Jeff Lantow, (702) 293-8557, jlantow@usbr.gov

Start Date: FY15

Expected Duration: FY18

Long-Term Goal: To maintain an effective LCR MSCP Fish Augmentation Program

Conservation Measures: BONY3, BONY 4, BONY5, RASU3, RASU4, and RASU6

Location: Reaches 2–5

Purpose: To provide information on movement, distribution, and habitat use of stocked razorback sucker and bonytail and to use this information to set up an appropriate monitoring network to suggest potential stocking locations and track post-stocking survival

Connections with Other Work Tasks (Past and Future): This work task represents the merger of three previously funded work tasks: C39, C45, and C49. The intent of this combination was to capture these activities with similar purpose and scope into a consolidated, multi-reach effort for both bonytail and razorback sucker. This work task is related to Work Tasks B2, B3, B4, and B6, all of which provide bonytail and razorback sucker for augmentation stocking and may also build on information gained in Reach 1 though Work Tasks C13 and C57. Information collected under this work task will be added to the database used to complete Work Task D8. This work task also has a past relationship with Work Task C8 and is expected to have future interactions with Work Task C61 or other work tasks that can benefit from the information and/or the monitoring network created under Work Task C64. Funds from Work Task G3 were provided in FY14 to accomplish preliminary work in Reach 2 that will be covered by this work task in FY15.

Project Description: The activities covered under this work task both consolidate and build on the work that has been undertaken and accomplished under Work Tasks C39, C45, and C49. The approaches used to identify appropriate stocking locations throughout Reaches 2–5 will be formalized, which will be accomplished through pilot releases of tagged fish to identify dispersal and movement of individuals or groups of fish. Information on preliminary post-stocking habitat selection and use and survival will be provided and can then be used to: (1) establish a more appropriate monitoring network in terms of where to locate remote sensing equipment or other sampling gear with higher probabilities for contacts, (2) indicate locations that may be better suited for stocking fish, and (3) possibly identify additional aggregations of native fish.

The networks that are established under this work task will also provide monitoring information on the effectiveness of different stocking treatments (conducted under Work Task C61) as well as longer-term information on survival, habitat use, and movement of native fishes in these reaches. Eventually, these established long-term monitoring networks may be used for system-wide monitoring and would be covered through Work Task D8.

Previous Activities: Detailed accounts of work and accomplishments covered under Work Tasks C39, C45, and C49 have been reported under these tasks and in their associated technical reports. They include the tracking and monitoring of stocked razorback sucker and bonytail in specific areas in Reaches 3 and 4. Post-stocking movement and habitat use have been documented, and post-stocking survival estimates have been developed for razorback sucker and/or bonytail in these reaches.

FY14 Accomplishments: This is a new start in FY15.

FY15 Activities: The budget estimates reflect the projected costs for FY15 from combined Work Tasks C39, C45, and C49 plus the additional work described below for Reaches 2, 4, and 5.

Reach 2: A study plan and equipment purchases for a pilot release of sonic-tagged bonytail in Lake Mohave were completed in FY14 under Work Task G3. Releases of sonic-tagged bonytail are anticipated to occur in the early spring of FY15, with the total number of sonic-tagged bonytail being dependent on fish availability. Bonytail will be implanted with sonic tags and released at locations in the lake where they were historically found. Following release, they will be intensively tracked to determine dispersal, movement patterns, and habitat selection as well as potential survival rates. Data gathered from this effort will be used to inform managers of future stocking of bonytail in Lake Mohave to meet LCR MSCP commitments. Groups of razorback sucker will also be released and tracked as part of this effort, as this work can be performed concurrently and will help to maximize resources and the use of acquired equipment.

Reach 3: Work previously described under Work Task C45 has been moved and is now covered by Work Task C64. For the final year of the project, razorback sucker will again be released into select backwaters to be monitored via trammel nets and PIT tag scanners. Peripheral limnological and habitat data will be collected to assess which backwater features are most critical to razorback sucker inhabitance.

Bonytail work previously conducted under closed Work Task C39 is now being reported here beginning in FY15. The final iteration for paired releases between a lake environment at the Bill Williams River NWR and a riverine environment near Blankenship Bend are being completed in the fall. An additional experimental release of bonytail will be conducted at the backwater in Park Moabi. Detailed dispersal, survival, and habitat use will be collected via sonic telemetry and remote PIT scanners.

Reach 4: Previous activities funded through Work Task C49 were moved to this new work task. There are no scheduled research projects for razorback sucker or bonytail between Parker and Palo Verde Diversion Dams in FY15.

A study plan encompassing a portion of Reaches 4 and 5 will be developed, and equipment purchases will be made in FY15 to prepare for pilot releases of razorback sucker and bonytail in Reach 4 below Palo Verde Diversion Dam in FY16. Previous surveys performed under Work Task D8 will be used to inform managers of potential release locations in this portion of Reach 4.

A study plan will also be completed to evaluate post-stocking survival of bonytail and razorback sucker below Palo Verde Diversion Dam; this will encompass a portion of Reaches 4 and 5.

Reach 5: A study plan will be developed, and equipment purchases will be made in FY15 to prepare for pilot releases of razorback sucker and bonytail in Reach 5 in FY16. Previous surveys performed under Work Task D8 will be used to inform managers of potential release locations in Reach 5.

Proposed FY16 Activities: Proposed activities for this work task have been summarized by river reach. Paired experimental releases of bonytail and razorback sucker exposed to predator avoidance conditioning and non-conditioned fish will be initiated. The location for the experiment is undecided, but one will be selected based on conditions suited for the experiment.

Reach 2: Continued releases of sonic-tagged bonytail will occur in Lake Mohave and will build upon the results from FY15. Sonic-tagged razorback sucker will continue to be monitored to help identify seasonal movements and potentially new spawning locations.

Reach 3: Experimental releases of bonytail that involve sonic telemetry and remote PIT scanning are expected to continue, adding to the knowledge of post-stocking survival and detailed habitat use for this species in reservoir and riverine environments.

Reach 4: A study plan for additional stocking and monitoring of razorback sucker and bonytail between Parker and Palo Verde Diversion Dams will be developed to evaluate the habitat use and relative survival of fish released into the LCR and backwaters on CRIT lands.

Pilot releases of pit-tagged and sonic-tagged razorback sucker and bonytail will occur in a number of locations in Reach 4. Tracking of sonic-tagged fish will begin in FY16.

Reach 5: Pilot releases of pit-tagged and sonic-tagged razorback sucker and bonytail will occur in a number of locations in Reach 5. Tracking of sonic-tagged fish will begin in FY16.

Pertinent Reports: N/A

Work Task C65: Evaluation of Immediate Post-Stocking Survival of Razorback Sucker and Bonytail

FY14 Estimate	FY14 Actual Obligations	Cumulative Accomplishment Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$0	$0	$0	$60,000	$120,000	$120,000	$120,00

Contact: Andrea Finnegan, (702) 293-8203, afinnegan@usbr.gov

Start Date: FY15

Expected Duration: FY18

Long-Term Goal: To maintain an effective LCR MSCP Fish Augmentation Program

Conservation Measures: BONY3, BONY4, BONY5, RASU3, RASU4, and RASU6

Location: Reaches 2–5

Purpose: To identify the most important sources of immediate post-stocking mortality and to inform managers of how to best target and prioritize solutions

Connections with Other Work Tasks (Past and Future): This work task is related to Work Tasks B2, B3, B4, C10, C11, C46 (closed), and C61. Preliminary planning, acquisition of materials, and study design development will occur in FY14 with funds from Work Task G3.

Project Description: Observations from past stocking events have indicated relatively high and immediate post-stocking mortality of razorback sucker and bonytail. This pattern appears more commonly in backwater situations and occurs even in instances where no or low numbers of predatory fish are present and where water quality parameters should not be a source of mortality. Transport and handling stress and predation by piscivorous birds have been suspected as causes of this low survival. Only anecdotal evidence exists to support the speculation that piscivorous birds are the major cause of this mortality, and although handling and transport stress have been measured for stocked fish, little evidence exists that connects this stress to actual latent mortality.

This work task builds directly on the knowledge gained from Work Task C46 (closed) and takes the next step from observing stress indicators in stocked fish to investigating how this translates into actual latent post-stocking mortality. This work may involve holding a subset of stocked fish in a protected area for observation and recording survival rates after 24, 48, and 72 hours. Longer durations may also be explored. A subsample of these fish may also have their blood tested for levels of stress-indicating compounds.

In addition, a bioenergetics model of piscivorous bird predation will be further developed and tested, and observational studies may be employed to help calibrate the model. These studies may include performing counts of confirmed feeding of piscivorous birds on stocked razorback sucker and bonytail. This model is intended to help inform managers of the relative pressure that bird predation may be having on stocked native fish.

These data are important to assess the effect of stocking treatments relative to stress-related mortality, bird predation, or other factors that may be accounting for immediate post-stocking mortality and will allow managers to better prioritize and target solutions, like those being tested under Work Task C61, or find new ways to improve survival of stocked fishes by identifying what factors are the greatest sources of immediate mortality.

Previous Activities: This is a new start in FY15. Previous activities have been conducted under Work Task G3 and include the development of a protocol and study plan to assess latent mortality of stocked fish. The development of a bioenergetics model was initiated in FY14. The purpose of the model is to suggest the potential pressure that available piscivorous birds could exert on stocked fish.

FY14 Accomplishments: This is a new start in FY15.

FY15 Activities: Latent mortality within the first 72 hours following selected stocking events in Reach 2 and 3 in FY15 will be evaluated. A subsample of fish will be held in net pens to provide protective cover from predators for 72 hours and to monitor survival; it will also allow for the evaluation of factors outside of predation that may impact survival of fish immediately following release.

A bioenergetics model is being created to determine a range of mortality that may be expected immediately following stocking. Data including piscivorous bird abundance, the energy content of bonytail and razorback sucker, and energy requirements for piscivorous birds will be collected or researched.

Proposed FY16 Activities: The methods being used for the latent mortality study will be refined based on the results from FY15, if needed. A number of stocking locations will be identified to conduct post-stocking observations of bird predation on razorback sucker and bonytail. These observations will be used to

provide an estimate of the number of razorback sucker and bonytail consumed per day to be input into the bioenergetics model. The larger-scale implementation of this study is expected to increase expenditures in FY16.

Pertinent Reports: N/A

Work Task C66: Marsh Bird Water Depth Analysis

FY14 Estimates	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$0	$0	$0	$0	$100,000	$300,000	$300,000

Contact: Chris Dodge, (702) 293-8115, cdodge@usbr.gov

Start Date: FY16

Expected Duration: FY19

Long-Term Goal: Define marsh water depth requirements for covered marsh birds

Conservation Measures: MRM1 and MRM2 (CLRA, LEBI, and BLRA)

Location: LCR MSCP project area

Purpose: The purpose of this work task is to identify the range of acceptable water depths in California black rail, least bittern, and Yuma clapper rail breeding sites and ranges of acceptable daily, monthly, and annual variability.

Connections with Other Work Tasks (Past and Future): Marsh bird habitat was studied previously under Work Task C24.

Project Description: The HCP requires the creation of a minimum of 512 acres of marsh habitat for three LCR MSCP covered marsh bird species. All 512 marsh acres should have water depths no greater than 12 inches to provide habitat for the Yuma clapper rail and western least bittern, while 130 acres of marsh is required with water depths no greater than 1 inch to provide habitat for the California black rail.

Water depths in California black rail, least bittern, and Yuma clapper rail existing breeding sites along the LCR will be evaluated. Data will be analyzed to identify the range of acceptable water depths in California black rail, least bittern, and Yuma clapper rail breeding sites and ranges of acceptable daily, monthly, and annual variability.

Previous Activities: This is a new start in FY16.

Under Work Task C24: In 2009, vegetation surveys were conducted, water depth data were monitored at wells, and biweekly marsh bird surveys were conducted throughout the breeding season at the Imperial NWR in Fields 16 and 18. The

locations of all black rails, clapper rails, and least bitterns were mapped in both fields. Black rails were first detected in Fields 16 and 18 in April and July 2009. Yuma clapper rails were consistently detected in Field 16 throughout the summer, with a high of 21 birds. In Field 18, clapper rails were also detected in 2009. In 2011, a final report was prepared, giving recommendations on creation of marshes for both clapper and black rails.

FY14 Accomplishments: This is a new start in FY16.

FY15 Activities: This is a new start in FY16.

Proposed FY16 Activities: The study design will be drafted and a schedule prepared. Existing river gauge and marsh bird breeding data will be compiled.

Pertinent Reports: N/A

WORK TASKS – SECTION D

System Monitoring

Work Task D1: Marsh Bird Surveys

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$25,000	$35,186.60	$252,070.08	$25,000	$40,000	$40,000	$40,000

Contact: Joe Kahl, (702) 293-8568, jkahl@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: System monitoring for marsh birds

Conservation Measures: MRM1 and MRM2 (LEBI, CLRA and BLRA)

Location: Havasu NWR, Arizona and California

Purpose: The purpose of this work task is to monitor Yuma clapper rail, California black rail, and western least bittern along a designated reach of the LCR as part of the interagency system monitoring program. The information obtained through this task may be used in managing marsh bird habitat creation areas.

Connections with Other Work Tasks (Past and Future): Data obtained from Work Task F7 may also be used in the marsh bird system monitoring program described in this work task. The protocol developed for task will also be used for Work Task F7.

Project Description: Marsh bird surveys will be conducted in coordination with the USFWS as part of a multi-agency, system-wide monitoring effort that has been ongoing annually since 1980. LCR MSCP surveys are conducted along the LCR between the I-40 Bridge, near Needles, California, and Lake Havasu, including Topock Gorge in the Havasu NWR.

Prior to implementation of the LCR MSCP, a study was conducted to determine whether Yuma clapper rail surveys could be expanded to a multi-species protocol without compromising Yuma clapper (Ridgway's) rail detection rates. Information obtained from this study has produced a multi-species protocol for marsh birds, including the LCR MSCP covered species (Yuma clapper rail, California black rail, and western least bittern). Marsh bird surveys, utilizing the multi-species protocol, will continue at designated survey points to track detections of covered species.

Previous Activities: Reclamation has monitored Yuma clapper rail within Topock Gorge since 1996 in coordination with the USFWS as part of a multi-agency, system-wide monitoring effort.

FY14 Accomplishments: Marsh bird surveys were conducted between the I-40 Bridge, near Needles, California, and Lake Havasu during March, April, and May 2014 in coordination with the USFWS as part of a multi-agency, system-wide monitoring effort. All three covered species were encountered: 24 Yuma clapper rail detections in March, 82 in April, and 66 in May; 2 western least bittern detections in March, 12 in April, and 23 in May; 1 California black rail detection in April and 1 in May. Data were compiled and entered into the Avian Knowledge Network database. Survey methods were reviewed, and a second surveyor/operator was added to all surveys conducted by boat.

FY14 obligations were greater than before due to increasing survey costs.

FY15 Activities: Marsh bird surveys will be conducted in Topock Gorge and the upper reaches of Lake Havasu using the multi-species marsh bird survey protocol in coordination with the USFWS as part of a multi-agency, system-wide monitoring effort. Surveys may also be conducted at the Havasu Refuge as needed. Data will be submitted to the USFWS. Information obtained through this work task may be used in planning future marsh bird habitat creation activities and research projects.

Proposed FY16 Activities: Marsh bird surveys will be conducted in Topock Gorge and the upper reaches of Lake Havasu and other sites using the multi-species marsh bird survey protocol in coordination with the USFWS as part of a multi-agency, system-wide monitoring effort. Data will be submitted to the USFWS. Information obtained through this work task may be used in planning future marsh bird habitat creation activities and research projects.

Pertinent Reports: The report titled *Marsh Bird Surveys – 2014* will be posted on the LCR MSCP Web site upon completion.

Work Task D2: Southwestern Willow Flycatcher Presence/Absence Surveys

FY14 Estimates	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$675,000	$717,918.05	$6,865,713.55	$675,000	$750,000	$750,000	$750,000

Contact: Chris Dodge, (702) 293-8115, cdodge@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: System monitoring and post-development monitoring for southwestern willow flycatcher

Conservation Measures: MRM1, MRM2, and MRM4 (WIFL)

Location: Reaches 1–7 along the LCR, southern Nevada, lower Bill Williams River, lower Gila River and the Virgin River between the Virgin River Gorge and Lake Mead. Life history study sites are located along: (1) the Virgin River at Mesquite, Nevada; (2) the Virgin River, near Mormon Mesa, Nevada; (3) Topock Marsh, Havasu NWR, Arizona; and (4) the Bill Williams River watershed, Arizona.

Connections with Other Work Tasks (Past and Future): Closed Work Task D3 provided information on southwestern willow flycatcher population numbers and demographics along the LCR.

Project Description: Presence/absence surveys are conducted along the LCR from the Southerly International Boundary with Mexico to southern Nevada, including the lower Virgin River, lower Bill Williams River, and lower Gila River. Life history studies are conducted at known breeding areas.

Previous Activities: Presence/absence surveys and life history studies for southwestern willow flycatcher have been conducted along the LCR since 1996.

FY14 Accomplishments: Presence/absence surveys were conducted at 87 sites along the LCR and its tributaries in 2014, and life history studies were conducted at 35 sites. All conservation areas were surveyed. System-wide surveys were conducted at the Pahranagat NWR, Meadow Valley Wash, Muddy River, Topock Marsh, Bill Williams River NWR, and Alamo Lake. No system-wide surveys were conducted below the Cibola NWR in 2014; surveys are only conducted in this portion of the river once every 3 years. Surveys were not

conducted on the Virgin River due to safety concerns, so efforts were redirected to Alamo Lake, Arizona, to increase the amount of demographic data collected at sites in southern Nevada normally only funded by the NDOW. Habitat threat monitoring in 2014 focused on measuring salt cedar beetle defoliation. Life history study activities included banding, nest monitoring, habitat threats analyses, and microclimate analyses.

Willow flycatchers were detected on at least one occasion at 61 of the 87 sites. During presence surveys at six of the sites, willow flycatchers were detected immediately each time the site was surveyed without the need for call playback protocols. Surveyors confirmed that willow flycatchers detected at 35 of the sites (within 6 study areas) were resident or breeding southwestern willow flycatchers. The study areas included Pahranagat NWR, Meadow Valley Wash, Muddy River, Topock Marsh, Bill Williams River NWR, and Alamo Lake.

One possible resident willow flycatcher was observed at LCR MSCP conservation areas in FY14. It was detected at the BLCA in the same general area on three consecutive visits from May 21 to June 2. Neither territorial behaviors nor any bands were observed, making it impossible to confirm that the bird detected on each visit was the same individual, but because it was detected in the same area on each visit over a span of more than 7 days, it was considered resident, and the site was considered occupied in 2014. A second flycatcher was detected on July 7 at the PVER, but this individual was detected very briefly and did not display territorial behavior, and it was likely not a resident flycatcher. Two additional willow flycatchers were detected at the BLCA on May 21 and one flycatcher on May 27 for which residency status could not be confirmed.

During the system-wide surveys south of the Bill Williams River, 46 willow flycatcher detections were recorded between May 28 and June 12. Monitoring results suggest these flycatchers were not resident, breeding individuals but were most likely spring migrants.

In FY14, 41 new adult southwestern willow flycatchers were captured and color-banded. Thirty-seven adult flycatchers remained unbanded. Overall, 56% of the adult flycatchers detected at the monitoring sites were known to be color banded by the end of the breeding season. Eight adults banded in previous years were recaptured, an additional 53 adults banded in previous years were redetected, and two individuals were redetected but did not have their color combinations confirmed. A total of 92 territories were recorded, with 68 territories consisting of breeding flycatchers, 6 pairs for which no nest could be found, and 18 consisting of unpaired individuals. Capture and redetections were compared between FY13 and FY14 at sites monitored in both years. Forty-two of the 57 resident adult flycatchers (74%) were redetected in FY14; 7 (17%) were detected at a different study area from where they were last detected in FY13. A total of 13 of the 48 (27%) banded juveniles detected in FY13 were identified again in FY14. In addition, three individuals originally banded as nestlings in

years previous to FY13 were redetected in FY14. Nine of the redetected southwestern willow flycatchers were detected at a different study area than where they were last detected. The distance between yearly sightings for these flycatchers ranged between 7 and 132 miles, with an average of 18 miles.

Nest success was calculated for 73 southwestern willow flycatcher nests. Thirty-three (45%) nests were successful and fledged young, and thirty-one (42%) failed. It is unknown what happened at nine (12%) nests, which were found empty with no indication of whether the young survived. Depredation was the major cause of nest failure (48%). Brown-headed cowbird brood parasitism was observed in 9 (15%) of the 62 nests with eggs and known contents.

For the first time in 2014, much of the field data were collected electronically using data dictionaries. The data dictionaries were developed, tested, and finalized for use in the field before the field season began. The data dictionaries were further improved based on feedback from the field crews during the field season. Data collected electronically can be directly integrated into the LCR MSCP database.

FY15 Activities: Presence/absence southwestern willow flycatcher surveys will be conducted along the LCR, lower Bill Williams River, lower Gila River, and other riparian areas in southern Nevada and will include areas along the LCR south of the Bill Williams NWR not surveyed in 2014. Life history studies will be conducted at the riparian areas in southern Nevada, Bill Williams River NWR, Alamo Lake, and Topock Marsh. Activities will include banding, nest monitoring, and microclimate analyses. Surveys will not be conducted on the Virgin River in 2015.

The LCR MSCP database for southwestern willow flycatcher monitoring and studies will continue to be developed.

Proposed FY16 Activities: Southwestern willow flycatcher presence/absence surveys will be conducted at approximately 15 study areas along the LCR, lower Bill Williams River, Virgin River, and other riparian areas in southern Nevada. Life history studies will be conducted at the riparian areas in southern Nevada, Bill Williams River NWR, Alamo Lake, and Topock Marsh. Activities include banding, nest monitoring, and microclimate analyses.

Testing of the LCR MSCP southwestern willow flycatcher database will be conducted.

The project budget will be greater beginning in FY16 due to increasing survey costs.

Pertinent Reports: The report titled *Southwestern Willow Flycatcher Surveys, Demography, and Ecology along the LCR and Tributaries* is posted on the LCR MSCP Web site.

Work Task D5: Monitoring Avian Productivity and Survivorship

FY14 Estimates	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$250,000	$290,972.22	$2,550,936.08	$250,000	$250,000	$250,000	$250,000

Contact: Joe Kahl, (702) 293-8568, jkahl@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: System monitoring for avian covered species by conducting intensive monitoring of habitat creation sites and sites that typify current conditions along the LCR

Conservation Measures: MRM1 and MRM2 (WIFL, YBCU, ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, and SUTA)

Location: Cibola NWR Unit #1, CVCA, and BLCA

Purpose: To collect intensive, site-specific data on avian species demographics, physical condition, species composition and diversity, and site persistence at existing and created habitat sites

Connections with Other Work Tasks (Past and Future): Data from this work task are used in conjunction with data collected from the system-wide bird monitoring program (D6) to monitor overall bird use of the LCR. Data collected at MAPS banding stations located at habitat creation sites may also be used for post-development monitoring.

Project Description: Under this work task, conservation areas and existing habitat sites along the LCR that represent typical avian riparian habitat will be monitored. Banding allows for the collection of detailed information about avian species' use patterns and demographics, and this site-specific data can be used to characterize habitats and monitor habitat use, population trends, and demographics of avian species along the LCR.

Avian populations throughout the United States, Canada, and Mexico are monitored using the MAPS protocol. Long-term population trend data are collected by conducting intensive banding throughout the breeding season. Data collected are analyzed by the Institute for Bird Populations, and long-term

population trends are determined on a regional and continental level, as the larger database has increased statistical power that cannot be economically duplicated at a site-specific level.

Reclamation established a MAPS banding station at the Cibola Nature Trail on the Cibola NWR in 2002 prior to LCR MSCP implementation. In 2005, an additional station was established on the Havasu NWR, at the New South Dike, and in mixed cottonwood-salt cedar habitats. These sites provided data from different reaches of the LCR and from different habitat types to allow comparisons among areas more typically found along the LCR and habitat creation sites like the LCR MSCP conservation areas.

The Institute for Bird Populations recommends netting birds at MAPS banding stations a minimum of 5 years to acquire site-specific data. After 5 years, each site will be evaluated and a decision made to continue, discontinue, or move the station to a new location.

Previous Activities: MAPS banding has been conducted during different seasons to provide information on habitat use by birds during the breeding and non-breeding seasons.

Winter banding was conducted from 2002 through 2005 at the Pratt restoration site near Yuma, Arizona, Cibola NWR from 2002 to 2011, and at the Havasu NWR (HAVA) from 2005 to 2009. Winter banding was discontinued in 2011.

Fall migration banding was conducted at the Pratt restoration site and the Cibola NWR from 2002 to 2005. Data on fall migration and winter use were also being recorded using an adapted MAPS protocol similar to protocols from migration banding projects throughout the West and the Monitoreo de Sobrevivencia Invernal (MOSI) protocol that is used in Mesoamerica. Fall banding was discontinued in 2005.

Summer MAPS banding has been conducted at four locations:

- Havasu NWR HAVA site (2005 to 2008) – This site was abandoned as a MAPS site in 2009 after a fire in 2008 burned a significant portion of the habitat.
- Cibola NWR Unit # 1 (2002 to present)
- BLCA (2009 to present)
- CVCA (2011 to present)

Color banding target species such as Bell's vireo, yellow warbler, and summer tanager was initiated in August 2008 at the banding sites to monitor site persistence during the breeding and winter banding seasons.

FY14 Accomplishments: Banding was conducted at three conservation areas during the summer using the MAPS protocol. Banding was conducted for a total of 10 days over the season at the Cibola NWR and the BLCA and for 9 days at the CVCA. One session at the CVCA was not conducted due to inclement weather. Banding was conducted once during every 10-day banding period for 5 hours a day, beginning 1/2 hour before sunrise. During the breeding season, there were a total of 242 captures at the Cibola NWR, 161 total captures at the BLCA, and 69 captures at the CVCA.

Three LCR MSCP listed species were captured and color banded during the breeding season. One yellow warbler was captured at the Cibola NWR, seven yellow warbler were captured at the BLCA, two summer tanagers were captured at the BLCA, and five Bell's vireos were captured at the BLCA. Three of these Bell's vireos were target netted and color banded outside of the MAPS session.

Five migrant willow flycatchers were banded at the Cibola NWR on May 28, one on June 3, and one on June 17. One migrant willow flycatcher was banded at the CVCA on May 29 and another on August 7. One migrant willow flycatcher was heard at the BLCA on June 5. Yellow-billed cuckoos were heard at the Cibola NWR on July 22 and at the BLCA from June 20 through July 17. No yellow-billed cuckoos were banded during MAPS sessions or MAPS summer target netting in FY14.

Birds previously captured and banded were recaptured in FY14. Three yellow warblers and two summer tanagers were recaptured at the BLCA. One recapture was a male yellow warbler that was color banded in 2011. A female summer tanager that was color banded in 2011 and recaptured in 2013 was recaptured again.

FY15 Activities: MAPS banding stations will continue to operate at all three conservation areas during the 2015 breeding season. Color banding of LCR MSCP covered species will continue to be implemented to increase the effective recapture rate. A visual identification of a color-banded bird qualifies as a recapture for statistical purposes. The 5-year evaluation will be conducted at the BLCA to determine if it should be continued.

Proposed FY16 Activities: Breeding season monitoring will continue in 2016. The work task will be evaluated to see if the information gathered from the MAPS banding stations is meeting system-wide and conservation area monitoring needs.

Pertinent Reports: The *2014 MAPS Summary Banding Report* will be posted on the LCR MSCP Web site upon completion.

Work Task D6: System Monitoring for Riparian Obligate Avian Species

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$400,000	$366,627.83	$2,058,551.10	$480,000	$150,000	$480,000	$480,000

Contact: Beth Sabin, (702) 293-8435, lsabin@usbr.gov

Start Date: FY06

Expected Duration: FY55

Long-Term Goal: System monitoring for avian covered species

Conservation Measures: MRM1 and MRM2 (ELOW, GIWO, VEFL, BEVI, YWAR, and SUTA)

Location: LCR MSCP planning area, Bill Williams River, and Virgin River

Purpose: To monitor riparian obligate avian species covered under the LCR MSCP to document long-term population trend and habitat use

Connections with Other Work Tasks (Past and Future): Information obtained through this work task will be used to conduct system monitoring for avian covered species. Data collected during post-development monitoring of habitat conservation areas (F2) may also be used in this work task. Information obtained through this task will also be used in association with Work Task C24 to help define habitat requirements for riparian obligate bird species and Work Tasks D2 (southwestern willow flycatcher) and D7 (yellow-billed cuckoo) that monitor single avian species.

Project Description: Avian habitat along the LCR and Bill Williams River below Alamo Dam will be monitored for Arizona Bell's vireo, elf owl, Gila woodpecker, gilded flicker, Sonoran yellow warbler, summer tanager, and vermilion flycatcher. It is inefficient to monitor all covered species individually throughout the entire LCR MSCP planning area. Many bird populations can be monitored effectively using multi-species survey protocols. Arizona Bell's vireo, Gila woodpecker, gilded flicker, Sonoran yellow warbler, summer tanager, and vermilion flycatcher will be monitored together using standard breeding bird surveys methods. Elf owls will be monitored using a species-specific call playback method. Presence and breeding of the covered species will be documented and analyzed to estimate species' abundance throughout the LCR.

Previous Activities: In FY05–06, surveys for Arizona Bell's vireo, Gila woodpecker, gilded flicker, Sonoran yellow warbler, summer tanager, and vermilion flycatcher were conducted utilizing random point-count transects. The monitoring protocol was improved in FY07 and became a double sampling rapid/intensive area search protocol, which provided density estimates of the six focal species and other common species within the study area. The double sampling rapid/intensive area search protocol was followed in FY07–13.

Of the six covered species surveyed under this protocol, the Arizona Bell's vireo and Sonoran yellow warbler have had the largest population sizes within the study area. Summer tanager and Gila woodpecker have been present within the study area, and vermilion flycatcher and gilded flicker have been rarely detected. Gilded flicker have only been detected breeding along the Bill Williams River east of Planet Ranch and have only used the riparian areas as foraging habitat.

Elf owls were monitored during the breeding season from FY08–10. Each year, surveys were conducted at 21 survey sites and 45 single call stations in suitable habitat within the LCR MSCP planning area. Only one elf owl was detected near Blankenship Bend during that 2-year period.

Monitoring methods to improve accuracy and reduce costs continue to be evaluated. Elf owl surveys were stopped after the FY10 season, and an evaluation of the protocol was initiated under Work Task C24. In FY12, the double sampling rapid/intensive area search protocol was improved: 2 weeks were added to the beginning of the field season to more accurately estimate the population of early-nesting species, field crew training was improved, and some processes, such as data analyses, were automated.

In addition, an analysis was conducted from FY11 to FY13 to test the assumption that estimation is unbiased during the intensive area search surveys used to monitor Arizona Bell's vireo, Gila woodpecker, gilded flicker, Sonoran yellow warbler, summer tanager, and vermilion flycatcher. Twenty-four plots were surveyed using intensive surveys and an enhanced intensive survey. Through the intensive and enhanced intensive effort surveys, new life history information was acquired for many of the riparian species in the project area, including a better understanding of arrival and departure times for migrants, unique calls and songs not previously documented, second clutches and re-nesting attempts, and a better understanding of territory sizes and partial territories.

FY14 Accomplishments: Eighty system-wide plots were surveyed with the double sampling rapid/intensive area search protocol, and 30 plots were surveyed within occupied or previously occupied southwestern willow flycatcher habitat at the Havasu NWR and the Bill Williams River NWR to document riparian species population sizes in areas that may have future tree defoliation by the Tamarisk beetle (*Diorhabda* sp.).

- Rapid surveys — Approximately 184 species were recorded either as territorial breeders, non-territorial breeders, migrants, or non-breeders.

- Intensive surveys — A total of 122 species were recorded either as territorial breeders, non-territorial breeders, migrants, or non-breeders.

- Southwestern willow flycatcher plot surveys – A total of 117 species were recorded as territorial breeders, non-territorial breeders, migrants, or non-breeders. This was the last year the surveys would be conducted within the southwestern willow flycatcher habitat.

The estimated number of territories of focal species in the program area from FY14 are shown in table 1.

Table 1.—Population Estimates for Focal Species in 2014

Focal Species	Population Estimates
Sonoran yellow warbler	2,821
Arizona Bell's vireo	898
Gila woodpecker	666
Summer tanager	356

There was one breeding gilded flicker detected near Lincoln Ranch along the Bill Williams River. The bird's territory was mostly outside the plot in upland habitat. The bird was not nesting within the plot but foraging within it. One pair of vermilion flycatcher was detected within the study area within the Giers Basin area. There were not enough pairs of vermilion flycatcher and gilded flicker detected in FY14 to calculate population estimates. Territories of covered species detected during rapid and intensive surveys were digitized using GIS.

The 3-year study to test the assumption of unbiased estimation during intensive area search surveys was completed. Comparing the survey types across all species, on average, the enhanced intensive sampling (complete count) produced 11.2, or 16.5%, additional territories compared to standard intensive sampling. There are many biological reasons that could account for this, including onset of breeding, migration arrival time, detectability throughout the season, territory size, breeding habitat, behavior, and parental care.

FY15 Activities: The study to test the assumption of unbiased estimation during intensive area search surveys and the resulting natural history information and best survey practices will be peer reviewed.

Area searches will be conducted during the breeding season following the double sampling intensive/rapid area search protocol used in previous years. A new set of 80 rapid area search plots will be randomly chosen from the 2010 plots layer using a stratified random sampling design. Two rapid surveys will be conducted per plot during the breeding season. Eight of these plots will be surveyed intensively, with each plot being surveyed eight times during the breeding season.

Proposed FY16 Activities: System-wide surveys will not be conducted in FY16. The protocol will be reviewed in light of the results from study and peer review, and changes will be made, if necessary, to improve the accuracy of the monitoring methods. Surveys will resume in FY17.

Funding is reduced in FY16, as no bird surveys will be conducted.

Pertinent Reports: The report titled *Lower Colorado River Riparian Bird Surveys, 2012* is posted on the LCR MSCP Web site.

Work Task D7: Yellow-billed Cuckoo Presence/ Absence Surveys

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$650,000	$756,988.58	$4,633,892.52	$750,000	$750,000	$750,000	$750,000

Contact: Barbara Raulston, (702) 293-8396, braulston@usbr.gov

Start Date: FY06

Expected Duration: FY55

Long-Term Goal: System monitoring and post-development monitoring for yellow-billed cuckoo

Conservation Measures: MRM1 and MRM2 (YBCU)

Location: General presence/absence surveys are conducted in suitable habitat within the LCR MSCP project boundary.

Purpose: To conduct surveys to monitor existing yellow-billed cuckoo populations along the LCR from the Grand Canyon to the Southerly International Boundary with Mexico and monitor long-term trends

Connections with Other Work Tasks (Past and Future): Under Work Task C37 (closed), the hydrologic conditions preferred by southwestern willow flycatcher and yellow-billed cuckoo have been measured.

Project Description: Yellow-billed cuckoo utilize cottonwood-willow habitat and may act as an umbrella species for other covered avian species that use these habitats. Existing yellow-billed cuckoo populations and habitat are being determined along the LCR as systematic surveys are conducted over the project area. Existing yellow-billed cuckoo populations will be assessed.

Previous Activities: Yellow-billed cuckoo life history and monitoring studies began in FY06. Prior to the creation of riparian habitat under the LCR MSCP, the only large breeding population of cuckoos was on the Bill Williams River NWR, with a few scattered pairs elsewhere on the LCR. The wide-ranging behavior and lack of strict territory boundaries of cuckoos precludes the confirmation of nesting with surveys alone. Instead, criteria (timing, location, and persistence of all detected cuckoos) defining “possible,” “probable,” and “confirmed” nesting have been developed based on survey results combined with observed behaviors of cuckoos. Between FY08 and FY13, the majority of confirmed breeding of cuckoos

has been at the PVER, with nesting also occurring at the CVCA, Cibola NWR Unit #1, and occasionally at the ʻAhakhav Tribal Preserve, BLCA, and Imperial NWR. Nesting activity has been documented late into September at the PVER.

FY14 Accomplishments: Work in 2014 included presence/absence surveys at 40 sites along the LCR and Bill Williams River, nest monitoring, banding of young and adults, telemetry, and migration tracking with GPS.

A total of 58 confirmed breeding territories and an additional 13 probable and 30 possible breeding territories were detected in FY14. Fifty-four territories were confirmed at LCR MSCP restoration sites, 49 at the PVER (Phases 4–7), 1 at the CVCA (Phase 2), and 4 at Cibola NWR Unit #1 (Crane Roost and Nature Trail). There were four nests found at the Bill Williams River NWR. Up to 101 breeding territories were estimated within the LCR MSCP planning area. A total of 35 nests were monitored. Using the Mayfield method, nest success was estimated to be 55%.

Thirty-two new adult cuckoos and 38 nestlings were captured and banded. Nineteen of the adults were fitted with radio telemetric devices, and 7 were fitted with GPS devices. Ten previously banded adults were recaptured. Fifteen birds banded between 2009 and 2013 were re-sighted, and two of these were identified to individual. Six males and two females returned to their previous breeding sites, seven of them to the PVER and one male to Crane Roost. Of the returning birds banded as young, four returned to their natal site (the PVER), and one bird banded in 2012 at either the PVER or Cibola NWR (the unconfirmed color band matched two possible birds) was re-sighted at Havasu (the BLCA).

Monitoring costs increased, requiring additional funding to be added to this work task in FY14. It is projected that costs will remain similar through FY18.

FY15 Activities: Activities in FY15 will involve work similar to 2014. Presence/absence surveys will be conducted at 40 sites along with nest monitoring, banding of young and adults, telemetry, and migration tracking with GPS.

Proposed FY16 Activities: Activities in FY16 will involve work similar to previous years. Presence/absence surveys will be conducted at 40 sites along with nest monitoring, banding of young and adults, telemetry, and migration tracking with GPS.

Pertinent Reports: The *Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use on the Lower Colorado River and Tributaries, 2013 Annual Report* has been posted on the Web site as well as a summary report covering this work between 2008 and 2012. The annual report for 2014 will be posted upon finalization.

Work Task D8: Razorback Sucker and Bonytail Stock Assessment

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$675,000	$802,447.87	$4,821,864.39	$850,000	$925,000	$925,000	$925,000

Contact: Ty Wolters, (702) 293-8463, twolters@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: Conduct long-term system monitoring of razorback sucker and bonytail

Conservation Measures: RASU6 and BONY5

Location: The LCR within the LCR MSCP planning area, including reservoirs and connected channels, from Lake Mead downstream to Imperial Dam

Purpose: To supplement and maintain sufficient knowledge and understanding of razorback sucker and bonytail populations within the LCR MSCP planning area in order to have an effective AMP

Connections with Other Work Tasks (Past and Future): Monitoring data for razorback sucker and bonytail have been or will be gleaned from work accomplished under Work Tasks C8 (closed) , C12 (closed), C13, C15 (closed), F5, and G3.

Project Description: Under this work task, razorback sucker and bonytail population and distribution data will be collected and organized to maintain up-to-date, system-wide, stock assessments for these species. Data acquisition work is accomplished by one of two strategies: (1) gleaning information from ongoing fish monitoring and fish research activities and (2) direct data collection through field surveys within the LCR MSCP planning area not covered by other work tasks. Additionally, as short-term research activities are completed under separate work tasks, a portion of those activities may transition into or be included as part of ongoing, long-term monitoring projects under this work task.

Work routinely includes trammel netting and electrofishing, but visual surveys are also periodically conducted, as well as surveys using specialized equipment and techniques (e.g., scuba divers, underwater photography, and video recordings). Funding described under this work task provides for all costs associated with

conducting field surveys, including salaries, travel, and materials necessary to accomplish this work. Funding for monitoring agreements, gleaning, or capturing data from ongoing research actions and monitoring programs; transfer of these data into record archives; and organizing these data into a cohesive report is also provided under this work task.

Previous Activities: In cooperation with the AGFD and NDOW, fall fish surveys on Lake Mead have been conducted since 1999. Reclamation has also participated in interagency cooperative Native Fish Roundups on Lake Mohave since 1987 and on Lake Havasu (including the river reach below Davis Dam) since 1999. This participation has continued under the LCR MSCP, beginning in 2005, when the program was implemented. Additional monitoring of native fish populations outside of these annual events has also been conducted under this work task as short-term research activities have transitioned into long-term monitoring projects.

FY14 Accomplishments: Accomplishments for this work task have been summarized by river reach. Budget expenditures in FY14 exceeded the approved estimate due in part to an expansion in effort in sampling in Reaches 4 and 5, particularly below Palo Verde Diversion Dam. In addition, a large part of these unforeseen expenses in FY14 were for capital equipment repair and replacement. A number of fleet vessels were in need of repairs for safety and reliability concerns, and one boat was replaced with a vessel that was customized specifically for LCR MSCP needs in Reaches 2 and 3.

Reach 1 (Lake Mead): In cooperation with the AGFD and NDOW, annual fall gill net surveys of Lake Mead have been conducted. Participating agencies were responsible for sampling Boulder Basin, Virgin Basin, Gregg Basin, and the Overton Arm. This lake-wide effort resulted in the capture over 2,252 fish, representing 15 different species. A total of 9 razorback sucker were captured during this effort. No additional native fish species were contacted.

Collection of wild-born razorback sucker larvae took place at all major spawning sites (Las Vegas Bay, Echo Bay, and the Muddy River/Virgin River inflow) over the course of the spawning season. This effort yielded 538 larvae from Las Vegas Bay, 119 larvae from Echo Bay, and 215 larvae from the Muddy River/Virgin River inflow area for a lake-wide total of 872 larvae. A portion of the captured larvae was retained for genetic analyses, with the majority being returned to the lake.

Monitoring of the Lake Mead razorback sucker population also continued. Tracking of sonic-tagged fish continued, and we gathered information on habitat use and movement patterns of razorback sucker. The data obtained from monitoring sonic-tagged fish provided valuable information, including the general location of razorback sucker populations, the location of spawning sites, and the movement patterns of razorback sucker within and among spawning areas.

Trammel netting surveys conducted during the spawning season resulted in the capture of 85 razorback sucker, with 22 coming from Echo Bay, 8 from Las Vegas Bay, and 55 from the Muddy River/Virgin River inflow area. Of the 85 razorback sucker captured, 45 were recaptured fish. The remaining razorback sucker captured were new, wild fish and included 8 from Echo Bay, 5 from Las Vegas Bay, and 27 from the Muddy River/Virgin River inflow area. Aging information was obtained from 35 razorback sucker during the 2014 study year, bringing the total number of razorback sucker aged as part of the long-term monitoring program to 470. Ages of new, wild razorback sucker captured from long-term monitoring areas in 2014 ranged from 5 to 15 years old. The evaluation of fin ray sections removed from captured fish continues to suggest ongoing and recent recruitment in Lake Mead.

Using mark-recapture data from the period spanning 2012–14, the combined lake-wide razorback sucker population was estimated at 589 individuals in 2014. This estimate included mark-recapture data from all areas of the lake, including Echo Bay, Las Vegas Bay, the Muddy River/Virgin River inflow area, and the Colorado River inflow.

Reach 2 (Lake Mohave): A total of 12,317 razorback sucker were successfully repatriated into Lake Mohave in calendar year 2014. This is a decrease from the number of razorback sucker stocked in 2013 (15,369), but above the targeted 6,000.

Annual razorback sucker roundups were conducted in November and March using trammel nets (50 net-nights; 123 razorback sucker contacted), and electrofishing was conducted above Willow Beach from June through October (14,207 seconds; 116 razorback sucker contacted). Based on monitoring data from the 2013 and 2014 field seasons, there was no wild razorback sucker population remaining in Lake Mohave. We estimated that the repatriated razorback sucker population was 2,525 (95% CI from 1,180 to 5,741) during the mark and recapture period and that long-term survival of all repatriates released as of March 1, 2013, was approximately 1%.

The use of remote sensing, which was expanded in 2011 to include the lotic portion of Lake Mohave upstream of Willow Beach, was also continued. Continued improvements in remote PIT tag antenna design have allowed for sampling in the high flow conditions of that reach, thereby contacting a large number of razorback sucker that had been previously undetected through other sampling methodologies.

In 2014, a total of 239,170 remote sensing PIT tag contacts were recorded lake-wide. In the river zone above Willow Beach, 4,091 hours of scan time resulted in 8,253 contacts, representing 1,430 unique razorback sucker. Throughout the rest of Lake Mohave, an effort of 4,753 hours of scan time resulted in 230,917 contacts, representing 1,347 unique razorback sucker. In

summary, a total of 2,777 individual razorback sucker were contacted in 8,844 hours of scan time in 2014. This is slightly lower than the 3,321 individual razorback sucker contacted in 11,293.4 hours of scan time in 2013, but it is very similar to the results from 2012 (2,788 individual razorback sucker contacted in 8,393 hours of scan time).

Based on 2013 and 2014 remote PIT scanning, the 134.2-kHz tagged Lake Mohave repatriate population was estimated at 3,284 individuals (95% CI from 3,067 to 3,516) for the mark and recapture period. Subpopulation estimates using zone-specific scanning were also calculated and estimated the basin zone (River Miles 13–29) population at 1,492 (95% CI from 1,357 to 1,640) and the river zone (River Miles 43–63) population at 2,053 (95% CI from 1,357 to 1,640).

Reach 3 (Lake Havasu): A total of 6,000 razorback sucker and 5,977 bonytail were released into Reach 3 during calendar year 2014; all fish were released with a PIT tag.

Capture/contact data were acquired through Work Tasks C53, C64, F5, ongoing multi-agency Native Fish Roundups, and from other annual surveys conducted by LCR MSCP partners. A fall and spring netting survey was conducted throughout Topock Gorge and lower Lake Havasu. Razorback sucker contacts were more frequent in Topock Gorge than Lake Havasu, but results were comparable to past years. Bonytail contacts via netting increased in FY14; these were all fish released within months of the surveys. Large numbers of razorback sucker continued to be contacted in the riverine portions near Needles, California, and select backwaters throughout Topock Gorge. The remainder of the non-native fish community did not show any substantial changes.

Remote PIT scanning has continued to improve razorback sucker contact rates. Scanning conducted in Reach 3 accounted for 2,324 unique razorback sucker contacts and 2,442 total contacts, including netting and electrofishing contacts. The current razorback sucker population estimate for Reach 3 is 4,456 (95% CI from 4,089 to 4,855). Size at release is the most critical factor affecting survival, and it is highly correlated with contact rate (which is an assumed measure of survival). Season also appears to be an important factor, with fish released in the spring showing higher survival. However, there are limited data for this comparison, and releases directed at validating these results will be incorporated into future fish augmentation strategies.

Reach 4 and 5 (Parker Dam to Imperial Dam): Under the LCR MSCP Fish Augmentation Program, 6,622 razorback sucker and 1,998 bonytail were stocked into Reach 4 during the 2014 calendar year. These fish were released above and below Headgate Rock Dam as part of Work Task C64, and additional fish were

released below Palo Verde Diversion Dam. A small population of razorback sucker continues to persist below Palo Verde Diversion Dam; 98 unique razorback sucker were contacted with scanners in the A-7, A-10, and Palo Verde backwaters. All of these contacts represented fish that were stocked in this reach from 2005 to 2008.

Additionally, 54 larvae were recorded in the A-10 backwater. Overall re-contacts of stocked fish were low in this reach, and population estimates were not calculated due to the low number of contacts.

FY15 Activities: Monitoring data will be collected for Reaches 1–5. Information will be gleaned from ongoing fish research activities as well as through fish monitoring field work. Field work will include trammel netting, electrofishing, remote sensing of PIT-tagged fish, and active and passive tracking of sonic-tagged fish.

Monitoring efforts, including the expanded use of scanners and netting, will be increased for Reaches 4 and 5 below Palo Verde Diversion Dam. These results will be used to guide future stocking locations and additional directed research under Work Tasks C64 and C65.

Proposed FY16 Activities: Monitoring efforts will continue in all river reaches as previously outlined, and participation in multi-agency field surveys will continue. As research-based work tasks are completed in Reaches 1 and 3 (C13 and C45, respectively), gaps in native fish community sampling data are expected. The proposed expansion of monitoring work within these and other reaches will allow for continued collection of data, compensating for the potential sampling gaps that resulted from the closure of multiple research work tasks. These closures can be advantageous, as a portion of research funding can be redistributed toward monitoring. The proposed funding increases for FY16–18 represent this redistribution effort to direct research under Species Research (Section C) work tasks to monitoring under Work Task D8. Overall, this will result in lower total expenditures based on a less intensive sampling effort, as only a portion of the research efforts will transition into monitoring. Take, for example, that $75,000 was added to the proposed estimate for FY16–18. This additional funding will cover the Lake Mead Colorado River inflow and lower Grand Canyon monitoring effort, an effort that was previously accomplished under research Work Task C13. The $75,000 represents a reduction in effort and overall cost for the collection of these data (approximately half the dollar amount used under Work Task C13). This less intensive effort will be accomplished primarily through the deployment of remote PIT tag sensing units, and the estimated funding increase includes the costs associated with acquisition of these units and their long-term maintenance.

Pertinent Reports: The reports titled *Razorback Sucker Studies on Lake Mead, Nevada and Arizona 2013–2014 Final Annual Report*, *2014 Lake Mohave Razorback Sucker Monitoring Annual Report*, *Comparative Survival of Repatriated Razorback Sucker in Lower Colorado River Reach 3 – 2014 Annual Report*, and *Movements of Sonic Tagged Razorback Suckers Between Davis and Parker Dams (Lake Havasu) Final Report* will be posted on the LCR MSCP Web site following review.

Work Task D9: System Monitoring and Research of Covered Bat Species

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$375,000	$387,326.01	$1,223,490.26	$380,000	$390,000	$190,000	$190,000

Contact: Allen Calvert, (702) 293-8311, acalvert@usbr.gov

Start Date: FY04

Expected Duration: FY55

Long-Term Goal: System monitoring and species research will be conducted for LCR MSCP bat species to monitor distribution and to evaluate habitat implementation success

Conservation Measures: MRM1 (WRBA, WYBA, CLNB, and PTBB), WRBA1, and WYBA1

Location: System-wide along the LCR below Hoover Dam

Purpose: To conduct system monitoring and research on the distribution of covered bat species utilizing roost surveys, acoustic survey techniques, and capture techniques

Connections with Other Work Tasks (Past and Future): System monitoring data will be used in conjunction with post-development monitoring (F4) to document habitat use of covered bat species.

Project Description: Several survey techniques will be utilized to detect the presence of covered and evaluation bat species. Acoustic surveys will be used to document the presence of covered and evaluation bat species in existing riparian habitat. Roost surveys will be conducted to track bat populations and to survey species such as the Townsend's big-eared bat and California leaf-nosed bat, which are not readily detected by acoustic technology. Individual bats will be captured using techniques such as mist netting to obtain reference calls for bat identification and to verify reproductive status.

Previous Activities: An LCR bat monitoring protocol was produced to assist in the development of a system-wide distribution and demography monitoring plan for covered bat species. A system-wide acoustic monitoring program was implemented that coordinated the collection and analyses of acoustic bat data

for system-wide monitoring of the LCR. Four permanent acoustic monitoring stations were placed along the river and are providing year-round data on bat species presence at the monitoring sites.

FY14 Accomplishments: The four permanent acoustic monitoring stations continued to operate year round recording presence data. A fifth station was added at the Havasu NWR. Acoustic monitoring and data analysis methods were reviewed, and it was recommended that: (1) data analyses be limited to only the two covered and two evaluation species, as collecting data on other species would not inform LCR MSCP species presence and habitat requirements, (2) a sampled approach be used during the winter and summer peak activity time periods instead of year-round data collection, as that data will be sufficient to document species presence, and (3) data analyses be focused on presence only, as the five sampling locations and acoustic methods do not provide enough information to monitor absence, population trends, or habitat characteristics.

California leaf-nosed and Townsends big-eared bat roost outflight counts were conducted in the winter and early summer at 17 mines along the LCR. Based on the roost outflight counts, populations at these roosts continue to appear stable.

A foraging distance study of California leaf-nosed and Townsend's big-eared bats along the LCR began in FY14. In August, a single session was conducted to capture and radio track both species. Neither species was captured. Equipment was tested, and radio tracking training was conducted using four bats of different species.

FY15 Activities: The five permanent acoustic monitoring stations will continue to operate. Data will be collected and analyzed for covered and evaluation species presence during winter and summer peak activity periods. Station data from the five non-LCR MSCP managed sites will be analyzed together with the nine habitat creation area stations (F4) as a single acoustic monitoring network to document trends in LCR MSCP species activity levels across the program area. Archived acoustic data will be organized, analyzed, and compiled so that it may be entered into a single database.

California leaf-nosed and Townsend's big-eared bat roost outflight counts will continue in the winter and early summer. California leaf-nosed bat banding data will be compiled and entered into a single database.

The foraging distance study of California leaf-nosed and Townsend's big-eared bats will continue. In February, up to 12 California leaf-nosed bats will be captured at a known winter roost and will be radio tracked for approximately 2 weeks. During that time, capture surveys will be conducted at three conservation areas. If California leaf-nosed bats are captured during these capture surveys, they will also be radio tracked to determine where their roost is as well as how far away they will forage from that roost. In August, 12 more bats

will be captured at a known summer roost, and they will be radio tracked for 2 weeks. Either Townsend's big-eared or California leaf-nosed bats (or both) will be tracked depending on which roost is selected for summer tracking. In the summer, California leaf-nosed bats will be radio tracked opportunistically during bat monitoring activities at conservation areas (F4).

Standardization of data and development of MEFFs for bat monitoring activities will continue.

Proposed FY16 Activities: The five permanent acoustic monitoring stations will continue to operate, and data will be analyzed for covered and evaluation species presence during winter and summer peak activity periods. Data will also be analyzed using the nine habitat creation area stations. California leaf-nosed and Townsend's big-eared bat roost outflight counts will continue in the winter and early summer. The foraging study will continue and will include tracking bats from roosts and foraging areas. Standardization and consolidation of data and development of MEFFs for bat monitoring activities will continue.

Pertinent Reports: The report titled *Monitoring of LCR MSCP Bat Species as Determined by Acoustic Sampling, 2013 Summary Findings* has been posted on the Web site. The report titled *Roost Surveys and Monitoring for Lower Colorado River Bat Species – 2013 Annual Report* is in the review queue and will be posted on the Web site once published.

Work Task D10: System Monitoring of Rodent Populations

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$40,000	$40,251.89	$174,521.98	$40,000	$40,000	$40,000	$40,000

Contact: Allen Calvert, (702) 293-8311, acalvert@usbr.gov

Start Date: FY11

Expected Duration: FY55

Long-Term Goal: System monitoring to document the presence of possible source populations of LCR MSCP covered rodents along the LCR

Conservation Measures: AMM1, AMM6, MRM2, DPMO1, CRCR1, CRCR2, YHCR1, and YHCR2

Location: System-wide along the LCR, including the Bill Williams River

Purpose: The purpose of this work task is to conduct presence surveys of the Yuma hispid cotton rat, Colorado River cotton rat, and desert pocket mouse within existing habitat along the LCR.

Connections with Other Work Tasks (Past and Future): System monitoring will be used in conjunction with post-development monitoring (F3) and small mammal research (C27) to document habitat at capture locations.

Project Description: The survey under this work task was designed so the presence of the Colorado River cotton rat and Yuma hispid cotton rat could be detected in an attempt to document populations within existing habitat on the LCR. Furthermore, surveys will be conducted to locate desert pocket mouse habitat that could be affected by habitat creation-related activities to determine whether the habitat is occupied by this species. Surveys may be conducted in the extreme edges of each species' range in an attempt to document the outer limits of their respective distributions within the LCR MSCP planning area.

Previous Activities: Presence surveys have been conducted in potential Colorado River and Yuma hispid cotton rat habitat within the LCR MSCP area to document each species range and to collect genetic samples.

FY14 Accomplishments: Surveys were conducted within previously known locations to document the presence of the Colorado River and Yuma hispid cotton rats. Areas surveyed included potential habitat near Yuma, Arizona, and Needles, California. No Colorado River cotton rats were captured at Pintail Slough this year. The Yuma hispid cotton rat was captured within the Limitrophe area south of Yuma.

FY15 Activities: System-wide rodent surveys for covered species will continue at sites monitored in FY14. If new potential cotton rat habitat is discovered, monitoring will be conducted to document their presence.

Proposed FY16 Activities: Surveying throughout the LCR system to document presence within existing habitat will continue. If new potential cotton rat habitat is discovered, monitoring will be conducted to document their presence.

Pertinent Reports: The 2013 annual report will be posted on the LCR MSCP Web site upon completion.

Work Task D12: Lowland Leopard Frog and Colorado River Toad Surveys

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$25,000	$29,627.44	$402,792.37	$25,000	$35,000	$35,000	$35,000

Contact: Allen Calvert, (702) 293-8311, acalvert@usbr.gov

Start Date: FY10

Expected Duration: FY55

Long-Term Goal: To document the existing populations of the lowland leopard frog and Colorado River toad along the LCR and understand their habitat requirements

Conservation Measures: LLFR1 and CRTO1

Location: Within Reaches 3–7 of the LCR MSCP boundary and the Bill Williams River

Purpose: To better define the distribution, habitat requirements, and factors limiting the distribution of the lowland leopard frog and Colorado River toad using a system-wide monitoring approach

Connections with Other Work Tasks (Past and Future): Populations that are found during system-wide surveys may be included in in the habitat study conducted under Work Task C62.

Project Description: System-wide surveys for the lowland leopard frog and Colorado River toad will be conducted along the LCR and the Bill Williams River. It is unknown if any populations still exist along the LCR. The lowland leopard frog has been observed on the Bill Williams River, and surveys will help determine the distribution of this population. Habitat characteristics will also be gathered in conjunction with surveys where the presence of either species is confirmed.

Previous Activities: In FY11, 139 locations along the LCR and Bill Williams River were surveyed. Six Colorado River toads were found at Planet Ranch, and no lowland leopard frogs were found. Lowland leopard frogs and Colorado River toads were found on the Bill Williams River, east of Planet Ranch, in FY12 and FY13. Neither species was documented on the main stem LCR.

FY14 Accomplishments: Presence surveys for Colorado River toads were conducted in the summer of FY14 along 4.3 miles of the Bill Williams River east of Planet Ranch. Visual encounter surveys, tape-playback surveys, digital automated recorders (frog loggers), funnel traps, and eDNA sampling were used.

A total of fifty-four visual encounter and tape-playback surveys were conducted. Eleven Colorado River toads were captured, with one male recaptured once. Four captures were on the same night at a recently created ephemeral pool. Callbacks were heard during seven of the surveys from five of the plots. All call responses came from outside the surveyed plot except for one on Plot 5. Two pairs were observed breeding on Plot 5 on August 5, 2014, and two egg masses were recorded on that plot on August 7, 2014. There we calling males on Plot 6, but no females or egg masses were observed.

The digital automated recorders detected Colorado River toads calling on 23 nights. All calling and breeding activity occurred between August 3 and September 17, 2014. There were 84 detections of Colorado River toads using this method. Detections occurred from all plots except Plots 7 and 8.

Funnel traps were deployed on August 7 and 8 and September 3, 23 and 24, 2014. Traps were only deployed on dates when and at locations where water was present. No lowland leopard frogs or Colorado River toads were captured.

A total of 11 water samples were collected for eDNA and sent for analyses. Samples were taken where ample water was available for lowland leopard frogs and Colorado River toads. Samples were collected on August 8 and September 3, 2014, on Plots 5 and 6. Samples for Plot 10 were collected on October 3, 2014.

FY15 Activities: Species presence data will be collected within the Bill Williams watershed using visual encounter surveys, tape-playback surveys, digital automated recorders (frog loggers), funnel traps, and eDNA sampling. Surveys for the lowland leopard frog will begin in February, and surveys for the Colorado River toad will be conducted in the summer and fall.

Proposed FY16 Activities: Species presence data will be collected within the Bill Williams watershed using visual encounter surveys, tape-playback surveys, digital automated recorders (frog loggers), funnel traps, and eDNA sampling. Surveys for lowland leopard frog will begin in February, and surveys for the Colorado River toad will be conducted in the summer and fall.

An analysis will be conducted comparing the five monitoring methods to identify the best methods to use in subsequent years. The project budget will increase in FY16 to fund this analysis.

Pertinent Reports: The FY13 annual report will be posted on the LCR MSCP Web site upon completion.

WORK TASKS – SECTION E

Conservation Area Development and Management

Work Task E1: Beal Lake Conservation Area

FY14 Estimate*	FY14 Actual Obligations*	Cumulative Expenditures Through FY14*	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$300,000	$130,785.45	$3,714,737.03	$300,000	$400,000	$200,000	$200,000

* Includes Work Task E2 (closed).

Contact: Laken Anderson, (702) 293-8153, landerson@usbr.gov

Start Date: FY04

Expected Duration: FY55

Long-Term Goal: Habitat creation

Conservation Measures: WIFL1, WRBA2, WYBA3, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, MNSW2, MNSW2, BONY2, and RASU2

Location: Reach 3, Havasu NWR, Arizona, 0.5 mile east of River Miles 238 and 239

Purpose: To create and manage a mosaic of native land cover types for LCR MSCP covered species

Connections with Other Work Tasks (Past and Future): With the concurrence of the Steering Committee, Work Tasks E1 and E2 (closed) have been combined into the BLCA. Vegetation and species monitoring are being addressed under Work Tasks F1–F4, and monitoring of native fish is being addressed under Work Task F5. Portions of restoration research at the BLCA have been funded under Work Task G3.

Project Description: Beal Lake was 225 acres of shallow, low-quality aquatic habitat that was dredged in 2001 to create a functioning backwater dedicated to native fish. Management of Beal Lake is a continuation of the commitment to construct habitat for protected native fish under the 1997 BO. Continued maintenance and management obligations of Beal Lake, as well as research and development of the backwater as native fish habitat, were subsumed under the LCR MSCP in 2005.

The development of the riparian area within the BLCA was initiated to research effective ways of using dredge material. The plan called for blending sediment dredged from Beal Lake with adjacent soils and replanting the mixed substrate with native vegetation. The project area, which is divided into fields that can be

independently irrigated and managed, was designed to provide a location for testing various riparian restoration methods and techniques for site preparation, planting, irrigation, monitoring, and management.

Previous Activities: Post-development habitat and avian monitoring have been conducted since FY04. Monitoring of post-development microclimate, small mammals, and bats has been conducted since FY06.

Experimentation and restoration of the Riparian Area began in 2001. Three distinct planting efforts have been completed and resulted in 107 acres of various native land cover types, including cottonwood-willow, honey mesquite, and marsh. Phase 1 (61acres) and Phase 2 (44 acres) consist of riparian trees, whereas the southwestern willow flycatcher marsh (13 acres) was created as marsh.

The backwater was dredged in 2001. In 2012, native fish stockings were discontinued at Beal Lake, and fisheries surveys were reduced to a relative abundance and biomass estimate for all species within the backwater. The results of these surveys indicated that the backwater contained nearly 4,000 fish comprised of at least 6 different species. Common carp and largemouth bass comprised almost 90% of the total fish (69 and 20%, respectively), with carp occupying 88% of the total fish biomass. This level of non-natives is likely leading to a competition for resources and, at least, is contributing to the poor survival of native fish.

Golden algae were confirmed following a fish kill in February 2013, and routine monthly monitoring of the algae has failed to detect it since May 2013. Electrofishing and remote PIT scanning surveys failed to detect any fish for several months following the toxic algae event. By mid-summer, young-of-year largemouth bass were observed in the backwater.

FY14 Accomplishments:

Maintenance/Restoration/Management:

Riparian Fields: Irrigation was conducted on the riparian fields from mid-March through mid-September using a diesel-driven pump, which delivered water to each individual field through an alfalfa valve. The system required onsite personnel to fuel, start, and maintain the pump as well as manually open and close the alfalfa valves. The diesel engine had reached a major maintenance interval and was removed, rebuilt, and reinstalled during the fiscal year.

No construction activities were planned within the riparian fields of the BLCA during FY14. However, in April 2014, one of the four Topock Marsh/Beal Lake canal irrigation gates required repair.

Repairs of irrigation Cell KK, needed due to a breach/blowout of the irrigation berm/border, were completed in August 2014. The berm was repaired, and the interior of the cell was graded to remove large sand drifts that hindered consistent irrigation. The repairs were successful, and the flood irrigation water is now reaching the full extent of the irrigation cell.

Beal Lake: Maintenance and manual cleaning of the screens that allow surface flows to move from Topock Marsh into Beal Lake will not be conducted due to the presence of golden algae. Water levels will continue to be monitored using the established gauging stations.

In cooperation with the USFWS, the long-term role of Beal Lake, given its past performance and the presence of golden algae, has been discussed although no decision has been made. The outcome will determine the level of effort required in future years. As a result no additional construction or restoration activities were conducted for Beal Lake during FY14, and expenditures were less than anticipated. Future budgets may be modified depending on the outcome of discussions with the USFWS.

Monitoring:

Riparian Fields: Vegetation monitoring was conducted between September and November 2014.

Small mammal monitoring was conducted in Field F in the fall and spring. No cotton rats were detected. One desert pocket mouse was captured in the fall and one in the spring.

Bat capture surveys were conducted at the site once per month in May, June, July, and August. Both LCR MSCP evaluation species were captured, including one Townsend's big-eared bat and two California leaf-nosed bats. In conjunction with the bat capture surveys, the established long-term acoustic bat station continuously collected acoustic bat data. Western red bats, western yellow bats, California leaf-nosed bats, and Townsend's big-eared bats were detected during acoustic surveys.

General avian surveys were conducted using intensive and rapid area search protocols. A total of 102 pairs of riparian birds were estimated to be breeding at the BLCA. Arizona Bell's vireo (13 territories), Sonoran yellow warbler (8 territories), and summer tanager (2 territories) were confirmed breeding.

Single species surveys were conducted for the southwestern willow flycatcher and western yellow-billed cuckoo during their respective breeding seasons. Western

yellow-billed cuckoo were detected on four of the five visits. There was one probable territory at the site. One willow flycatcher was using the site from May to June 2 but was not detected after that date.

Avian mist netting following the MAPS protocol (D5) was conducted from early May to early August. Sonoran yellow warbler, Arizona Bell's vireo, and summer tanager were color banded to better monitor their breeding activities at the riparian fields.

Three marsh bird survey points were established at the willow marsh and nine points were established at the existing lake. Marsh bird surveys were conducted according to the National Marsh Bird Monitoring protocol. There were four detections of Yuma clapper rail at the existing lake. There were seven detections of least bitterns at the existing lake and six detections at the willow marsh.

Beal Lake: The water quality at Beal Lake was monitored throughout the backwater; low levels of DO and high temperatures were observed locally but not lake-wide. Zooplankton and phytoplankton results continue to show relatively low levels of plankton biomass.

The backwater was isolated from Topock Marsh following the detection of golden algae in 2013; this closure resulted in a rapid increase in specific conductivity, which approached 11,000 µS/cm in FY14. No golden algae have been detected in Beal Lake since May 2013. Limited electrofishing and netting surveys in FY14 detected many of the non-native species that were known to have previously inhabited the backwater. The majority of these fish were in the juvenile size classes, with the exception of one large carp.

FY15 Activities:

Maintenance/Restoration/Management:

Riparian Fields: Irrigation and possible fertilization is projected on the riparian fields from mid-March through mid-September using a diesel-driven pump, which delivers water to each individual field through an alfalfa valve. The system requires onsite personnel to fuel, start, and maintain the pump as well as manually open and close the alfalfa valves.

Beal Lake: Maintenance and manual cleaning of the screens that allow surface flows to move from Topock Marsh into Beal Lake will be conducted in FY15. Water levels will continue to be monitored using the established gauging stations. Clearing of the unlined inlet canal, which connects Topock Marsh to Beal Lake, is anticipated.

Monitoring:

Riparian Fields: Vegetation monitoring will continue. Small mammal monitoring will be conducted in the fall and spring. Bat capture surveys will be conducted from May to September. An established long-term bat monitoring station will be used to collect acoustic data. General bird surveys will be conducted from mid-April to mid-June. Single species surveys for the southwestern willow flycatcher and yellow-billed cuckoo will be conducted during their respective breeding seasons. Marsh bird surveys will be conducted in the willow marsh and existing lake in March, April, and May. MacNeill's sootywing surveys will be conducted in the spring and summer.

Beal Lake: The activities from FY14 will continue into this year. A drawdown to exchange water from Beal Lake, originally scheduled for FY15, was delayed to allow discussion with the USFWS on the presence of golden algae. Salinity levels within the lake are monitored and have been increasing over time. The drawdown would be initiated to lower salinity levels in the backwater and facilitate fisheries management. Recommendations for management guidelines and future outbreaks of golden algae at Beal Lake will dictate future monitoring and research objectives for the site.

Proposed FY16 Activities:

Maintenance/Restoration/Management:

Riparian Fields: Irrigation and fertilization is projected on the riparian fields from mid-March through mid-September using a diesel-driven pump, which delivers water to each individual field through an alfalfa valve. The system requires onsite personnel to fuel, start, and maintain the pump as well as manually open and close the alfalfa valves. No construction activities are planned within the riparian fields of the BLCA during FY16.

Beal Lake: Maintenance and manual cleaning of the screens that allow surface flows to move from Topock Marsh into Beal Lake will be conducted in FY16. Water levels will continue to be monitored using the established gauging stations. A drawdown to exchange water from Beal Lake, originally scheduled for FY15, is anticipated in FY16. Salinity levels within the lake are monitored and have been increasing over time. The drawdown would be initiated to lower salinity levels in the backwater and facilitate fisheries management.

No other construction or restoration activities are planned for Beal Lake during FY16.

Monitoring:

Riparian Fields: Vegetation monitoring will continue. Small mammal monitoring will be conducted in the spring and fall. Bat capture surveys will be conducted from May to September. An established long-term bat monitoring station will be used to collect acoustic data. General avian surveys will be conducted from mid-April to mid-June. Single species surveys for the southwestern willow flycatcher and yellow-billed cuckoo will be conducted during their respective breeding seasons. Surveys for marsh birds will be conducted within the willow marsh and existing lake. MacNeill's sootywing surveys will be conducted in the spring and summer.

Beal Lake: The activities from FY15 will continue into this year. Recommendations for management guidelines and future outbreaks of golden algae at Beal Lake will dictate future monitoring and research objectives for the site.

Pertinent Reports: The report titled *Beal Lake Restoration Site Amendment Study: Irrigation Monitoring and Instrumentation Report, 2012* will be posted on the LCR MSCP Web site upon completion. The *2013 Beal Lake Conservation Area Annual Report*, which summarizes any planting conducted, site management, the results of monitoring, and any recommendations for future adaptive management, will be posted once integration of the data collected throughout the calendar year is complete.

Work Task E4: Palo Verde Ecological Reserve

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$725,000	$487,583.25	$8,524,176.15	$500,000	$500,000	$500,000	$500,000

Contact: Darrin Miller, (702) 293-8166, dmiller@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: Habitat creation

Conservation Measures: WIFL1, WRBA2, WYBA3, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, and MNSW2

Location: Reach 4, River Miles 129–133, California

Purpose: To create and manage a mosaic of native land cover types for LCR MSCP covered species

Connections with Other Work Tasks (Past and Future): Vegetation is being addressed under Work Tasks F1–F4, wildlife under Work Tasks D2, D6, D7, D9, and D10, and insect populations are being evaluated under Work Tasks C5 (closed) and C6.

Project Description: The PVER encompasses more than 1,300 acres. This property has been made available for LCR MSCP habitat restoration activities by the CDFW. Development of the project is intended to satisfy both the LCR MSCP and a portion of CESA Incidental Take Permit No. 2081-2005-008-06.

The eastern boundary of the property (more than 4 miles) is adjacent to the Colorado River; the western boundary is adjacent to active agricultural fields. The PVER has an extensive infrastructure consisting of miles of lined irrigation ditches, roads, and a pump. Each year, a portion of the active crop acreage was taken out of production to develop the next phase of native habitat. The intent was to create as much riparian habitat as practical. Generally, all phases at the PVER are targeted for southwestern willow flycatcher, yellow-billed cuckoo, and other covered species. The final phase was planted in FY13. The PVID provides water to the PVER. The costs associated with irrigation, electricity, and water is proportional to the amount of acreage that has been converted to habitat.

The creation of a mosaic of habitats that contain areas of riparian species (including mesquite) and ground covers or open areas is intended. Ground cover is an effective method of controlling non-native species and provides another layer of vegetation for habitat. Ground cover is planted with transplants or by seed; costs vary with the methods of planting used. Mesquite trees are generally planted by a tree planter or auger. Typically, mesquite costs are based on a 1-gallon planted tree.

Agricultural areas have irrigation systems in place that are conducive for water management of riparian species. Checks, which are small borders placed within a given field, allow for flooding of only a portion of a field. These provide additional flexibility to create and maintain standing water or saturated soil areas for covered species.

Previous Activities: Through FY13, over 1,000 acres of cottonwood-willow and mesquite land cover types have been established in Phases 1–8 and are being managed for the LCR MSCP covered species.

FY14 Accomplishments:

Maintenance/Restoration/Management: All phases have been planted and are being managed for LCR MSCP covered species. The contract farmer continued to manage the irrigation cycles and water orders through the PVID. Maintenance of the irrigation canals, gates, and roads continued. Removal of vegetation along the roadside and ditches has been performed quarterly or as needed. Replacement of the existing pump with two 30-cfs electric irrigation pumps, delivery pipes, electrical upgrade, and pump stand was started 2014. Final construction and operation will occur during the PVID's annual outage in January 2015. Expenditures were less than anticipated, and future budget projections have been reduced to reflect actual expenditures.

Monitoring: Vegetation monitoring was conducted between September and November 2014.

MacNeill's sootywing were surveyed between May and August 2014. All three life stages were observed at PVER4 and PVER6.

Colorado River cotton rats were surveyed in the fall of 2013. Thirty-one cotton rats were captured on the accretion bench along the river on the eastern portion of the conservation area, and two were captured at PVER 6.

Two LCR MSCP covered bat species and 1 evaluation species were captured at the PVER, including 15 western yellow bats, 1 western red bat, and 6 California

leaf-nosed bats. In conjunction with the bat capture surveys, the established long-term acoustic bat station was used to continuously collect data. Western red bats, western yellow bats, California leaf-nosed bats, and Townsend's big-eared bats were detected during acoustic surveys.

During rapid area searches for birds at the PVER, more than 25 different species and greater than 400 breeding territories were detected as well as 96 species of migrants and other non-breeders. Of the covered species, 4 pairs of Sonoran yellow warblers were found breeding in Phases 4, 5, and 6, and an additional 104 individual yellow warblers were detected but not confirmed breeding. Several other species, including Arizona Bell's vireo, Gila woodpecker, summer tanager, lesser goldfinch, lesser nighthawk, and marsh wren were detected, but breeding could not be confirmed.

Yellow-billed cuckoos were surveyed five times throughout the breeding season using taped playback recordings. Based on the timing, location, persistence, and behavior of all cuckoos detected at PVER Phases 1–7, 49 confirmed breeding pairs produced 29 nests and fledged 44 young. Breeding activity continued through September 12. Seven cuckoos were fitted with GPS tracking devices for monitoring during migration and the non-breeding season. Results of this tracking will be reported in future years. Thirty-two new cuckoos were banded, and 10 banded birds from previous years were recaptured.

Surveys for southwestern willow flycatcher were conducted five times. Several migrants were detected, but no confirmation of breeding or resident southwestern willow flycatchers were documented.

FY15 Activities:

Maintenance/Restoration/Management: The entire conservation area is now fully developed and is transitioning from the development stage into the maintenance and monitoring stage. Water for irrigation of the trees and to simulate historical river flooding is provided by the PVID. A local farmer is utilized to divert and irrigate the various phases based on site conditions and species planted. The farmer provides local knowledge of weather and farming practices, which are applied to the maintenance of the conservation area. The farmer and his employees are an onsite presence and provide early recognition of issues or concerns. The farmer is also responsible for assessing the water needs of the trees and, in coordination with the district and the LCR MSCP, orders and delivers the water. Maintenance activities include grading access roads; maintaining field borders, irrigation canals, and invasive plant control, including hand removal and application of herbicides; and physically opening and closing the irrigation gates for over 1,000 acres of established land cover types.

The annual costs associated with operating within the district, such as water taxes, water tolls, electrical power utility bills, and assessments for district operation, are included in the annual maintenance costs.

The two 20-cfs electric fixed irrigation pumps, delivery pipes, the electrical upgrade, and the pump stand were completed in 2015. Irrigation will continue on the same schedule until data become available that indicate adjustments are needed.

Since development is now complete, the management plan for the entire conservation area will be drafted.

Monitoring: Vegetation monitoring will continue starting in September 2015. Small mammal monitoring will be conducted in the fall and spring. Bat capture surveys will be conducted from May to September. An established long-term bat monitoring station has been used to collect acoustic data. General bird surveys will be conducted from mid-April to mid-June. Single species surveys for the southwestern willow flycatcher and yellow-billed cuckoo will be conducted during their respective breeding seasons. MacNeill's sootywing surveys will be conducted in the spring and summer.

Proposed FY16 Activities:

Maintenance/Restoration/Management: The contract farmer will continue to manage the irrigation cycles and water orders through the PVID. Maintenance of the irrigation canals, gates, and roads will continue. Removal of vegetation along the roadside and ditches will be performed quarterly or as needed.

Monitoring: Vegetation monitoring will continue. Small mammal monitoring will be conducted in the fall and spring. Bat capture surveys will be conducted from May to September. An established long-term bat monitoring station will be used to collect acoustic data. General bird surveys will be conducted from mid-April to mid-June. Single species surveys for the southwestern willow flycatcher and yellow-billed cuckoo will be conducted during their respective breeding seasons. MacNeill's sootywing surveys will be conducted in the spring and summer.

Pertinent Reports: The *2013 Palo Verde Ecological Reserve Annual Report*, which summarizes any planting conducted, site management, the results of monitoring, and any recommendations for future adaptive management, will be posted on the LCR MSCP Web site once integration of the data collected throughout the calendar year is complete.

Work Task E5: Cibola Valley Conservation Area

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$550,000	$505,920.13	$10,779,643.89	$700,000	$750,000	$800,000	$850,000

Contact: Jessie Stegmeier, (702) 293-8121, jstegmeier@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: Habitat creation

Conservation Measures: WIFL1, WRBA2, WYBA3, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, and MNSW2

Location: Reach 4, River Miles 99–104, Arizona

Purpose: To create and manage a mosaic of native land cover types for LCR MSCP covered species

Connections with Other Work Tasks (Past and Future): Vegetation and species monitoring are being addressed under Work Tasks F1–F4 and F6.

Project Description: In 2007, under the LCR MSCP, 1,309 acres of land serviced by the Cibola Valley Irrigation and Drainage District were secured, and the CVCA was established. The AGFD acquired the CVCA in September 2007 through a multi-organizational agreement involving the AGFD, Reclamation, the Mohave County Water Authority, The Conservation Fund, and the Hopi Tribe. Through these agreements, the AGFD acquired CVCA fee title and water entitlements and agreed to manage the site.

The CVCA is located in southwestern La Paz County, Arizona, about 15 miles south of Blythe, California. The valley encompasses the land inside an engineered bend of the LCR and a remnant oxbow on the west side of the river (Palo Verde Oxbow). Six phases have been restored with native vegetation, and the remainder is farmed for cotton and alfalfa. The area is bordered to the south by the Cibola NWR and on the east by unimproved land under the jurisdiction of the Bureau of Land Management (BLM). The river forms the north and west boundaries, except for the Palo Verde Oxbow, from River Miles 98.8 to 104.9.

Agricultural areas have irrigation systems in place that are conducive for water management of riparian species. Checks, which are small borders placed within a given field, allow for flooding of only a portion of a field. These provide additional flexibility to create and maintain saturated soil areas for covered species.

Previous Activities: Through FY13, over 650 acres of cottonwood-willow, honey mesquite, and buffer-stabilized ground have been established in Phases 1–6 and are being managed for LCR MSCP covered species. Phase 4 actually consists of two locations; one site (58 acres) is located north of Phase 3. The other site, consisting of 187 acres, is located west of Phases 1 and 2. Approximately 80 acres of this site were planted with a mix of native seeds and irrigated in an effort to eliminate blowing dust and stabilize the ground. This seed mixture consisted of quail bush, needle grama, curly mesquite grass, desert bluebells, and desert Indian wheat.

FY14 Accomplishments: The planting material for Phase 7, approximately 72 acres of honey mesquite habitat, was purchased in FY14 to be planted in the spring of FY15 in accordance with the *Cibola Valley Conservation Area Restoration Development and Monitoring Plan: Phase 7*.

Maintenance/Restoration/Management: No restoration activities were scheduled for FY14. Normal scheduled maintenance and irrigation activities were performed throughout the site.

All fields continued to be flood irrigated. Field crews continued to control small patches of morning glory, volunteer cotton, and salt cedar as necessary, with hand tools, throughout all the phases. This method of using crews proved to be an effective method of controlling invasive plants as they germinate. The crews removed invasive plants from the fields in the late spring or early summer.

Vegetation growing near concrete-lined canals was mechanically cleared several times to keep the tree roots from damaging or blocking them. Limited chemical spraying has been used to control vegetation from growing along these canals.

The Cibola Valley Irrigation and Drainage District hosts monthly meetings with its water users. The LCR MSCP is represented at each meeting. All topics are discussed, ranging from irrigation issues, to maintenance, to upcoming events and activities.

Monitoring: Vegetation monitoring was conducted between September and November 2014.

Yellow-billed cuckoo surveys were conducted between late June and early August. In Phases 1, 2, and 3, there was one confirmed breeding territory, one probable breeding territory, and one possible breeding territory. Resident or

breeding southwestern willow flycatchers were not found at the CVCA during 2014. Five migrating flycatchers were detected on May 30 and six and on June 12.

General bird surveys were conducted at the CVCA from April 15 to June 15, 2014. No confirmed breeding pairs of covered species were detected. Yellow warblers were detected in Phase 3 but were not considered to be breeding or resident at the site.

The CVCA was mist netted for bats once per month from May to September during 2014. Twelve western yellow bats and eight western red bats were captured. Western red bats, western yellow bats, California leaf-nosed bats, and Townsend's big-eared bats were detected during acoustic surveys.

Colorado River cotton rats were captured at CVCA Phase 1; nine during the spring and two in the fall.

Surveys were conducted for MacNeill's sootywing in Phase 4 in 2014. Larvae were detected in June and July, and adults were detected in July and August.

FY15 Activities: The planting material for Phase 8 (111 acres), primarily cottonwood-willow, was purchased in FY15 to be planted in the spring of FY16 in accordance with the *Cibola Valley Conservation Area Restoration Development and Monitoring Plan: Phase 8*.

Maintenance/Restoration/Management: Maintenance and regular irrigation of Phases 1–3 will continue. The planting of Phase 7 is scheduled for March 2015. The Restoration Development and Monitoring Plan for the planting of Phase 8 (111 acres) will be drafted.

Monitoring: Vegetation monitoring will continue. Small mammal monitoring will be conducted in the fall and spring. Bat capture surveys will be conducted from May to September. An established long-term bat monitoring station will be used to collect acoustic data. General bird surveys will be conducted from mid-April to mid-June. Single species surveys for the southwestern willow flycatcher and yellow-billed cuckoo will be conducted during their respective breeding seasons. MacNeill's sootywing surveys will be conducted in the spring and summer.

Proposed FY16 Activities:

Maintenance/Restoration/Management: Maintenance and management will continue. The Restoration Development and Monitoring Plan for the planting of Phase 9 (76 acres) will be drafted. Trees will be purchased in FY16, and planting should occur in the spring of FY17.

Monitoring: Vegetation monitoring will continue. Small mammal monitoring will be conducted in the fall and spring. Bat capture surveys will be conducted from May to September. An established long-term bat monitoring station will be used to collect acoustic data. General bird surveys will be conducted from mid-April to mid-June. Single species surveys for the southwestern willow flycatcher and yellow-billed cuckoo will be conducted during their respective breeding seasons. MacNeill's sootywing surveys will be conducted in the spring and summer.

Pertinent Reports: The *2013 Cibola Valley Conservation Area Annual Report*, which summarizes any planting conducted, site management, the results of monitoring, and any recommendations for future adaptive management, will be posted on the LCR MSCP Web site once integration of the data collected throughout the calendar year is complete.

Work Task E9: Hart Mine Marsh

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$250,000	$229,824.73	$6,559,043.30	$250,000	$250,000	$250,000	$250,000

Contact: Jimmy Knowles, (702) 293-8172, jknowles@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: Habitat creation

Conservation Measures: CLRA1, LEBI1, BLRA1, and CRCR2

Location: Reach 4, Cibola NWR, River Mile 92, Arizona

Purpose: To create and manage marsh habitat for Yuma clapper rail, least bittern, California black rail, and Colorado River cotton rat

Connections with Other Work Tasks (Past and Future): Vegetation and species monitoring are being addressed under Work Tasks F1–F4 and F7.

Project Description: Hart Mine Marsh was a decadent marsh located on the Cibola NWR that was restored and expanded to create functional habitat for covered species. This was accomplished by the installation of control structures to manage water levels, providing sources of higher-quality surface water flows, making physical changes to the site's topography, and by planting and supporting native wetland and marsh vegetation. The approach was to remove a substantial amount of existing salt cedar from the site, deepen areas of existing open water, contour areas adjacent to those deeper areas, and manage water at the higher elevations to promote and sustain marsh cover type vegetation and wetland functions. The creation of habitat included both the establishment of native plants and management of water levels to meet performance standards for integrating emergent vegetation and open water at varying depths into a mosaic of marsh habitats.

Previous Activities: In FY08, NEPA compliance activities, cultural surveys, topographic surveys, and pre-development surveys for marsh birds and riparian obligate birds were conducted. Engineering designs were finalized, and all regulatory permitting required for construction was completed, including NEPA, ESA, Sections 401 and 404 of the Clean Water Act, and Section 106 of the National Historic Preservation Act. In FY09, the first phase of construction was

completed and resulted in 92 acres of marsh. In FY10, Phase 2 of construction was completed and resulted in the creation of an additional 163 acres of marsh. In FY13, upgrades to the water delivery infrastructure were completed, which allowed for greater flexibility and control of water delivery to the marsh.

FY14 Accomplishments:

Maintenance/Restoration/Management: The majority of the activities that occurred in FY14 were for management, maintenance, and monitoring of the established marsh. Water management activities, including water delivery to maintain static water levels during marsh bird nesting season, were performed. Invasive and non-native vegetation control continued. Monitoring of abiotic and biotic parameters was also conducted.

In December 2013, the pumps that supply water to the marsh were vandalized. The copper wiring was removed, and the pumps were inoperable until repairs could be completed; this interfered with the scheduled marsh drawdown and flush that is typically performed during the winter months to aid in controlling marsh salinity levels. After the pump wiring was repaired, an abbreviated flush was completed in February 2014, which kept salinity levels within management thresholds.

In February/March 2014, security fencing was installed around the flow delivery valves and flow measurement instrumentation to prevent unauthorized entry and vandalism.

During March and April 2014, increased river stage due to the Minute 319 pulse flow caused marsh levels to rise. This increased surface water level in the marsh was due to both groundwater interactions and surface backflow into the marsh from downstream and adjacent water bodies, including Cibola Lake. Water levels in the marsh did not exceed the established thresholds for Yuma clapper rail nesting season but did reach areas of the marsh footprint that normally do not become inundated. These areas responded positively, and observations showed that native vegetation was able to become established in previously barren areas after the marsh levels receded.

Control of invasive, non-native vegetation continued throughout FY14. Vegetation maintenance at the marsh employs an integrated pest management approach that utilizes both manual (hand pulling) and chemical (herbicide) treatment of invasive species, including salt cedar, phragmites, and five-hook bassia. These efforts were primarily carried out by a vegetation maintenance contractor, but additional assistance was provided by a youth conservation corps in September 2014. Improved access to the islands allowed maintenance to occur on the marsh perimeter and the islands that form part of the marsh footprint.

Monitoring: Marsh bird surveys were conducted four times between March and May. One Yuma clapper rail was detected during the March 17 survey, four were detected during the April 7 survey, five were detected on the April 28 survey, and six were detected during the May 15 survey. At least 1 least bittern was detected during all 4 surveys, with a maximum of 10 detected during the May 15 survey. One California black rail was detected in May.

MacNeill's sootywing surveys were conducted on the northeastern corner of Hart Mine Marsh between May and August. The adult life stage was detected in May and August, and the larval life stage was detected in July.

FY15 Activities: Regular management and monitoring activities will continue in FY15. Water management, including the maintenance of water levels and water delivery activities on the site, will continue. Invasive and non-native vegetation control will continue.

Minor construction activities planned for FY15 include upgrades to the water control infrastructure. Most canal gates will be retrofitted (new headrails and stems will be installed) so that they can be exercised (raised and lowered) with a gas-powered or electric actuator. Currently, the gates can only be exercised by manually turning a handwheel, which requires large inputs of manual labor. The retrofit and upgrade will allow for more efficient use of labor resources and will also allow the gates to be exercised on a more frequent basis. Frequent exercising of the gates will ensure that that they do not become seized and will prevent the subsequent damage that typically occurs when attempting to unseize an immobilized gate.

Major infrastructure improvements at shared locations, such as Hart Mine Marsh, are identified in cooperation with the USFWS to pool resources and ensure upgrades are made in a proactive manner. Initial planning and design will be conducted in FY15 for these upgrades, which will include abandoning the existing pump stand and constructing a new one. The pump stand replacement was targeted as a priority since it was close exceeding its normal operational lifespan. Additional infrastructure maintenance and upgrades that will also be investigated include the farm canal delivery system and automation of marsh water levels. The USFWS is contributing $500,000 for the replacement of both the pump stand at Hart Mine Marsh as well as the pump stand at Unit #1.

Monitoring: Marsh bird surveys will be conducted in March, April, and May, and MacNeill's sootywing surveys will be conducted in the spring and summer.

Proposed FY16 Activities: Depending on the planning, design, and permitting activities completed in FY15 for the pump stand relocation project, some construction may take place in FY16, but it is likely that construction will

not begin until FY17. In addition to the pump stand project, it is also possible that the additional maintenance and upgrade projects identified in FY15 will be added to the schedule for FY16.

Other activities are expected to be limited to marsh management, maintenance of access roads, invasive plant control, and monitoring. To maintain relatively static water levels for marsh birds during the nesting season and to mitigate salinity in the marsh, a combination of drainage water from Arnett Ditch and pumped Colorado River water is used. Annual maintenance costs include electrical utility bills associated with pumping, labor to turn on the pumps and adjust water control structures, invasive and non-native vegetation control, water quality sampling, and road grading.

Monitoring: Marsh bird surveys will be conducted in March, April, and May, and MacNeill's sootywing surveys will be conducted in spring and summer.

Pertinent Reports: The *2013 Hart Mine Marsh Conservation Area Annual Report*, which summarizes any construction, planting conducted, site management, the results of monitoring, and any recommendations for future adaptive management, will be posted on the LCR MSCP Web site once integration of the data collected throughout the calendar year is complete.

Work Task E14: Imperial Ponds Conservation Area

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$600,000	$693,768.00	$9,211,702.14	$800,000	$1,500,000	$450,000	$450,000

Contact: Andrea Finnegan, (702) 293-8203, afinnegan@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: Habitat creation

Conservation Measures: CLRA1, BONY2, RASU2, LEBI1, and BLRA1

Location: Reach 5, Imperial NWR, River Mile 59, Arizona

Purpose: To create and manage a mosaic of native land cover types for LCR MSCP covered species

Connections with Other Work Tasks (Past and Future): Vegetation and species monitoring is being conducted under Work Tasks F1–F5 and D9.

Project Description: The IPCA is an integrated mosaic of native land cover types, including disconnected backwaters, cottonwood-willow, and marsh. It is situated within the Intensive Management Area of the Imperial NWR, an area of focused management for sensitive wildlife species, including native fish, marsh birds, neotropical migratory birds, and migratory waterfowl.

Previous Activities:

Ponds: Six ponds have been constructed to provide approximately 80 surface acres of backwater habitat for bonytail and razorback sucker. LCR water was supplied to the ponds by a pump fitted with a wedge-wire screen system. The screen had a slot size of 0.05 mm that was designed to prevent passage of fish eggs and larvae into the ponds. An in situ evaluation of the screen was completed through the Work Task G3. The results indicated that fish eggs and larvae of multiple species were passing through the screen. In response to the results, the pump was shut off in the summer of 2009, and water was supplied to all the ponds using a single groundwater well. A water management study was initiated in May 2011 to evaluate the water quality in Pond 1 (where regular water management was continued) and Ponds 2–6 (without a managed water supply). A trends analysis from the physico-chemical profiles indicated that the temperature was

increasing over time in all six ponds; however, it appeared to be increasing at a slightly higher rate in Pond 1. The pH levels also appeared to increase over time, with differences being observed among ponds. The values of pH commonly exceeded a set standard of 9.0 in Ponds 2–6 in the summers of 2011 and 2012. The pH levels were lowest in Pond 1. DO levels did not appear to be a cause for concern in an absence of water management. Specific conductivity levels showed a gradual increase over time in all ponds.

Riparian: Yellow-billed cuckoo and southwestern willow flycatcher have been sighted adjacent to the conservation area in the cottonwood nursery. Field leveling and irrigation system installation for the area were completed in FY08.

Restoration and planting with native cottonwood and willow is not anticipated until FY17. In the interim, soil salinity in the fields will be reduced through irrigation of a cover crop.

Marsh: A 12-acre marsh unit was created at Field 18 in the southeast corner of the Imperial NWR. This field was cleared in the winter of 2007–08 and was converted into a bulrush-dominated marsh managed for rails.

FY14 Accomplishments:

Maintenance/Restoration/Management: A second well was installed onsite to supply water to the ponds. The new well both increased the volume of water that could be delivered to the ponds as well as provided redundancy in case one well was not operational.

Ponds: A renovation plan was drafted and approved. All six ponds were scheduled for renovation in FY15.

Riparian: Fields were irrigated to reduce salinity in the soils. Phragmites and salt cedar were removed from the riparian fields as necessary. No additional restoration or monitoring was performed on the 34 acres of the future cottonwood-willow field.

Marsh: Field 18 was irrigated to provide shallow, wet habitat during October 2013 and from February through September 2014. Water was not supplied to the field from November 2013 through January 2014 so that maintenance could be performed on the canal system and adjacent fields.

Monitoring:

Ponds: Bonytail and razorback sucker were removed from Pond 1 in preparation for the renovation efforts in FY15. Thirty bonytail were taken to the Lake Mead Fish Hatchery, and another three were put into the display tank at the Imperial NWR Headquarters. Only one of the bonytail captured had a PIT tag, the

remaining bonytail, based on their size, were assumed to be the progeny from one or more recruitment events in Pond 1. Twenty-six razorback sucker were captured; 18 had previously been PIT tagged, and 8 were untagged. All razorback sucker were stocked into the A-10 backwater in Ehrenberg, Arizona, any razorback sucker that did not have a tag received one prior to stocking.

Marsh: Marsh bird surveys were conducted by the USFWS at the ponds and at Field 18. Least bittern was detected in Pond 5 on two separate occasions. This is the first LCR MSCP marsh bird species detected in the ponds since 2009. Yuma clapper rails were detected in March and April, and California black rail were detected in March, April, and May in Field 18.

FY15 Activities:

Maintenance/Restoration/Management: Onsite maintenance, utility payments, and water management for the site will continue. The last major capital improvement, replacement of portions of the concrete-lined canal for the delivery of water into the fields, has been delayed until FY16, and therefore, expenditures are expected to be less than approved.

Ponds: Pond 5 was pumped down and held at an elevation of 180 feet for a 2-week period in preparation for a prescribed burn of the marsh area within the pond. Renovation of all six ponds with rotenone began in December 2014 and continued through January 2015. Post-renovation monitoring is being completed under Work Task C25.

A water management plan will be drafted in FY15. The plan will identify methods to mitigate for pH and conductivity. Suggested strategies may include pumping water out of the ponds or the seasonal addition of surface water from the wells. Monitoring water physico-chemical parameters will be completed through Work Task C25.

Riparian: Repairs will be completed on the canals as needed. The fields will be irrigated to reduce salinity in the soils. Phragmites and salt cedar will also be removed from the riparian fields as necessary. No additional restoration or monitoring is anticipated on the 34 acres of the future cottonwood-willow field.

Marsh: The 12-acre marsh created in Field 18 will continue to be managed for marsh covered species.

Monitoring: Monitoring will continue in FY15, similar to previous efforts for fish and marsh birds. MacNeill's sootywing surveys will be conducted in the spring and summer.

Proposed FY16 Activities:

Maintenance/Restoration/Management: Onsite maintenance, utility payments, and water management for the site will continue. The last major capital improvement, replacement of the concrete-lined canal for the delivery of water into the riparian fields and marsh complex, is scheduled for FY16, although the actual replacement would likely occur in FY17 using funds from FY16.

Ponds: Boat ramps and riprap shorelines will be maintained. An automated watering schedule for all six ponds will be developed and implemented.

Riparian: The fields will be irrigated to reduce soil salinity. A Restoration Development and Monitoring Plan for the 34 acres of cottonwood-willow will be drafted, and trees will be purchased for planting in FY17.

Marsh: The 12-acre marsh created in Field 18 will continue to be managed for marsh covered species.

Monitoring: Monitoring will continue in FY16, similar to previous efforts for fish, marsh birds, and MacNeill's sootywing.

Pertinent Reports: The *2013 Imperial Ponds Conservation Area Annual Report*, which summarizes any planting conducted, site management, the results of monitoring, and any recommendations for future adaptive management, will be posted on the LCR MSCP Web site once integration of the data collected throughout the calendar year is complete.

Work Task E16: Conservation Area Site Selection

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$600,000	$701,608.57	$2,451,472.03	$500,000	$1,300,000	$700,000	$700,000

Contact: Terry Murphy, (702) 293-8140, tmurphy@usbr.gov

Start Date: FY05

Expected Duration: FY25

Long-Term Goal: Habitat creation

Conservation Measures: CLRA1, WIFL1, BONY2, RASU2, WRBA2, WYBA2, CRCR2, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, FLSU1, MNSW2, CLNB2, and PTBB2

Location: Reaches 1–7, Arizona, California, and Nevada

Purpose: To identify, visit, evaluate, prioritize, and recommend potential conservation areas to the Steering Committee for development under the habitat creation requirements of the LCR MSCP

Connections with Other Work Tasks (Past and Future): The process developed under this work task will guide the selection of future conservation area sites to be developed under Conservation Area Development and Management (Section E) work tasks.

Project Description: Reclamation will work with landowners to secure an interest in land and water resources sufficient to create and maintain LCR MSCP habitats. It is anticipated that willing landowners will enter into some form of long-term commitment that secures resources for the 50-year term of the program.

When developing a financial value for subject lands and water, Reclamation must administer a Federal appraisal using the U.S. Department of the Interior's designated Appraisal Services Office. The cost of appraisal services is typically captured in the Work Task E16 budget.

As new sites are evaluated and prioritized, each new site will be presented to the Steering Committee either through the site selection process or, if acquisition is required, through a Land and Water Resolution or Program Decision Document.

This approval allows Reclamation to move forward with the new site and prepare specific Restoration Development and Monitoring Plans that guide implementation of the conservation area.

In FY14, backwater site selection previously tracked under Work Task E15 was combined with this work task, which reflects the change in the process to select backwaters and allows integration of multiple land cover types on a conservation area in which the primary purpose is the creation of a backwater.

Previous Activities: Guidelines have been developed to describe the process of working with interested parties to identify sites for screening and evaluation as potential conservation areas for creating and maintaining habitat over the term of the LCR MSCP. Through FY13, 11 conservation areas have been established.

FY14 Accomplishments: LCR MSCP staff attended and contributed at numerous meetings held with other resource agencies and Tribal entities. Quarterly meetings were conducted with USFWS representatives from all four Federal National Wildlife refuges (Bill Williams River, Cibola, Havasu, and Imperial) on the LCR, two Complex Refuge Managers, and staff from both the Ecological Services Office and the Arizona Fisheries Research Office of the USFWS.

The CDFW and Reclamation have partnered with the California Wildlife Board, Trust for Public Land, and The Conservation Fund to identify lands within the State of California that could be secured and developed as conservation areas under the LCR MSCP. The potential acquisitions range in size from small undeveloped parcels (less than 10 acres) to large parcels over 2,000 acres in size. Securing additional acreage for restoration of marsh and backwaters within California is the highest priority at this time.

California Lands:

PVER-South: Two adjacent landowners have been contacted and have expressed an interest in selling small, undeveloped parcels that would expand the footprint of PVER-South. During the due diligence portion of a potential land acquisition, some discrepancies in the title documentation were discovered. Those discrepancies are being discussed with the landowners and the California State Lands Department. Resolution may take a significant effort over several years and will involve formal land surveying.

In addition, a small fire, approximately 60 acres in size, occurred within the undeveloped portion of PVER-South in December 2013. LCR MSCP staff took advantage of the situation to survey the topography and limit the re-sprout of non-native vegetation in advance of the restoration of the entire conservation area using funds from Work Task E18.

PVID Lands: Negotiations to acquire a large tract of agricultural lands in the southern portion of the PVID was initiated; however, an agreement could not be reached, and negotiations have ended.

Mohave Valley Lands: Approximately 1,600 acres of land, located just south of the Avi Casino in California, were identified for potential acquisition. During negotiations with the landowner, the property was sold to a developer in Needles, California.

Reach 3 Backwaters:

MVCA: Development and construction of the MVCA, 56 acres of open water and emergent marsh, along with planting approximately 34 acres of cottonwood-willow and mesquite habitats, is expected to result in approximately 90 acres of native land cover types. A survey of the parcel was conducted to establish new control points and develop elevation contours. Additionally, a temporary gauging station was installed to monitor river stage. For the MVCA, a preliminary design drawing was completed. The NEPA/CEQA permitting process and the U.S. Army Corps of Engineers 404 application has started. These data, in conjunction with the site elevation data, will be used to determine the volume of material that will need to be excavated. Starting in FY15, the project is progressing under a new work task, Work Task E35.

Needles Lagoon: Four adjacent parcels of land, totaling 53 acres and located along the Colorado River at River Mile 247, were investigated as the location for a potential 20-acre backwater project in Needles, California. The site, commonly referred to as Needles Lagoon, is a remnant of the old river channel that became isolated once the river was channelized in 1960. Three of the four parcels are owned by the California State Lands Commission and leased to the city of Needles, and the fourth is federally owned. Needles Lagoon is adjacent to the Fort Mojave Indian Reservation, creating a partnership among the Fort Mojave Indian Tribe, the city of Needles, and the LCR MSCP.

A feasibility report for the backwater was developed and presented to both the city of Needles and the Fort Mohave Indian Tribe. The report reviewed the location and site characteristics, proposed a design and layout for the backwater based on species-specific Conservation Measure FLSU2 for the flannelmouth sucker, discussed the design for both the inlet and outlet structures, assessed potential sediment and flood runoff dynamics, and provided a cost estimate for construction and maintenance of the backwater. Although the lagoon does have the potential to be restored, the high cost and technical issues associated with the site do not make it viable at this time. However, should conditions change or the priorities of the program be altered, the project may be revised and re-evaluated for implementation at a later date. Should the project move forward based on the current design concept, approximately 20 acres of connected backwater habitat would be created in California for the flannelmouth sucker.

Other Lands:

Virgin River: The Virgin River lands owned by the NDOW on the Overton WMA have been identified for potential restoration. For safety reasons, the data loggers installed in FY13 are no longer monitored. Data collection may resume at a later date.

FY15 Activities: Coordination with resource agencies and attendance at planning meetings is expected to be expanded slightly with the inclusion of Work Task E15 (closed). A workshop with representatives of the California parties was held to evaluate the status of establishing new conservation areas within the State of California.

PVER-South: Negotiations and due diligences for the adjacent undeveloped lands is continuing. We anticipate resolution of landownership, and surveying of property boundaries and the initiation of the appraisal process will begin. Pending a successful negotiation, a land and water resolution would be brought to the Steering Committee for approval.

Parker Dam Camp: Investigatory borings and wells were drilled earlier at Parker Dam Camp. The results of the investigation revealed high saline groundwater and limited well production; therefore, Parker Dam Camp was not suitable for the development of native fish ponds using the well water. However, potential for establishment of habitat on the site still exists. In FY15, other techniques to collect and distribute the return flow (water) from Gene Reservoir to create backwaters and establish riparian habitat at the camp will be evaluated.

Proposed FY16 Activities: Coordination with resource agencies and attendance at planning meetings is expected to be similar to that in FY15. The following potential conservation areas, primarily in California, are to be evaluated and the findings brought back to the Steering Committee.

Parker Dam Camp: A Restoration Development and Monitoring Plan is expected to be drafted and submitted to the Steering Committee. The plan would identify the technique to capture drainage from Gene Reservoir as well as the restoration concept that is expected to include 20 acres of backwater and a small riparian component.

3 Fingers Lake: This lake was identified during a workshop with representatives of the California Parties workshop in FY 15 and has the potential to provide both backwater and marsh land cover types for the program. The lake is located on the Cibola NWR within the State of California on lands owned by the USFWS. A Restoration Development and Monitoring Plan is expected to be drafted and submitted to the Steering Committee. Expenditures would include topographic surveying, design, creating a water budget, and drafting of the development plan.

Davis Lake: This lake was also identified during a workshop with representatives of the California parties in FY15. The concept being evaluated includes creation of a shallow marsh similar in size to Hart Mine Marsh. The remnant lake is located on the Cibola NWR within the State of California on lands owned by the USFWS. A Restoration Development and Monitoring Plan may be drafted and submitted to the Steering Committee. Expenditures would include topographic surveying, design, creating a water budget, and drafting of the development plan if necessary.

Pertinent Reports: N/A

Work Task E17: Topock Marsh Pumping

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$1,000	$29,544.13*	$1,134,907.04	$1,000	$1,000	$1,000	$1,000

* Actual obligations for FY14 are funds that were deobligated from the 2012 Interagency Agreement at the request of the USFWS to fund the Value Engineering Study administered by Reclamation's Technical Service Center.

Contact: Jeremy Brooks, (702) 293-8257, jjbrooks@usbr.gov

Start Date: FY06

Expected Duration: FY25

Long-Term Goal: Avoid impacts from flow-related covered activities on covered species habitats at Topock Marsh

Conservation Measures: AMM2

Location: Reach 3, Havasu NWR, River Miles 235–244, Arizona

Purpose: To avoid flow-related covered impacts on covered species habitats at Topock Marsh by constructing a reliable and manageable water control structure that ensures water delivery off the main stem of the Colorado River by gravitational diversion or pumping

Connections with Other Work Tasks (Past and Future): N/A

Project Description: Topock Marsh has been identified as habitat for the Yuma clapper rail and the southwestern willow flycatcher. At times, flow-related activities could lower river elevations to levels that will disrupt existing gravitational diversions of water from the river to the marsh. Construction of a new control structure that diverts water gravitationally or through pumping will ensure water can be delivered to the marsh even when river elevations are low.

Previous Activities: In early 2010, $1 million was committed under the LCR MSCP toward the construction of Firebreak Canal, which improved the delivery of water to Topock Marsh by greatly reducing transmission losses that occurred when using the old, unlined inlet canal. In return for the monetary contribution, the USFWS rendered correspondence stating that the construction obligations under Avoidance Measure AMM2 have been met under the LCR MSCP.

At the LCR MSCP Steering Committee meeting on April 28, 2010, the decision was made to provide the USFWS with all the operation and maintenance funds, also required under Avoidance Measure AMM2, in a lump sum of $2.55 million during FY12. It was agreed that, upon the USFWS's receipt of the funds, a second letter would be rendered, affirming that all operation and maintenance commitments under Avoidance Measure AMM2 have been fulfilled under the LCR MSCP. The lump sum funding under the avoidance measure was made available from under the LCR MSCP to the USFWS via an Interagency Agreement in March 2012. The final USFWS letter, stating that no further action under the LCR MSCP relating to any further commitments regarding Avoidance Measure AMM2, was presented to the Steering Committee during the October 2012 meeting.

FY14 Accomplishments: Monitoring of the Interagency Agreement with the USFWS continued. Construction on the pump station has not begun. A design review was initiated by the USFWS and completed in April 2013. Based on the results of the review, the USFWS scheduled a Value Engineering Study with Reclamation's Technical Services Center in July 2014 to evaluate a number of design options. Funds expended in FY14 include this study and are a portion of the $2.55 million committed to the USFWS under Avoidance Measure AMM2.

The USFWS continues to take the steps necessary to ensure a viable water management system will be constructed. At the conclusion of FY14, approximately $2,500,000 remained in the Interagency Agreement.

The Final Value Engineering Study Report was completed in November 2014. The USFWS continues to take the steps necessary to ensure a viable water management system will be constructed.

Proposed FY15 Activities: Although Avoidance Measure AMM2 is complete, the work task remains open until all funds have been expended. No further action, beyond monitoring the Interagency Agreement with the USFWS, is required under the LCR MSCP. The Final Value Engineering Study Report, for delivery of water into the marsh, was completed in November 2014.

Topock Marsh is one of four major population centers for rail species covered under the program. The highest priority under Work Task H1 is the maintenance of marshes that support these key rail population centers. Discussions are underway with the USFWS regarding what value would be gained if the remaining funds under Work Task E17 were combined with a portion of the funds from Work Task H1 for the specific goal of operating the marsh for covered rails species. A planning team is anticipated to be established this fiscal year to evaluate the benefit of combining funds.

The use of the Existing Habitat Maintenance Fund in coordination with this work task funding would not affect the commitments under the LCR MSCP.

Avoidance Measure AMM2 has been fulfilled, as concurred by the USFWS, and no further obligations to maintain Topock Marsh are required under the LCR MSCP.

FY16 Activities: The progress and expenditures of the USFWS, agreed to in the Interagency Agreement, will be tracked.

Pertinent Reports: N/A

Work Task E18: Law Enforcement and Fire Suppression

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$250,000	$268,053.92	$1,438,886.27	$200,000	$250,000	$250,000	$250,000

Contact: Jeremy Brooks, (702) 293-8257, jjbrooks@usbr.gov

Start Date: FY06

Expected Duration: FY55

Long-Term Goal: Create habitat protection

Conservation Measures: CMM1

Location: Reaches 1–7

Purpose: To provide law enforcement and fire suppression in support of habitat created under the LCR MSCP

Connections with Other Work Tasks (Past and Future): Law enforcement and fire suppression are anticipated to be integral management components for all habitats created through Conservation Area Development and Management (Section E) work tasks.

Project Description: Under this work task, law enforcement and fire protection for created habitat will be funded. It is assumed that the BLM, USFWS, AGFD, CDFW, NDOW, Bureau of Indian Affairs, CAL-Fire, and other agencies will conduct law enforcement and firefighting activities on the river. Law enforcement and fire suppression strategies have been developed at the programmatic level for each individual conservation area. As new conservation areas are incorporated into the program, site-specific fire and law plans will be drafted.

Conservation area specific access plans that address public access, agency access, and authorized contractors are drafted at the conclusion of development and incorporated in conservation area management plans for each conservation area and incorporated into their respective fire plans (both BLM's State Fire Plan and site-specific conservation area fire suppression and law enforcement plans). The access plans will designate routes and parking facilities to minimize the impact of activities on the conservation areas and reduce fire risks.

Previous Activities: The BLM Colorado River District Office based in Lake Havasu, Arizona, provided fire management support services. The BLM has been responsible for handling fire-related activities and has been the lead wildland fire agency for conservation areas on both State and Reclamation lands. Conservation areas located on Federal refuges are managed for wildland fire and law enforcement by the USFWS.

The BLM also conducts patrols on the site, outreach to landowners, risk assessments, site mapping, and identification of critical infrastructure. Inspections are intended to proactively identify and address potential wildland fire management issues, and recommendations are discussed with the landowner and the LCR MSCP Project Manager. These recommendations help identify high risk areas, areas in need of fuel reduction, damage to infrastructure, and management of visitor use areas.

FY14 Accomplishments: Working with local fire and law agencies proactively in support of the conservation areas continued in FY14. Map creation, site visits, coordination meetings, and attendance at agency staff meetings were accomplished in FY14.

The scope of the agreement with the BLM for fire suppression support was expanded to include law enforcement. Regular patrols have been conducted on the conservation areas. The majority of funding from this work task has been used for proactive patrols on conservation areas in conjunction with preparation and implementation of access plans.

Fire Management Plan: The BLM formally adopted the new Laguna Division Fire Plan and the revised fire plan for Hunters Hole. As new conservation areas are developed, the BLM may be asked to be the lead law and fire agency, or LCR MSCP staff will work with the appropriate State, city, or Tribal agencies, leveraging the existing mutual aid agreements in place.

Yuma East Wetlands: Clearing of phragmites on the north side of the Colorado River on Quechan Tribal land (started in FY13) was completed. The 300-linear-foot area was targeted to reduce fuel loading and was replanted with native vegetation.

PVER-South: A small fire (50–60 acres) occurred on December 30, 2013, at the area typically referred to as PVER-South (an extension of the PVER) just north of the town of Blythe, California. The area burned was confined to an undeveloped portion of the low meander on the southern portion of the property.

As PVER-South is scheduled for restoration in the future, LCR MSCP staff took advantage of the situation to gather topographic information and have electively controlled the re-sprout of non-native vegetation using a youth conservation crew to remove vegetation.

FY15 Activities: Work with local fire and law agencies will proactively continue in support of the conservation areas in FY15. The majority of funding will be for proactive patrols from both law and fire personnel from the BLM. Map creation, site visits, coordination meetings, attendance at agency staff meetings, etc., is envisioned.

Access plans, which address public access, agency access, and access by authorized contractors, will be developed for each conservation area. The access plans will designate routes and parking facilities to minimize the impact to activities on the conservation area and reduce fire risks. An access plan for the LDCA is being drafted and will serve as a template for other conservation areas; however, it is not expected to be finalized until input from partner agencies has been incorporated. Access plans are typically kept in draft form and become a portion of each conservation area management plan. Access plans will be developed for the PVER and CVCA and will be incorporated into their respective law enforcement and fire suppression plans using the LDCA template.

Fire Suppression and Law Enforcement Plans: Site-specific conservation area fire suppression and law enforcement plans, initiated in FY14, are being drafted for Yuma East Wetlands, Hunters Hole, and the LDCA, and are expected to be completed.

Proposed FY16 Activities: BLM law and fire personnel will continue with proactive patrols similar to FY15. A site-specific fire suppression and law enforcement plan for the LDCA will be drafted.

Pertinent Reports: N/A

Work Task E21: Planet Ranch, Bill Williams River

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$40,000	$45,033.35	$270,136.18	$40,000	$10,340,000*	$540,000	$540,000

* Includes $8,300,000 acquisition pending approval from the Steering Committee.

Contact: Jessie Stegmeier, (702) 293-8121, jstegmeier@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: Habitat creation and management

Conservation Measures: CLRA1, WIFL1, WIFL2, WRBA2, WYBA3, CRCR2, LEB1, YBCU1, YBCU2, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, and MNSW2

Location: Reach 3, Bill Williams River, 11 miles east of River Mile 190, Arizona

Purpose: To create and manage a mosaic of native land cover types for LCR MSCP covered species

Connections with Other Work Tasks (Past and Future): This work task was previously included in the draft FY05 work tasks as Work Task E4. Costs associated with a Federal land and water appraisal conducted in FY08 were captured under Work Task E16. Work Task E21 was closed at the end of FY05 but was reopened in FY09 to track expenditures during negotiations.

Project Description: Planet Ranch encompasses approximately 8,400 acres, of which approximately 2,400 acres had previously been farmed for alfalfa. In 2008, the LCR MSCP Steering Committee approved a land and water resolution, which authorized Reclamation to enter into negotiations to secure approximately 3,418 acres of land and 5,549 acre-feet of water per year. The sum of $8,300,000 to secure this land and water was determined through the Federal appraisal process. Negotiations are also underway to allow the BLM to secure the remaining acreage, which has no water entitlement from the Bill Williams River. Once finalized, the terms and conditions to secure the land and water resources will be brought back to the Steering Committee.

An estimated 550 acres of cottonwood-willow trees are anticipated to be developed on Planet Ranch; another 396 acres of cottonwood-willow trees

downstream on the Bill Williams River NWR will also be afforded protection by securing the Planet Ranch property. Additionally, there may be an opportunity to incorporate disconnected backwaters into the restoration plan.

Previous Activities: Planet Ranch was evaluated and a conceptual design was developed, assuming the ranch and water entitlement were secured for the program. This information is posted on the LCR MSCP Web site as *Planet Ranch: Potential Restoration Site, Preliminary Site Analysis and Conceptual Design*.

Regulatory compliance activities required under NEPA, ESA, and the National Historic Preservation Act are complete but may be updated at the time of property purchase. Native American consultation and a Class I Cultural Survey as prescribed in Section 106 of the National Historic Preservation Act were completed in FY11.

FY14 Accomplishments: Negotiations to secure the land and water resources for the project continued; specifically, the final details of the lease, donation, and water agreements. NEPA compliance was initiated.

The Arizona Game and Fish Commission approved the acquisition of Planet Ranch in August 2014. Legislation directing the Secretary of the Interior to enter in an agreement for the acquisition of Planet Ranch was signed in December 2014.

Reclamation continued to be a member of the Bill Williams River Corridor Steering Committee.

FY15 Activities: The land and water resolution for the acquisition of Planet Ranch was approved by the LCR MSCP Steering Committee on April 22, 2015. A schedule to complete the acquisition and transition ownership to the AGFD Commission will be drafted.

Reclamation continues to be an active member of the Bill Williams River Corridor Steering Committee.

Proposed FY16 Activities: The proposed budget assumes both approval of the acquisition of Planet Ranch by the LCR MSCP Steering Committee and successful closing of escrow. The budget includes funds for both acquisition ($8,300,000) and coordination for the transfer of ownership, ranch operations, and capital expenditures for items such as motor graders, water trucks, dump trucks, and backhoes.

Reclamation participation in the Bill Williams River Corridor Steering Committee continues.

Pertinent Reports: N/A

Work Task E24: Cibola National Wildlife Refuge Unit #1

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$500,000	$209,836.42	$4,191,076.31	$1,000,000	$700,000	$750,000	$750,000

Contact: Jimmy Knowles, (702) 293-8172, jknowles@usbr.gov

Start Date: FY07

Expected Duration: FY55

Long-Term Goal: Habitat creation and management

Conservation Measures: WIFL1, WRBA2, WYBA3, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, and CRCR2

Location: Reach 4, Cibola NWR, one-half mile east of River Mile 97, Arizona

Purpose: To create and manage a mosaic of native land cover types for LCR MSCP covered species

Connections with Other Work Tasks (Past and Future): This work task incorporated lands under Work Tasks E6–E8 (closed), with additional adjacent acreage at Cibola NWR Unit #1. Operation and maintenance of these work tasks will now be tracked under Work Task E24.

Project Description: Reclamation currently has a number of established projects at Cibola NWR Unit #1, which includes restoration research and demonstration projects that began as a precursor to the LCR MSCP. A 50-year Land Use Agreement with the USFWS to restore new areas and maintain created land covers on Cibola NWR Unit #1 has been signed.

Work Task E24 incorporates the existing projects and active agricultural land as well as substantial additional, undeveloped, adjacent acreage into a single conservation area. The land included in Cibola NWR Unit #1 (E24) encompasses approximately 950 acres and ranges in cover and use from agricultural fields, to partially improved land, to undeveloped land. The acreage in Unit #1 is targeted primarily for cottonwood-willow land cover type but will also likely include a mosaic of native habitats, including wetland and riparian-upland interface areas.

The acreage in Cibola NWR Unit #1 has been categorized into five areas:

- Area #1 (193 acres) includes active agricultural fields, existing (converted agriculture) cottonwood-willow cover type, and ongoing LCR MSCP research and demonstration projects.

- Area #2 (Hippy Fire) includes 338 acres that have been cleared as a result of the Hippy Fire. The area is planted in a cover crop until it is conditioned to improve soil salinity.

- Areas #3 (Baseline 90) and #4 (North 160) are 107 and 158 acres of undeveloped land and fallowed agricultural land, respectively. The areas will require clearing, leveling, installation of irrigation infrastructure, and soil conditioning before development for native riparian species.

- Area #5 (Crane Roost) includes 154 acres that have been planted with cottonwood, willow, and mesquite species.

Previous Activities: A Land Use Agreement and exhibit specific to this conservation area have been signed. Several research and development projects are underway or completed and are currently being managed as land cover types for various LCR MSCP covered species. Through FY13, 343 acres of native trees have been established within the 950-acre site.

FY14 Accomplishments:

Maintenance/Restoration/Management: Ongoing infrastructure improvements and repair occurred during this fiscal year. Site maintenance, including irrigation, invasive and non-native weeding, and other associated farm services, was conducted.

The operating cost of managing Cibola NWR Unit #1 was less than anticipated, and subsequent budgets have been reduced even though additional plantings are scheduled starting in FY16. The pump platform and pumps have exceeded their normal operational lifespan and will need to be replaced. No significant repairs were necessary in FY14; therefore, expenditures were significantly less than anticipated.

Monitoring: Vegetation monitoring continued in FY14. Plots were surveyed at the following sites: Nature Trail, Crane Roost, and Hippy Burn.

Small mammal trapping was conducted at the Cibola Nature Trail, Cottonwood Genetics fields, and north Hippy Burn areas. Cotton rats were documented at Cibola Nature Trail and the Cottonwood Genetics fields. The long-term acoustic bat station operated most of the year. Western red bats, western yellow bats,

California leaf-nosed bats, and Townsend's big-eared bats were detected during acoustic surveys. One California leaf-nosed bat and three western yellow bats were captured during mist net surveys.

General avian species were surveyed to determine their breeding status at the Cibola Nature Trail, Crane Roost, and the LCR MSCP research and demonstration fields using area search and spot mapping techniques. Four pairs of Arizona Bell's vireo were detected at the Nature Trail, and one pair of Sonoran yellow warblers was detected at Crane Roost.

Bird banding, following the MAPS protocol, was again conducted at the Cibola Nature Trail. Ten surveys were conducted between May and August, and 242 birds of 33 species were captured.

No breeding southwestern willow flycatchers were detected at the Cibola Nature Trail, and all birds were detected before June 16, when birds are considered to be residents.

Yellow-billed cuckoos were detected at the Cibola Nature Trail, Crane Roost, Cottonwood Genetics and cottonwood north fields, with most detections located at Crane Roost. Breeding was confirmed at the Nature Trail and Crane Roost.

FY15 Activities: No additional restoration or tree planting is scheduled for FY15. Site maintenance will continue, including regular watering and field maintenance of all the established fields within the conservation area's portion of Cibola NWR Unit #1. Water for irrigation of the trees and to simulate historical river flooding will be provided by the Cibola NWR.

A local farmer is utilized to divert and irrigate established land cover types based on site conditions and species planted. The farmer provides local knowledge of weather and farming practices, which are applied to the maintenance of the conservation area. The farmer and his employees are an onsite presence and provide early recognition of issues or concerns. The farmer is also responsible for assessing the water needs of the trees, and in coordination with the USFWS and LCR MSCP staff, delivers the water.

Maintenance activities will include grading access roads; maintaining field borders, irrigation canals, and invasive plant control, including hand removal and application of herbicides; and physically opening and closing the irrigation gates of established land cover types. The annual costs associated with operating the irrigation pumps are shared with the USFWS and are included in the annual maintenance costs.

Plants will be ordered in April 2015, in accordance with the Restoration Development and Monitoring Plan, for the planting that will take place in the spring of 2016. Approximately 85 acres will be planted with a mix of

cottonwood, willow, and other riparian shrub and grass species. The local contract farmer will continue to prepare this acreage for planting during 2016, and the activities will include planting and/or maintenance of a cover crop to assist with keeping salinity levels low and controlling invasive vegetation. Some preliminary field preparation activities for this area may take place during FY15.

Monitoring: Vegetation monitoring will continue. Small mammal monitoring will be conducted in the fall and spring. Bat capture surveys will be conducted from May to September. An established long-term bat monitoring station will be used to collect acoustic data. General bird surveys will be conducted from mid-April to mid-June. Single species surveys for the southwestern willow flycatcher and yellow-billed cuckoo will be conducted during their respective breeding seasons. MacNeill's sootywing surveys will be conducted in spring and summer.

Proposed FY16 Activities:

Maintenance/Restoration/Management: As mentioned above, 85 acres of the Hippy Burn area are scheduled for field preparation and riparian planting in FY16. Land preparation will take place in the first months of 2016, with planting scheduled for March/April 2016. This area is located in the southern portion of Area #2 (Hippy Fire). The western portion of this area has historically had issues with elevated salinity, so it is estimated that approximately 18 acres will be planted with saltgrass and alkali sacaton. The remaining acreage will be planted with a mix of cottonwood and willow with small strips of baccharis throughout.

A Restoration Development and Monitoring Plan for a portion of the Hippy Burn area will be drafted for planting in FY17.

Site maintenance will continue, including regular watering and field maintenance of all the established fields within the conservation area's portion of Cibola NWR Unit #1. These tasks will continue as described above in "FY15 Activities."

Monitoring: Vegetation monitoring will continue. Small mammal monitoring will be conducted in the fall and spring. Bat capture surveys will be conducted from May to September. An established long-term bat monitoring station will be used to collect acoustic data. General bird surveys will be conducted from mid-April to mid-June. Single species surveys for the southwestern willow flycatcher and yellow-billed cuckoo will be conducted during their respective breeding seasons. MacNeill's sootywing surveys will be conducted in the spring and summer.

Pertinent Reports: The *2013 Cibola NWR Unit #1 Conservation Area Annual Report*, which summarizes any planting conducted, site management, the results of monitoring, and any recommendations for future adaptive management, will be posted on the LCR MSCP Web site once integration of the data collected throughout the calendar year is complete.

Work Task E25: Big Bend Conservation Area

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$30,000	$30,349.86	$1,164,390.11	$30,000	$30,000	$30,000	$30,000

Contact: Laken Anderson, (702) 293-8153, landerson@usbr.gov

Start Date: FY09

Expected Duration: FY55

Long-Term Goal: Habitat protection

Conservation Measures: BONY2, RASU2, and FLSU1

Location: Reach 3, Nevada, River Mile 266.5

Purpose: To protect an existing backwater from development, which will result in a 15-acre backwater credit

Connections with Other Work Tasks (Past and Future): Marsh bird surveys are conducted under Work Task D1, while fish surveys have been conducted under multiple work tasks in Species Research (Section C) and Work Task F5.

Project Description: The Boy Scout Camp purchased by the SNWA, combined with the adjacent backwater managed by the State of Nevada, has collectively been identified as the BBCA. The conservation area includes approximately 15 acres of backwater within the Nevada portion of the Colorado River that will be protected and approximately 15 acres of upland area adjacent to the backwater. The dry upland area is planned to be enhanced for education and outreach purposes by the SNWA at minimal cost to the program and is being completed in concert with protection of the backwater. The properties are adjacent to and buffered by Big Bend State Park.

Past native fish monitoring efforts have indicated the presence of native fishes in and adjacent to the existing backwater. Successfully securing the site will result in 15 acres of backwater habitat credit that benefits flannelmouth sucker, razorback sucker, and bonytail in Reach 3 of the LCR MSCP planning area. Reach 3 maintains the only self-sustaining population of flannelmouth sucker and has very few undeveloped backwaters, which make protection of the existing backwater a LCR MSCP priority. The Colorado River and Reach 3, in particular, are experiencing extensive urban development. The BBCA, formerly known as

the Boy Scout Camp, maintains access to the river via the adjacent backwater and would make the area a likely candidate for development. Securing the property for the LCR MSCP ensures the commitment of adjacent landowners and controls future development in the surrounding areas. Long-term security of the property provides protection to the backwater and allows for future restoration activities as warranted.

Previous Activities: The Land Use Agreement documents the roles and responsibilities of each party pertaining to continual management of the BBCA. In FY09, the SNWA assumed the responsibility of restoring the upland portion of the conservation area at minimal cost to the LCR MSCP. LCR MSCP staff reviewed and concurred with the site improvement plans to ensure compatibility with the program. Salt cedar was removed from the upland site, and roughly 800 mesquite trees were planted. LCR MSCP staff provided mesquite trees, developed the existing groundwater well, and procured a portion of the irrigation system in support of the SNWA's upland restoration action. In FY10, the NDOW received approval from the Nevada Wildlife Commission to install two buoys, which have been placed at the entrance of the backwater.

Prior to FY13, all fisheries activities were restricted to February through May as part of ongoing flannelmouth sucker activities associated with Work Task C15 (closed). Two razorback sucker and one flannelmouth sucker were contacted in FY12. Marsh bird and small mammal surveys were conducted annually.

FY14 Accomplishments:

Maintenance/Restoration/Management. Selective clearing of non-native vegetation to reduce the risk of fire was conducted using youth conservation crews funded with non-cost share dollars. Once cleared, non-native material was chipped and spread onto the trail system. Mulch allowed for dust control and road stabilization for work trucks entering the site. The SNWA's effort to establish native plants on the upland property and ensure compatibility with the goals of backwater protection will continue to be supported under the LCR MSCP. Erosional damage to the parking lot from a summer rainstorm was repaired, and access to the backwater was maintained.

The BBCA upland section also experienced flood damage in September 2014. The main wash leading into the site flooded and washed debris over Needles Highway and into the site, damaging the fencing and filling the culverts with sediment. The State of Nevada Department of Transportation/Clark County cleared the highway of sediment and debris but left the culverts full of sediment. Clark County is responsible for clearing the culverts, but road and fencing repairs are the responsibility of the SNWA. No repairs were conducted in FY14 because flood occurred near the end of the fiscal year.

Monitoring: Fish monitoring occurred 2 nights per month in December and February – May. A variety of techniques were used during the surveys in an attempt to contact multiple species and life stages. Eleven razorback sucker and one flannelmouth sucker were contacted via netting and remote PIT scanning. Electrofishing continued to be ineffective and will be discontinued in future years. Larval sampling resulted in the capture of several razorback sucker in February and March; these were the first larval razorback sucker contacted within this conservation area. Larval flannelmouth sucker were contacted at rates similar to past years. Under a sonic telemetry study (conducted under Work Task C53), continuous use of this backwater by one flannelmouth sucker was recorded; this fish was contacted repeatedly for 10 days. Water quality monitoring continued to indicate that this was not a cause for concern, as this was to be expected with such a substantial hydrological connection to the river.

Marsh bird surveys were conducted during March and April. No LCR MSCP species were detected.

Small mammal trapping was conducted in the fall and winter. One Colorado River cotton rat was captured in the spring. Fifty-four desert pocket mice were captured in the fall, and five were captured in the spring.

FY15 Activities:

Maintenance/Restoration/Management: Youth conservation crews funded with non-cost share dollars will continue to be used to clear vegetation. The site provides a good venue for youth to conduct habitat maintenance and is consistent with the goals and objectives of the conservation area. LCR MSCP staff will be available for coordination meetings, site visits, meetings with adjacent landowners, and similar meetings when required. Routine maintenance includes blading the roads to ensure access and performing minor repairs as necessary.

Monitoring: Fisheries monitoring will be conducted at a level and interval similar to FY13. Monitoring will include monthly survey trips during the razorback sucker and flannelmouth sucker spawning seasons. Trips will include larval light trapping, remote PIT scanning, and trammel netting. Water quality profiles will be performed during each monitoring event and quarterly outside of the monitoring period. Marsh bird surveys will be conducted during March, April, and May at the four established survey points. Small mammal trapping will be conducted in the fall and spring. MacNeill's sootywing surveys will be conducted in the spring and summer.

Proposed FY16 Activities:

Maintenance/Restoration/Management: Youth conservation crews funded with non-cost share dollars may continue to be used to perform maintenance

activities. The site provides a good venue for youth to conduct habitat maintenance and is consistent with the goals and objectives for the conservation area. The SNWA's effort to establish native plants on the upland property and ensure compatibility with the goals of backwater protection will continue to be supported under the LCR MSCP.

Monitoring: Fisheries monitoring will be conducted at a level and interval similar to previous years. Monitoring trips will include larval light trapping, remote PIT scanning, and trammel netting. Water quality profiles will be performed during each monitoring event and quarterly outside of the monitoring period. Marsh bird surveys will be conducted during March, April, and May at the four established survey points. Small mammal trapping will be conducted in the fall and spring. MacNeill's sootywing surveys will be conducted in the spring and summer.

Pertinent Reports: The *2013 Big Bend Conservation Area Annual Report*, which summarizes any planting conducted, site management, the results of monitoring, and any recommendations for future adaptive management, will be posted on the LCR MSCP Web site once integration of the data collected throughout the calendar year is complete.

Work Task E27: Laguna Division Conservation Area

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$8,600,000	$6,081,471.60	$22,825,960.27	$3,000,000	$900,000	$650,000	$650,000

Contact: Nick Schultz, (702) 293-8089, nschultz@usbr.gov

Start Date: FY10

Expected Duration: FY55

Long-Term Goal: Habitat creation and management

Conservation Measures: WIFL1, YHCR2, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, and SUTA1

Location: Reach 6, Federal lands, River Miles 43–49, California and Arizona

Purpose: To create and manage a mosaic of native land cover types for LCR MSCP covered species

Connections with Other Work Tasks (Past and Future): Vegetation and species monitoring are being addressed under Work Tasks F1-4 and F7.

Project Description: The Laguna Division, River Miles 43–49, was identified as having potential for large-scale riparian and marsh restoration and enhancement. In 2007, the Laguna Division Planning Group was formed to identify potential restoration projects within the division. The intent was to identify potential restoration projects and combine resources to ensure any actions taken in the area would not affect other potential restoration projects or ongoing river operations.

The Laguna Division Planning Group consists of representatives from the following organizations:

- Arizona Game and Fish Department
- Arizona Department of Water Resources
- California Department of Fish and Wildlife
- Pacific Institute
- U.S. Fish and Wildlife Service
- Bureau of Land Management
- Bureau of Reclamation

The LDCA is a relatively wide, undeveloped area with a series of low linear depressions, which are remnants of former river meanders. The intent of this

project is to create marsh and riparian land cover types by shaping and contouring multiple meandering channels. These land cover types will be maintained with a maximum base flow of 100 cfs from the Gila Gravity Canal sluicing gates. Open water areas have been created in the form of linear excavations aligned with historic river meanders east of lands identified as future stockpiling areas for dredged silt removed from the river (Laguna settling basin). To minimize earthwork, cuts and fills follow the existing topography where feasible. Adjacent terraces are graded to allow flooding and promote the establishment of native riparian species. Water control structures have been designed to manage water levels. Upland vegetation will receive water through flooding.

To support the concept described above, inlet modifications to the point of diversion at the Gila Gravity Canal sluicing gates will be made to allow for up to 100-cfs capacity. The diversion pipe system has been engineered to allow for maximum management flexibility, including diverting the entire flow to Mittry Lake Wildlife Area, the LDCA, or the historic river channel. The Water Accounting Agreement will be used to support the LDCA.

In coordination with the Laguna Planning Group, several conceptual designs were created with the intent of determining the technical feasibility of implementing a large-scale restoration project. In addition, a team was established to determine the availability of water to create and support the new habitat. The combination of technical feasibility, water availability, and cost effectiveness was used to determine how the project would be implemented.

A final design was presented and approved as a new start project by the LCR MSCP Steering Committee in October 2009 with the passing of Resolution 10-002. The final environmental assessment was prepared for the LDCA in February 2011. A Finding of No Significant Impact was determined which allowed earthwork to commence.

Previous Activities:

Construction and Management: Procurement and delivery of approximately 4,000 feet of 48-inch high-density polyethylene pipe was completed in early 2011. Fusion and installation of the pipeline began in the summer of 2011 and finished in the summer 2012.

Clearing of Reach 1 began in the fall 2011. Clearing and contouring of Reach 1 (over 500 acres) was completed in 2012. The newly created topography of Reach 1 was verified by utilizing LiDAR, an optical remote sensing technology, flown in late summer, which was used to create contour mapping. This mapping was used to verify the original design drawings. Clearing and contouring of Reach 2 began in the summer of 2012.

Six groundwater monitoring wells have been installed in Reach 1 and will be instrumented with data loggers to collect groundwater elevations and salinity throughout the lifetime of the project. Modeling to forecast groundwater and surface water interactions once diversions began and 100 cfs was delivered to the site have been completed.

Several months of meetings were scheduled with representatives from multiple offices within Reclamation to design and approve construction drawings. A water control structure, which allows the delivery of water into Mittry Lake from Reach 1, was constructed. Construction of two water control structures, located at the southern end of Reach 1, was completed in the spring of 2013. The water intake structure was relocated from the Gila Canal storage basin to one of the Gila sluiceway gates, and construction began in the spring of 2013 and was completed in the summer of 2013.

Test flooding of Reach 1 occurred in the summer of 2013, to verify groundwater elevations in preparation for marsh planting. During test flooding, the site was evaluated for habitat viability, and planting plan changes were made as necessary to ensure the highest rate of survivability.

Planting and Maintenance: Over 800,000 marsh plants were planted on approximately 150 acres in Reach 1 during August and September 2013. Over 1 million cottonwood, willow, and other riparian species were ordered in 2013 for planting of Reach 1 in 2014. Cleared and contoured ground within the project footprint was maintained to prevent regrowth of non-native and invasive species. Herbicide application and hand-pulling methods were used to eradicate invasive vegetation.

Monitoring: The land adjacent to the LDCA has been surveyed for many years by the AGFD for marsh birds, including Yuma clapper rail, California black rail, and least bittern, which are LCR MSCP covered species. All three of these species are present within the adjacent wetland/marsh area during the breeding season. Surveying of marsh birds continued until work began at the site. To allow for the completion of construction and planting, no monitoring activities occurred during FY13.

FY14 Accomplishments:

Construction and Management: Clearing and contouring activities in Reach 2, which began in the summer of 2012 and were completed in April 2014 (over 500 acres). Approximately 50,000 cubic yards of soil were moved per shift in order to contour the site according to the grading plan. In all, approximately 3,400,000 cubic yards of earthen material were excavated and backfilled. A water control structure, located at the southern end of Reach 2, was completed in early 2014.

Upon completion of this final water control structure, the entire LDCA became fully operational and could be controlled remotely or onsite. Remote monitoring and gate operations have been established through a secure online site. A camera was installed at the staff gauge at one water control structure in order to verify water elevations visually.

Cracks that developed in the water control structures due to concrete curing were identified and repaired in January 2014.

Planting and Maintenance: Riparian and mesquite planting of Reach 1 commenced in February and finished in April 2014. Marsh planting of Reach 2 took place in May 2014. Over 1 million trees and plants were planted in the spring of 2014. Cleared and contoured ground, as well as planted areas within the LDCA, were maintained to prevent the regrowth of non-native and invasive species.

Monitoring: No monitoring of species was conducted during FY2014. Once vegetation has been established, monitoring will commence.

FY15 Activities:

Construction and Management: Gates were constructed at the entrances to the LDCA in order to control motorized vehicle access. LDCA Project Managers will work with the BLM and AGFD to control access and provide law enforcement support.

Planting and Maintenance: Final riparian and mesquite plantings in Reach 2 are scheduled for the spring of 2015. Certain areas in Reach 1 that experienced lower survival rates due to excessive salt accumulation and other factors, such as wave action, will be replanted.

Monitoring: Monitoring activities are scheduled to begin in the spring of 2015 once all planting has been completed. Suitable habitat has developed in some areas for marsh birds and will be surveyed beginning in the spring of 2015.

Proposed FY16 Activities:

Management: Access and law enforcement for the LDCA will be regulated by the BLM in accordance with the approved access plan.

Maintenance: Control of invasive and non-native species is expected to continue through 2018. Site maintenance, irrigation, and replanting are expected to continue for the first 3–5 years (FY13–18) of plant establishment.

Monitoring: Monitoring for marsh birds will continue in all suitable habitat. Riparian habitat planted in 2014 and 2015 may be surveyed if it becomes suitable for LCR MSCP species.

Pertinent Reports: N/A

Work Task E28: Yuma East Wetlands

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$450,000	$492,318.96	$1,231,981.21	$600,000	$1,200,000	$700,000	$700,000

Contact: Darrin Miller, (702) 293-8166, dmiller@usbr.gov

Start Date: FY10

Expected Duration: FY55

Long-Term Goal: Habitat creation

Conservation Measures: CLRA1, WIFL1, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, and SUTA1

Location: Reach 6, Arizona, River Mile 31

Purpose: To maintain newly created land cover types that benefit LCR MSCP covered species

Connections with Other Work Tasks (Past and Future): Vegetation and species monitoring are being addressed under Work Tasks F1–F4.

Project Description: In the year 2000, the city of Yuma and the Quechan Tribe collaborated to analyze the potential of restoring the local wetlands along the Colorado River by removing overgrown non-native species. Approximately 373 acres have been restored to create a mosaic of marsh, mesquite, and cottonwood-willow. The project is located in Yuma, Arizona, on city of Yuma, Quechan Tribal, and AGFD Commission lands. In partnership with the Yuma Crossing National Heritage Area (YCNHA), the lead agency establishing the wetlands, funding will be provided under the LCR MSCP for the maintenance of existing habitat and to support adaptive management activities to improve site conditions, which will benefit the LCR MSCP covered species.

Previous Activities: Funding in the amount of $350,000 was provided under the LCR MSCP for maintenance of created habitats in FY10 and FY11. In FY13, the Quechan Tribe, AGFD, city of Yuma, YCNHA, and Reclamation agreed to the terms and conditions in the multi-party Land Use Agreement. The agreement was signed in late FY13 after review by the Steering Committee.

FY14 Accomplishments:

Maintenance/Restoration/Management: Habitat maintenance activities mainly consisted of removal of non-native species, application of herbicide, replanting of native species as required, maintenance and repair of irrigation systems, sign placement, fuel delivery, access road maintenance, vehicle maintenance, safety meetings, and ensuring the site meets Arizona occupational safety and health work standards.

Management activities in FY14 consisted of planning and developing the FY15 Cooperative Agreement, the FY15 Annual Work Plan and Budget, and the FY15 Standard Operations and Maintenance Plan (developed under the LCR MSCP); developing standard operating procedures for the irrigation system; submitting water accounting data to Reclamation's Boulder Canyon Operations Office; and coordinating meetings with stakeholders.

Other management activities in FY14 consisted of implementing the LCR MSCP vegetation and wildlife monitoring protocols for the habitat and ensuring the site was managed for LCR MSCP covered species.

To modify the agreement with the YCNHA to coincide with the fiscal year, an additional $106,438.36 was added to the agreement, which increased expenditures. The funding allowed maintenance to continue until the end of the fiscal year.

Monitoring: Vegetation monitoring was conducted in cottonwood-willow habitat at 15 locations throughout the site. Monitoring was conducted at Yuma East Wetlands for birds, small mammals, and bats. For the first time, all surveys were conducted by LCR MSCP personnel or contractors using the same methods and protocol as used at all other habitat creation sites.

Marsh bird surveys were conducted on three occasions at the wetland portions of the site. Four least bitterns were detected in March and two in April. Five Yuma clapper rails were detected during the first April survey and four during the second April survey.

The entire site was surveyed for riparian birds using the LCR MSCP double sampling protocol. No breeding LCR MSCP species were detected. A total of 222 breeding territories comprised of 26 different species were detected. Yellow warbler were detected at the site but were considered to be migratory.

Southwestern willow flycatcher surveys were conducted, and no resident or breeding individuals were detected.

Yellow-billed cuckoo surveys were conducted from late June to early August on four occasions. There were no detections of yellow-billed cuckoos at the site in 2014.

Small mammal trapping was conducted in the fall and spring; Yuma hispid cotton rats continue to be detected at the site. Four rats were captured in the spring, and 23 were captured in the fall. This is currently the only population of the Yuma hispid cotton rat at a LCR MSCP conservation area.

Monthly bat capture surveys were conducted at Yuma East Wetlands from May to September. Western yellow bats were captured on two separate occasions, and a California leaf-nosed bat was captured on one occasion. In conjunction with the bat capture surveys, the established long-term acoustic bat station was used to continuously collect acoustic bat data. Western red bats, western yellow bats, California leaf-nosed bats, and Townsend's big-eared bats were detected during acoustic surveys.

FY15 Activities:

Maintenance/Restoration/Management: Habitat maintenance is continuing in FY15 in accordance with the signed Land Use Agreement. Maintenance will primarily consist of removal of non-native species, application of herbicide, replanting of native species as required, maintenance and repair of irrigation systems, sign placement, fuel delivery, access road maintenance, vehicle maintenance, safety meetings, and ensuring the site meets Arizona occupational safety and health work standards.

Management activities in FY15 will consist of implementing the FY15 Cooperative Agreement, the FY15 Annual Work Plan and Budget, and the FY15 Standard Operations and Maintenance Plan (developed under the LCR MSCP) as well as the planning and development of the FY16 Cooperative Agreement, the FY16 Annual Work Plan and Budget, and the FY16 Standard Operations and Maintenance Plan. Other activities will include conducting an operations and maintenance review in order to improve the efficiency of the site, developing standard operating procedures for the irrigation system, updating a 2015 Safety Plan, submitting water accounting data to Reclamation's Boulder Canyon Operations Office, and coordinating meetings with stakeholders. Finalization of the conservation area's law enforcement and fire suppression plan is anticipated.

Damage to the north channel pump, attributed to sedimentation in the river, has occurred over the last couple of years and will need to be addressed in FY15. A review of the existing infrastructure, including pumps and canals, will be undertaken, and a budget for replacement, as necessary, will be prepared. Replacement of the north channel pump and redesign of the intake structure are anticipated and are reflected in the increased budget for FY15.

Monitoring: Vegetation monitoring continues to be conducted. Small mammal monitoring will be conducted in the fall and spring. Bat capture surveys will be conducted from May to September. An established long-term bat monitoring station will be used to collect acoustic data. General bird surveys will be conducted from mid-April to mid-June. Single species surveys for the southwestern willow flycatcher and yellow-billed cuckoo will be conducted during their respective breeding seasons. Marsh bird surveys will be conducted in March and April. MacNeill's sootywing surveys will be conducted in spring and summer.

Proposed FY16 Activities: Habitat maintenance will continue in FY16 in accordance with the signed Land Use Agreement. Maintenance will primarily consist of removal of non-native species, application of herbicide, replanting of native species as required, maintenance and repair of irrigation systems, sign placement, fuel delivery, access road maintenance, vehicle maintenance, safety meetings, and ensuring the site meets Arizona occupational safety and health work standards.

Management activities in FY16 will consist of implementing the FY16 Cooperative Agreement, the FY16 Annual Work Plan and Budget, and the FY16 Standard Operations and Maintenance Plan (developed under the LCR MSCP) as well as the planning and development of the FY17 Cooperative Agreement, the FY17 Annual Work Plan and Budget, and the FY17 Standard Operations and Maintenance Plan. Other activities will include conducting an operations and maintenance review in order to improve the efficiency of the site, developing standard operating procedures for the irrigation system, submitting water accounting data to Reclamation's Boulder Canyon Operations Office, and coordinating meetings with stakeholders.

Replacement of the north channel pump and redesign of the intake structure are anticipated to be continued from FY15 and are reflected in the increased budget for FY16. A review of all operations and maintenance activities will be conducted to ensure the sustainability of the habitat and evaluate options to secure a consistent source of water for the south channel.

Monitoring: Vegetation monitoring will continue. Small mammal monitoring will be conducted in the fall and spring. Bat capture surveys will be conducted from May to September. An established long-term bat monitoring station will be used to collect acoustic data. General bird surveys will be conducted from mid-April to mid-June. Single species surveys for the southwestern willow flycatcher and yellow-billed cuckoo will be conducted during their respective breeding seasons. Marsh bird surveys will be conducted in March and April. MacNeill's sootywing surveys will be conducted in the spring and summer.

Pertinent Reports: N/A

Work Task E31: Hunters Hole

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$75,000	$86,326.00	$344,044.72	$80,000	$65,000	$60,000	$60,000

Contact: Darrin Miller, (702) 293-8166, dmiller@usbr.gov

Start Date: FY11

Expected Duration: FY55

Long-Term Goal: Habitat creation and maintenance

Conservation Measures: WIFL1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, and YHCR2

Location: Reach 7, Arizona, River Mile 2.5

Purpose: To create and maintain land cover types and support site improvements that benefit LCR MSCP covered species

Connections with Other Work Tasks (Past and Future): Vegetation and species monitoring are being addressed under Work Tasks F1–F7.

Project Description: In 2010, in cooperation with the YCNHA, a restoration plan for Hunters Hole, located within the State of Arizona and within Reach 7 of the LCR MSCP planning area was developed. The focus of the restoration has changed due to dropping groundwater levels. The open water was eliminated and replaced with wet, dense, cottonwood-willow and honey mesquite and is anticipated to achieve 36 acres of cottonwood-willow land cover type, reducing future pumping costs, using less water, and maximizing the credit for the LCR MSCP.

The YCNHA secured funding from the Arizona Water Protection Fund to design, permit, and clear and has completed establishment of native plants at Hunters Hole. At the October 27, 2010, LCR MSCP Steering Committee meeting, Resolution 11-001 was approved, and LCR MSCP staff are now responsible for the operation and maintenance of created land cover types at Hunters Hole.

Previous Activities: Earthwork and irrigation infrastructure was fully installed in February 2012. The site was planted using a variety of native species planting techniques during March and was planted similar to the original design that

incorporated marsh and riparian land cover types. Bulrush and willows were planted in the marsh cells, and willows, mesquite, cottonwoods, and native grasses were planted in the flood-managed fields.

FY14 Accomplishments:

Maintenance/Restoration/Management: A plan to remotely irrigate the site was developed and implemented in FY14. To complement the new groundwater pump, which can now be remotely operated, additional upgrades were made in FY14 to automate the irrigation system valves. These upgrades were intended to reduce labor costs and increase safety of onsite personnel; however, they resulted in the increased expenditures in FY14. A standard operating procedure for the irrigation system was refined to reduce water use and allow for remote operation. Due to the travel time associated with reaching the site, Hunters Hole will utilize this automated irrigation system, expected to be operational in FY15.

Maintenance activities can be separated into two categories: infrastructure maintenance and habitat maintenance. Infrastructure maintenance includes road grading, groundwater pump preventative maintenance, and related activities. Habitat maintenance includes weeding of invasive species, maintaining the irrigation outfall structures, coordinating activities with the United States Border Patrol, application of herbicide when required, and maintaining the site as a safe working environment.

The roads, in addition to being used for LCR MSCP purposes, are also used by the United States Border Patrol for patrolling the surrounding area.

Monitoring: Monitoring was changed in 2014, as southwestern willow flycatcher and yellow-billed cuckoo surveys were added in the third year of growth per protocol. Vegetation monitoring was not conducted in FY14 and will not be conducted in future years until management guidelines have been established for the conservation area.

Small mammal trapping was conducted on three occasions in 2014, and approximately 120 traps were placed each time. No covered species were captured, but some species typically found in riparian habitat were captured.

Two rapid surveys for birds were conducted at Hunters Hole. One survey was conducted in April, and a second survey was conducted May. No covered species were detected breeding, but migratory yellow warblers were detected.

Marsh bird surveys were conducted on three occasions where marsh habitat remains at the site. No marsh birds were detected. Surveys will be discontinued, as marsh habitat has begun to convert to riparian habitat.

Southwestern willow flycatcher surveys were conducted on five occasions. Migrant flycatchers were detected on the first survey in May, but no breeding or resident birds were detected.

Yellow-billed cuckoo surveys were conducted on four occasions, and no birds were detected.

A permanent acoustic bat monitoring station was set up at Hunters Hole in 2013. In 2014, western red bats, western yellow bats, and the Townsend's big-eared bats were detected at Hunters Hole.

FY15 Activities:

Maintenance/Restoration/Management: An automated irrigation system at Hunters Hole will be utilized in FY15. This upgrade was implemented in order to allow all six of the irrigation valves and the well pump to be controlled electronically and remotely from Reclamation's Yuma Area Office. It will also reduce the labor hours required to travel to the site for manual irrigation and increase personnel safety at this remote site near the International Border with Mexico. Invasive species control and irrigation will continue throughout 2015 as the site becomes established.

Road maintenance is ongoing and conducted as required. The roads, in addition to being used for LCR MSCP purposes, are also used by the United States Border Patrol for patrolling the surrounding area.

Monitoring. An established long-term bat monitoring station will be used to collect acoustic data. General bird surveys will be conducted from mid-April to mid-June. Single species surveys for the southwestern willow flycatcher and yellow-billed cuckoo will be conducted during their respective breeding seasons. MacNeill's sootywing surveys will be conducted in the spring and summer.

Proposed FY16 Activities: Hunters Hole will be maintained and operated to meet covered species habitat requirements and support adaptive management activities to improve site conditions. Maintenance, monitoring, and project coordination will be conducted. Invasive species control and irrigation will continue throughout 2016 as the site becomes established.

Road maintenance is ongoing and conducted as required. The roads, in addition to being used for LCR MSCP purposes, are also used by the United States Border Patrol for patrolling the surrounding area.

Monitoring. An established long-term bat monitoring station will be used to collect acoustic data. General bird surveys will be conducted from mid-April to

mid-June. Single species surveys for the southwestern willow flycatcher and yellow-billed cuckoo will be conducted during their respective breeding seasons. MacNeill's sootywing surveys will be conducted in the spring and summer.

Pertinent Reports: The *2013 Hunters Hole Conservation Area Annual Report*, which summarizes any planting conducted, site management, the results of monitoring, and any recommendations for future adaptive management, will be posted on the LCR MSCP Web site once integration of the data collected throughout the calendar year is complete.

Work Task E33: Pretty Water Conservation Area

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$600,000	$344,159.32	$114,679.27	$700,000	$450,000	$150,000	$150,000

Contact: Jimmy Knowles, (702) 293-8172, jknowles@usbr.gov

Start Date: FY13

Expected Duration: FY55

Long-Term Goal: Habitat creation

Conservation Measures: VEFL1, WRBA2, WYBA3, ELOW1, and BEVI1

Location: Reach 4, Cibola NWR, River Miles 95–97, California

Purpose: To create and manage a mosaic of native land cover types for LCR MSCP covered species

Connections with Other Work Tasks (Past and Future): This work task was identified under Work Task E16 and was previously identified as the Shark's Tooth Conservation Area.

Project Description: The PWCA (previously referred to as the Shark's Tooth Conservation Area) consists of approximately 566 acres on the Cibola NWR, located in California between River Miles 95 and 97. On July 17, 2006, lightning ignited a fire on the Cibola NWR that burned approximately 4,600 acres of salt cedar intermixed with mesquite in both California and Arizona. A burned section will be restored primarily with honey mesquite as described in the *Sharks Tooth Conservation Area Restoration, Development, and Monitoring Plan*. The intent is to create a large honey mesquite bosque, which will be managed for LCR MSCP covered species.

Previous Activities: During FY12, the restoration and development plan was finalized and submitted to the CDFW for approval. The plan was approved, and the Land Use Agreement exhibit was drafted and transmitted to the USFWS for signatures. Compliance activities (NEPA, Section 106 of the National Historic Preservation Act, and ESA) were also initiated in FY12. The expenditures related to these activities were captured in Work Task E16, which is typical for projects being evaluated for inclusion into the LCR MSCP.

FY14 Accomplishments: The majority of the tasks completed during FY14 were related to compliance and pre-construction planning. The remaining compliance approvals were received in early FY14, which included the Section 401 Technically-Conditioned Certification from the California Water Boards and the Section 404 Nationwide Permit Verification from the U.S. Army Corps of Engineers. These were the last two approvals needed to ensure that project activities would be in full compliance with all local, State, and Federal regulations.

In order to secure resources for construction and planting in FY15, honey mesquites trees were purchased and are being grown. Rental of earth moving equipment was not secured until the start of FY15 which resulted in less expenditures in FY14.

FY15 Activities: Pre-construction coordination meetings occurred prior to commencement of clearing activities in January 2015. Additional pre-construction activities, including flagging of areas to be cleared, flagging of jurisdictional wetlands, installation of construction signage, and worksite logistics planning also occurred. Mobilization, clearing, and land preparation are scheduled to begin in January and are expected to be completed by April 2015, with planting to occur during the first two weeks of April. Once the clearing and planting are complete, the mesquite trees will be irrigated utilizing water trucks for up to 3 years. Weed maintenance will occur as required during tree establishment. No wildlife monitoring will occur due to planned construction activities.

Proposed FY16 Activities: Activities for FY16 will be focused on ensuring that the mesquite trees establish themselves successfully. Irrigation utilizing water trucks will continue during FY16 if deemed necessary based on the growth status of the trees and climatic conditions. Weed maintenance will also continue on an as-needed basis.

Monitoring. Riparian habitat will be surveyed as it becomes suitable for LCR MSCP covered species. In FY16, avian monitoring will begin.

Pertinent Reports: N/A

Work Task E34: Salinity and Soil Moisture Monitoring Network

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$250,000	$49,616.14	$81,457.29	$150,000	$500,000	$300,000	$350,000

Contact: Jimmy Knowles, (702) 293-8172, jknowles@usbr.gov

Start Date: FY13

Expected Duration: FY55

Long-Term Goal: Restoration research to guide management actions

Conservation Measures: MRM1, MRM2, CLRA1, WIFL1, WRBA2, WYBA3, CRCR2, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, and MNSW2

Location: Conservation areas

Purpose: To monitor salinity (soil and groundwater) and soil moisture to facilitate management actions that will allow for the long-term health and survival of established land cover types on LCR MSCP conservation areas

Connections with Other Work Tasks (Past and Future): This work task was initiated with funds from Work Tasks E4, E24, F1, and G3.

Project Description: Monitoring soil and groundwater conditions provides information about why some restoration sites establish and develop more successfully than others. In addition to guiding decisions for vegetation establishment and health, research suggests that adequate soil moisture levels are an important habitat requirement for certain covered species. The soil and groundwater monitoring network will be expanded, and monitoring efforts will be standardized across all applicable LCR MSCP conservation areas. The process of determining which phases will be monitored and to what level will occur over a period of years. The information gathered through this effort will facilitate decisions about managing soil moisture levels and saline conditions of soils and groundwater and will also ensure the long-term viability of LCR MSCP conservation areas.

Previous Activities: Research results from previous studies funded by Work Task G3 indicate that riparian obligate trees will utilize groundwater over applied surface water when they have reached sufficient maturity.

An extensive review of the available literature on salinity and sodicity was conducted to summarize what was already known about managing saline soil and groundwater conditions.

Efforts to ensure that adequate soil moisture existed for recently planted riparian vegetation were initiated in 2007 by installing soil moisture devices on Cibola NWR Unit #1 (Nature Trail and Crane Roost), PVER (Phases 1–5), CVCA (Phases 1–3), and the BLCA. These sites were operated and maintained until the vegetation was adequately established (c. 2010). Data collected at these sites will be used to evaluate past irrigation management of constructed restoration sites and may be used during the expansion of the monitoring network.

A soil and groundwater monitoring network was established at portions of three LCR MSCP conservation areas: the BLCA, PVER, and Cibola NWR Unit #1. Using the data collected from the three conservation areas over 2.5 years, a mass balance model to evaluate salt accretion/loss in soils and groundwater was developed.

A soil moisture monitoring pilot study was completed in Phase 2 of the PVER during 2010–13 under Work Task F1. The results and lessons learned from this study will be used to guide future efforts in monitoring soil moisture at existing and future conservation areas.

FY14 Accomplishments: The final version of *Soil and Groundwater Salinity Conditions for Lower Colorado River Multi-Species Conservation Program Habitat Creation Sites* was received early in FY14. The report summarized soil and groundwater salinity conditions at the BLCA, PVER, and Cibola NWR Unit #1 Conservation Area. The final version of *Soil Moisture Monitoring Pilot Study at Palo Verde Ecological Reserve Phase 2* was also received and reviewed during FY14. This report summarized the installation of a soil moisture monitoring network, collection and analyses of soil moisture data, and recommendations for soil moisture management for meeting both vegetation evapotranspiration requirements and covered species habitat requirements.

Reviews of both documents were completed. In general, salinity is not a concern at conservation areas with frequent irrigation and coarse soil texture (the PVER and BLCA), and therefore, the monitoring network density would be lower, and the frequency of sampling could be infrequent. At conservation areas with higher salinity values (Cibola NWR Unit #1), the network density would be higher, and the frequency of sampling should be more frequent.

The conclusions of the soil moisture pilot study report included: (1) expand monitoring to all conservation areas; (2) since no data exist for southwestern willow flycatcher-occupied sites, soil moisture monitoring should be conducted at

these sites; (3) develop target soil moisture values for conservation areas; and (4) target areas with finer-textured soils when making decisions about where to allocate limited water resources.

An inventory of the existing, but unmaintained, soil moisture stations was performed at Cibola NWR Unit #1 (Nature Trail and Crane Roost), the PVER (Phases 1–5), and CVCA (Phases 1–3) to evaluate their operational status. Data were downloaded from select stations.

Expenditures were less than what had been approved, as planning was conducted to define future requirements, which in turn reduced the field effort in FY14.

FY15 Activities: Data from the previous soil moisture, salinity, and groundwater monitoring efforts will be sequenced into the LCR MSCP database. A master plan to expand the monitoring network to encompass all conservation areas will be drafted. Based on initial planning performed during FY14, preliminary soil moisture monitoring will begin at a select few sites, including at least one southwestern willow flycatcher-occupied restoration site (non-LCR MSCP conservation area) and two LCR MSCP conservation areas.

Proposed FY16 Activities: The long-term soil and groundwater monitoring effort, guided by the master plan, will go into effect, and additional LCR MSCP conservation areas will continue to be added to the network in FY16. The monitoring network will be established over several years, targeting the higher priority (high soil salinity, higher southwestern willow flycatcher potential) areas first. The proposed budget increase in FY16 includes procurement of instrumentation. The bulk purchase of equipment will reduce future purchases, provide backup equipment, and ensure consistency in data collection. Since soil moisture has been added to the parameters to be monitored (in addition to soil salinity and groundwater levels), the future budgets have been increased.

Pertinent Reports*:* The reports titled *Review of Salinity and Sodicity, Monitoring, and Remediation for Riparian Restoration Areas; Groundwater and Soil Salinity Monitoring Network in Support of Long-term Irrigation and Salt Management of MSCP Restoration Areas;* and *Soil Moisture Monitoring Pilot Study at Palo Verde Ecological Reserve Phase 2* have been posted on the LCR MSCP Web site. Once a final review has been completed, the report titled *Soil and Groundwater Salinity Conditions for Lower Colorado River Multi-Species Conservation Program Habitat Creation Sites* will also be posted on the Web site.

Work Task E35: Mohave Valley Conservation Area

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$0	$0	$0	$500,000	$1,250,000	$6,000,000	$3,000,000

Contact: Nick Schultz, (702) 293-8089, nschultz@usbr.gov

Start Date: FY15

Expected Duration: FY55

Long-Term Goal: Habitat creation

Conservation Measures: BONY2, RASU2, and FLSU1

Location: Reach 3, River Miles 237–238, Park Moabi Regional Park, California

Purpose: The purpose of this work task is to create and manage a mosaic of land cover types to provide habitat for LCR MSCP covered species. Approximately 56 acres of backwater habitat for native fish will be provided and will incorporate marsh, riparian, and mesquite cover types where appropriate.

Connections with Other Work Tasks (Past and Future): This project was identified under Work Task E16, and design of the conservation area will also be conducted under that work task. Vegetation and species monitoring will be conducted under Work Tasks F1–F7.

Project Description: In the MVCA, a connected backwater will be created that diverts water off the main stem of the Colorado River just below River Mile 237. Diverted flows will run through an excavated channel, enter the existing Park Moabi backwater, and converge with the river 2 miles downstream from the new point of diversion. Excavating the channel will create approximately 56 acres of backwater habitat. The footprint of the conservation area is projected at approximately 90 acres, with native land cover types lining the banks and upland slopes of the backwater accounting for the additional 34 acres.

The MVCA is located 13 miles south of Needles, California, along the Colorado River. The 146-acre property resides within the boundary of Park Moabi Regional Park. The land is owned by the California State Lands Commission and leased to San Bernardino County. Prior to approaching the commission and county about the backwater project, the 146-acre parcel was used as an

off-highway vehicle recreational area; however, once the backwater project was presented, the county was willing to divide the property to accommodate both uses.

The project's area of impact will involve the entire 146 acres (includes areas of fill) as well as lands at the top and bottom of the parcel to connect the backwater to the main stem of the river and the Park Moabi channel. Excavated material will be used throughout the site to create the desired contour elevations, but the majority of the excavated material will be used to create terrain within the county's off-highway vehicle area.

Previous Activities: The California State Lands Commission, the landowner, and San Bernardino County, the lessee, were approached about the project in 2012. Basic, conceptual ideas about the project were presented to the commission and the county, and discussions and lease agreement negotiations continued, but they could not move forward toward a final agreement without an official design proposal for the project. Reclamation's contracting deadline schedule did not allow the solicitation for project design to be advertised during FY13; thus, project construction was delayed.

Reclamation is working with the California State Lands Commission to ensure NEPA/CEQA permitting requirements are met. Both the U.S. Army Corps of Engineers and the USFWS were notified about the project.

A survey of the 146-acre parcel was conducted to establish new control points and develop elevation contours. Additionally, a temporary gauging station was installed directly across the river from the proposed inlet location so river stage could be monitored. These data, in conjunction with the site elevation data, will be used to determine the volume of material that will need to be excavated to achieve the desired depth of the backwater.

FY14 Accomplishments: Due to the 3-month contracting blackout that occurred while Reclamation transitioned to the new Federal accounting system, the design contract for the MVCA was not awarded during FY14. The permits necessary to perform a geotechnical survey were acquired and a survey was conducted in June 2014. The survey consisted of excavating test pits, logging the soil substrate, and determining the depth to groundwater. Additionally, the lease application for the land associated with the project was submitted to the California State Lands Commission; however, the lease cannot be finalized until a design for the project is reviewed by the commission.

All FY14 accomplishments for this project were funded under Work Task E16.

FY15 Activities: Following completion of the 30% design, environmental compliance activities will begin, and the lease with the California State Lands

Commission will be finalized. Pre-development monitoring of riparian birds will be conducted. Desert tortoise pre-construction clearances will be conducted as necessary.

Proposed FY16 Activities: Environmental permitting requirements will be finished. Plants will be ordered in the spring. Construction is anticipated to begin late in FY16. Desert tortoise pre-construction clearances and construction monitoring will be conducted as necessary.

Pertinent Reports: N/A

WORK TASKS – SECTION F

Post-Development Monitoring

Work Task F1: Habitat Monitoring at Conservation Areas

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$650,000	$472,448.47	$3,696,603.91	$650,000	$450,000	$450,000	$450,000

Contact: Sonja Kokos, (702) 293-8033, skokos@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: Pre- and post-development monitoring

Conservation Measures: MRM2, CLRA1, WIFL1, WRBA2, WYBA3, CRCR2, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, and MNSW1

Location: Beal Lake, Havasu NWR, Arizona; PVER, California; CVCA, Arizona; Cibola NWR Unit #1, Cibola NWR, Cibola, Arizona; Yuma East Wetlands, Yuma, Arizona

Purpose: The purpose of this work task is to provide post-development monitoring that is necessary to assess the effectiveness of each habitat creation and restoration site. Monitoring will include biotic and abiotic components and will inform management decisions throughout the life of the LCR MSCP.

Connections with Other Work Tasks (Past and Future): Post-development habitat monitoring will be conducted at habitat creation sites detailed in the Conservation Area Development and Management (Section E) work tasks.

Project Description: Using post-development monitoring, species habitat characteristics will be evaluated. Monitoring data will be used to document progress toward achieving the biological goals and habitat characteristics for covered species and document the acreage by land cover type (riparian, mesquite, and marsh) each year.

Previous Activities: Five habitat creation sites were monitored in FY10 using different monitoring protocols. In FY11, new protocols were developed and implemented in a pilot year study. Protocols included measuring variables such

as density, species richness, vegetation structure, ground cover, canopy closure, distance to nearest standing water, and distance to nearest open space. Temperature and relative humidity data were also collected.

An external program review (G4) was conducted in FY12 on the vegetation monitoring project to address how the data being collected could be used to assess conservation measure accomplishment. It was found that, under the vegetation monitoring protocol developed over several years, the variability that was known to occur on the sites at various spatial scales was not able to be detected. Following an external program review, recommendations were provided for adjusting the current vegetation monitoring sample design and protocols, including the method chosen for randomization of monitoring plots, the collection of various data that were not tied to management questions, and measurements that were too subjective for inclusion into decisionmaking.

FY14 Accomplishments: In FY14, the adaptive management recommendations for vegetation monitoring were implemented. Vegetation monitoring was conducted in a spatially randomized approach, targeting areas where the vegetation structure and soils were more consistent with southwestern willow flycatcher and yellow-billed cuckoo habitat characteristics. The BLCA, Cibola NWR Unit #1, CVCA, PVER, and Yuma East Wetlands were monitored, collecting data on density, vegetation structure, canopy closure, and canopy height.

Abiotic data were collected using existing monitoring instrumentation. The new study designs for the inclusion of soil moisture monitoring with the vegetation monitoring strategy was drafted (C60).

FY14 obligations were less than approved due adaptive management changes to incorporate stratification of monitoring within conservation areas that support the habitat characteristics suitable for southwestern willow flycatcher.

Vegetation classification mapping was completed in FY14.

FY15 Activities: In recent years, LiDAR technologies have proven to provide more accurate representations of vegetation in forests; it can be collected quickly during the breeding season without disturbing the covered species, and it is expected to provide higher-quality data at a reduced cost. A study plan to evaluate vegetation structures using LiDAR technology and soil moisture dynamics has been completed, and a pilot study will begin in the spring of 2015. The study will be conducted in one area known to be occupied by southwestern willow flycatchers and one area within the PVER with similar habitat characteristics.

The new habitat monitoring approach for long-term monitoring, including soil moisture monitoring at habitat creation areas, will be determined after evaluating the results from the pilot study. LiDAR data will be acquired to assess vegetation characteristics and develop analysis tools (C60).

Proposed FY16 Activities: Incorporating the results from FY15, habitat monitoring using the new methods will continue in FY16.

Pertinent Reports: Reports are being prepared, but drafts are available upon request.

Work Task F2: Avian Use of Conservation Areas

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$220,000	$197,840.80	$1,398,308.36	$220,000	$220,000	$220,000	$220,000

Contact: Beth Sabin, (702) 293-8435, lsabin@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: Conduct pre- and post-development monitoring for avian species

Conservation Measures: MRM1 and MRM2 (ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, and SUTA)

Location: BLCA, Havasu NWR, Arizona; CVCA, Arizona; Cibola NWR Unit #1, Cibola NWR, Cibola, Arizona; Hunters Hole, Arizona; LDCA, Arizona; MVCA and Yuma East Wetlands, Arizona; PVER, California; and PWCA, California

Purpose: The purpose of this work task is to monitor Arizona Bell's vireo, elf owl, gilded flicker, Gila woodpecker, Sonoran yellow warbler, vermillion flycatcher, and western summer tanager use of habitat conservation areas to provide data for the adaptive management process and to develop management guidelines for created habitat conservation areas. Pre-development data will be collected on areas that will be converted to more favorable habitat so a comparison of bird use between existing low-quality habitat and newly created high-quality habitat can be made.

Connections with Other Work Tasks (Past and Future): Post- and pre-development avian monitoring will be conducted at habitat conservation areas listed in Conservation Area Development and Management (Section E). In addition, information obtained from this work task may be used to provide data for avian system monitoring by using the same protocols established in the system monitoring program (D6).

Project Description: Creation of riparian habitat will benefit LCR MSCP covered avian species (Arizona Bell's vireo, elf owl, gilded flicker, Gila woodpecker, Sonoran yellow warbler, vermillion flycatcher, and western summer tanager). Conservation areas will be monitored for bird activity using the double sampling area search method, which involves intensive and rapid area searches.

Data gathered will be used to document the presence of covered species at the conservation areas and guide the design of future riparian habitat conservation areas to provide covered species habitat.

Previous Activities: Pre- and post-development monitoring for avian covered species has been conducted at habitat conservation areas since FY05. Post-development monitoring for avian covered species was conducted at the BLCA, Cibola NWR Unit #1, CVCA, PVER, and Yuma East Wetlands. Avian pre-development monitoring was conducted at the CVCA, Cibola NWR Unit #1, IPCA, Hart Mine Marsh, PVER, PWCA, and LDCA. The double sampling rapid and intensive area search survey protocol has been used since 2008 for pre- and post-development monitoring. From FY08 to FY10, all plots were surveyed using intensive area search surveys due to the small acreage of habitat in the conservation areas. In FY11 and FY12, all plots were surveyed with rapid area search protocols, and a subset of those plots was surveyed using intensive area search protocols. In FY13, three additional plots were established at Yuma East Wetlands and were surveyed with intensive area search surveys. Each year, avian use was evaluated at each conservation area and compared among conservation areas.

FY14 Accomplishments: Avian post-development monitoring was conducted at existing habitat conservation areas in FY14. The following conservation areas were surveyed: (1) the BLCA, (2) Cibola NWR Unit #1, (3) the CVCA, (4) the PVER, (5) Yuma East Wetlands, and (6) Hunters Hole. Eighty plots on the conservation areas were surveyed using the double sampling protocol. Rapid area search surveys were conducted on all plots, and intensive area search surveys were conducted on a random subsample of four of those plots. In FY14, the plots were randomly selected because existing habitat at the habitat conservation areas exceeded the amount of habitat that could be covered within 80 area search plots for the first time.

LCR MSCP covered bird species and other territorial breeding birds were documented at each conservation area:

- BLCA – There were 102 pairs of territorial breeding birds comprising 17 species detected. These included 8 pairs of Sonoran yellow warbler, 13 pairs of Arizona Bell's vireo, and 2 pairs of summer tanager.

- Cibola NWR Unit #1 – There were 192 pairs of territorial breeding birds comprising 28 species detected. These included four pairs of Arizona Bell's vireo and one Sonoran yellow warbler pair.

- CVCA – There were 237 pairs of territorial breeding birds comprising 18 species detected. No LCR MSCP covered species were detected breeding here.

- PVER – There were 410 pairs of territorial breeding birds comprising 25 species detected. These included five pairs of Sonoran yellow warbler.

- Yuma East Wetlands – There were 223 pairs of territorial breeding birds comprising 26 species detected. No LCR MSCP species were detected breeding here.

- Hunters Hole – A few pairs of territorial birds were detected at Hunters Hole. No LCR MSCP covered species were detected breeding here.

All the habitat conservation areas had numerous pairs of non-territorial breeders as well. Many species of migrants and non-breeders were detected at all habitat conservation areas.

FY15 Activities: Avian post-development monitoring will be conducted at conservation areas, including the BLCA, Cibola NWR Unit #1, the CVCA, Hunters Hole, the PVER, and Yuma East Wetlands. Surveys will be conducted using double sampling method. Eighty plots will be randomly selected from all possible plots within the habitat conservation areas. All plots will be surveyed with rapid surveys, and a subset of four plots will be randomly selected to be surveyed with intensive surveys. Avian pre-development monitoring will be conducted at the MVCA.

Proposed FY16 Activities: Avian post-development monitoring for LCR MSCP covered species will be conducted at conservation areas supporting riparian vegetation, including: the BLCA, Cibola NWR Unit #1, the CVCA, Hunters Hole, the PVER, and Yuma East Wetlands. The LDCA and PWCA may be added if the vegetation is mature enough to provide habitat.

The project will be evaluated, and the results of this evaluation may be incorporated into future protocols.

Pertinent Reports: The report titled *Lower Colorado River Riparian Bird Surveys, 2012* is posted on the LCR MSCP Web site.

Work Task F3: Small Mammal Colonization of Conservation Areas

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$60,000	$56,766.91	$372,989.29	$55,000	$65,000	$65,000	$65,000

Contact: Allen Calvert, (702) 293-8311, acalvert@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: Conduct pre- and post-development monitoring for small mammal species

Conservation Measures: YHCR1, CRCR1, DPMO1, and MRM2 (DPMO, CRCR, and YHCR)

Location: BLCA, Havasu NWR; PVER, California; CVCA, Cibola Nature Trail, and LDCA, Arizona

Purpose: The purpose of this work task is to monitor small mammal populations within habitat creation sites. Data will be used in the adaptive management process to guide the design of future habitat creation projects targeting covered small mammal species.

Connections with Other Work Tasks (Past and Future): Post-development small mammal monitoring will be conducted at habitat creation sites listed in Conservation Area Development and Management (Section E). In addition, presence information obtained from this work task will be used in Work Task C27 to document habitat characteristics and improve small mammal monitoring methods. Protocol improvements developed under Work Task C27 will be incorporated under this work task.

Project Description: Small mammal live trapping will be conducted in conservation areas to document the presence of Colorado River cotton rats, Yuma hispid cotton rats, and desert pocket mice.

Previous Activities: Prior to 2005, small mammal surveys were conducted on Cibola NWR Unit #1 and at the Pratt Agricultural Lease site. Several cotton rats were captured at each site (Yuma hispid at Pratt and Colorado River cotton rat at

Unit #1). At the Pratt site, Yuma hispid cotton rats were captured in dense *Baccharis* spp., and at Unit #1, Colorado River cotton rats were captured in dense Johnsongrass.

Presence/absence live trapping surveys were conducted at several habitat creation sites during FY06, but only one Colorado River cotton rat was captured at the BLCA. In 2007, cotton rats were found at Cibola NWR Unit #1, the Imperial NWR, and at a reference site between Laguna Dam and Mittry Lake north of Yuma, Arizona. In 2008, one cotton rat was captured during pre-development monitoring in adjacent habitat at the Imperial NWR. A new cotton rat population was found near the PVER. During the 2009, 2010, and 2011 surveys, cotton rats were detected at Cibola NWR Unit #1 and the bench population near the PVER. In 2012, Colorado River cotton rats were found at the BBCA, BLCA, PVER, CVCA, and Cibola NWR Unit #1.

FY14 Accomplishments: Presence live trapping surveys were conducted in at the BLCA, PVER, CVCA, Cibola NWR Unit #1, BBCA, Yuma East Wetlands, and Hunters Hole. Cotton rats were captured within all conservation areas except the BLCA and Hunters Hole. All cotton rats captured at the BBCA, PVER, CVCA, and Cibola NWR were Colorado River cotton rats. All cotton rats captured at Yuma East Wetlands were Yuma hispid cotton rats.

MEFFs were finalized, and all data collected in 2014 were recorded on these forms by using a handheld GPS unit.

FY15 Activities: Presence live trapping surveys will continue as part of the post-development monitoring efforts at the BLCA, PVER, CVCA, Cibola NWR Unit #1, BBCA, Yuma East Wetlands, and Hunters Hole.

Proposed FY16 Activities: Presence live trapping surveys will continue as part of the post-development monitoring efforts at the BLCA, PVER, CVCA, Cibola NWR Unit #1, BBCA, Yuma East Wetlands, and Hunters Hole.

If appropriate habitat develops at the LDCA, this site would be surveyed as well. Funding increases in FY16 are for pre- and post-development monitoring of new conservation areas.

Pertinent Reports: Annual reports will be posted on the LCR MSCP Web site.

Work Task F4: Covered Bat Species Monitoring at Conservation Areas

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$135,000	$165,161.31	$848,899.39	$135,000	$150,000	$150,000	$150,000

Contact: Allen Calvert, (702) 293-8311, acalvert@usbr.gov

Start Date: FY07

Expected Duration: FY55

Long-Term Goal: Pre- and post-development monitoring of covered bat species

Conservation Measures: MRM1, MRM2 (WRBA, WYBA, CLNB, and PTBB), WRBA1, and WYBA1

Location: BLCA, Havasu NWR; PVER, California; CVCA, Cibola NWR Unit #1, Cibola, Arizona; IPCA, Imperial NWR, Arizona; and LDCA, Yuma East Wetlands, and Hunters Hole, Arizona

Purpose: Assess use of the conservation areas by the two covered bat species (western red bat and western yellow bat) and the two evaluation species (Townsend's big-eared bat and California leaf-nosed bat). Pre- and post-development monitoring for the presence/absence of covered bat species will be conducted following a study design developed in 2008. Information obtained through this work task, in conjunction with Work Task D9, will provide data on the distribution of these species.

Connections with Other Work Tasks (Past and Future): Pre- and post-development avian monitoring will be conducted at habitat conservation areas listed in Conservation Area Development and Management (Section E). Information obtained through this work task, in conjunction with Work Task D9, will help determine the distribution of these species.

Project Description: Post-development monitoring for the two covered bat species (western red bat and western yellow bat) and the two evaluation species (Townsend's big-eared bat and California leaf-nosed bat) at conservation areas includes both acoustic and mist netting capture methods. Acoustic monitoring will be conducted at conservation areas, including the CVCA, PVER, Cibola NWR Unit #1, BLCA, and IPCA. These surveys utilize either active or passive acoustic detection systems to record bat echolocation calls for presence.

Bats will also be captured with mist nets at these sites to acquire reference acoustic calls and determine age, sex, and reproductive status of covered and evaluation bat species.

Previous Activities: Conservation areas were monitored from FY07 to FY13 using acoustic and/or capture techniques.

FY14 Accomplishments: Acoustic monitoring consisted of long-term bat detector stations that were used to record echolocation calls of bats every night. The stations were used to collect data at the BLCA, PVER, CVCA, Cibola NWR Unit #1, Yuma East Wetlands, Hunters Hole, and the ‘Ahakhav Tribal Preserve. At the PVER and CVCA, two stations were used to cover these large conservation areas. All four LCR MSCP species were detected at all sites except Hunters Hole. At Hunters Hole, all LCR MSCP species, except for the California leaf-nosed bat, were detected in FY14.

Capture surveys were conducted at five LCR MSCP conservation areas (BLCA, PVER, CVCA, Cibola NWR, and Yuma East Wetlands) and at the ‘Ahakhav Tribal Preserve. Western red bats were captured at the PVER and CVCA. Western yellow bats were captured at the ‘Ahakhav Tribal Preserve, PVER, CVCA, Cibola NWR, and Yuma East Wetlands. California leaf-nosed bats were captured at all five sites. Townsend’s big-eared bats were captured at the BLCA. This was the second year in a row that Townsend’s big-eared bats have been captured at this site. All red and yellow bats were PIT tagged, but none were recaptured.

In addition, MEFFs were finalized, and all capture data collected in 2014 were recorded on these forms by using a handheld GPS unit.

Projects costs increased in FY14 due to field testing and refinement of the bat capture MEFFs as well as analyses of an additional acoustic station data.

FY15 Activities: Bat presence will continue to be monitored by using eight acoustic monitoring stations. The station at the ‘Ahakhav Tribal Preserve will be reassigned to the system-wide monitoring work task (D9), as the site is not a LCR MSCP conservation area. The station will continue to operate, and data will be analyzed, presence documented, and activity level rates calculated. Capture surveys will continue at the BLCA, PVER, CVCA, Cibola NWR, and Yuma East Wetlands.

Proposed 16 Activities: Bat presence at the conservation areas will continue to be monitored with the use of acoustic stations and capture surveys. Data will be analyzed, presence documented, and activity level rates calculated.

Pertinent Reports: Annual reports will be posted on the LCR MSCP Web site.

Work Task F5: Post-Development Monitoring of Fish at Conservation Areas

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$250,000	$271,044.01	$1,286,639.20	$265,000	$250,000	$250,000	$350,000

Contact: Jeff Lantow, (702) 293-8557, jlantow@usbr.gov

Start Date: FY07

Expected Duration: FY55

Long-Term Goal: Post-development monitoring

Conservation Measures: RASU6 and BONY5

Location: Backwater habitats (Reaches 3–6)

Purpose: To monitor fish use of habitat creation sites in order to provide data for the adaptive management process and to develop management guidelines for created backwater habitats

Connections with Other Work Tasks (Past and Future): Post-development monitoring will be conducted at all backwaters created under Conservation Area Development and Management (Section E) work tasks and Work Tasks C23 (closed), C31, C33 (closed), C34 (closed), C40, and C41.

Project Description: Fish and fish habitat will be monitored at conservation areas. It is anticipated that these areas will play various roles in the conservation of target fish species throughout the term of the LCR MSCP. Some habitats will be able to develop self-sustaining populations, others may become overpopulated, requiring harvest or thinning, and some will require continuous population augmentation. Most isolated fish habitats will require some stock rotation to maintain genetic diversity through time. Basic surveys of the fish population and the physical and chemical habitat developed or restored will be required. Fish monitoring will include trapping (hoop, fyke, and minnow traps), trammel netting, electrofishing, larvae light trapping, and ocular surveys (including scuba and snorkeling where necessary and practical). Water quality assessment will require annual measurements of temperature, oxygen, pH, and conductivity (salinity) as well as periodic monitoring of chemical makeup, including electro-ions and selenium.

Previous Activities: Since 2006, Beal Lake has been renovated and stocked with more than 6,000 razorback sucker and 2,000 large bonytail (an additional 27,000 young-of-the-year bonytail have also been released); a limited portion of each of these stockings was marked with PIT tags. Non-natives were identified shortly after the renovation efforts. Through annual surveys, subsets of each of these stockings have been contacted, but long-term survival has been low. A more intensive monitoring effort using remote sensing was initiated in FY09 and continued through FY11. Populations of stocked razorback sucker declined rapidly within the first several months post-release and eventually leveled off near 100 individuals. Water quality has been monitored constantly with multi-parameter water quality loggers, and all parameters have remained within the known ranges of acceptability for native fish.

In 2012, stockings were discontinued at Beal Lake, and fisheries surveys were reduced to a relative abundance and biomass estimate for all species within the backwater. Results of this survey indicated that the backwater contained at least six different species, but relative to the size of the backwater, had low overall numbers of fish (approximately 4,000). Non-native fishes were the dominant species in the lake, accounting for almost 90% of the total fish.

A large fishkill was observed in February 2013; water samples confirmed a golden algae bloom. Monthly golden algae monitoring was initiated immediately following its detection. No fish were observed for several months after the event. By mid-summer, young-of-year largemouth bass were observed in the backwater.

Routine monitoring of the BBCA was conducted monthly from February through May and included electrofishing, trammel netting, and larval light trapping in areas where there have been historical contacts of native fish and adequate water levels to permit access for sampling. Water quality profiles were conducted during each monitoring trip and at least quarterly the remainder of the year. Through monitoring, low numbers of razorback sucker and flannelmouth sucker continued to be contacted, including larvae of both species and flannelmouth sucker subadults. The backwater has a direct surface connection to the LCR; consequently, water quality parameters mirror that of the river.

FY14 Accomplishments: Water quality at Beal Lake was monitored throughout the backwater using permanently deployed multi-parameter instruments. Low levels of DO and high temperatures were observed locally but not lake-wide. The backwater was isolated from Topock Marsh following the detection of golden algae in 2013; this closure resulted in a rapid increase in specific conductivity, which approached 11,000 µS/cm in FY14. Zooplankton and phytoplankton results continue to show relatively low levels of plankton biomass. No golden algae have been detected in Beal Lake since May 2013. Limited electrofishing and netting surveys in FY14 resulted in detections of many

of the non-native species that were known to have previously inhabited the backwater. The majority of these fish were in the juvenile size classes, with the exception of one large carp.

Routine monitoring at the BBCA continued in FY14; native fish contacts included eight razorback sucker and one flannelmouth sucker. All of the razorback originated from localized stocking events from the past two years. Larval flannelmouth sucker and razorback sucker were captured at rates similar to years past. Multiple telemetered juvenile flannelmouth sucker from Work Task C53 were routinely contacted in the dense bulrush stands near the center of the backwater. Remote PIT scanners were deployed, and 14 razorback sucker within the conservation area were successfully contacted. This monitoring tool is not effective on flannelmouth sucker due to the lack of fish with PIT tags. Fish surveys at this location were highly influenced by river operations from Davis Dam. Water quality parameters remained within thresholds for all native fish.

FY15 Activities: Monitoring activities at Beal Lake will be focused on water quality and plankton, with limited fish monitoring. Monthly golden algae sampling will continue throughout the year. Infrastructure improvements to facilitate management of water quality are planned for FY15 and will be implemented under Work Task E1.

The BBCA will be monitored at a level similar to FY14. In lieu of electrofishing, additional effort will be expended to deploy remote PIT scanners during routine monitoring.

Proposed FY16 Activities: The activities from FY15 will continue into this year. If Beal Lake remains free of golden algae, and infrastructure improvements are completed, management of the backwater for native fish will resume. Before any additional stocking of native fish at Beal Lake occurs, a study/management plan will be developed.

BBCA activities will be similar to those of the previous year and will include electrofishing and deployment of remote PIT scanners.

Out-year budget estimates have been increased in anticipation of additional water quality and fisheries monitoring efforts being assumed under this work task. Specifically, these include: monitoring at the MVCA backwater (E35) when construction is completed and the incorporation of regular monitoring efforts at Imperial Ponds (C25).

Pertinent Reports: A report titled *Beal Lake Species Abundance and Biomass* is completed and will be posted on the LCR MSCP Web site.

Work Task F6: Post-Development Monitoring of MacNeill's Sootywing at Conservation Areas

FY14 Estimates	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$80,000	$71,134.99	$381,740.90	$80,000	$80,000	$80,000	$80,000

Contact: Carrie Ronning, (702) 293-8106, cronning@usbr.gov

Start Date: FY09

Expected Duration: FY55

Long-Term Goal: Post-development monitoring for MacNeill's sootywing

Conservation Measures: MNSW2

Location: Habitat conservation areas, Reaches 3–5.

Purpose: To monitor vegetation, plant quality, and populations of MacNeill's sootywing in habitat created for this species

Connections with Other Work Tasks (Past and Future): Habitat requirements were determined under Work Task C7.

Project Description: Habitat use and requirements of MacNeill's sootywings will be monitored in conservation areas that have the appropriate land cover type available.

Previous Activities: Habitat created for MacNeill's sootywing at the CVCA and PVER was surveyed for adult sootywing from FY09 to FY11. In FY09 and FY10, sootywings were most abundant at CVCA Phase 4W along the road edge, (> 200 adults counted) and at a separate patch in the same phase. Sootywings were rare (<5 adults per date) or absent at the other CVCA plots and at all of the PVER plots. In FY11, the large population of sootywings previously recorded in CVCA Phase 4W were not observed. In FY11, most observations were at PVER Phase 4 (< 5 adults per date). Sootywing populations at the remaining CVCA and PVER plots were low or absent.

Monitoring methods were modified in FY12 and FY13. One random transect was walked in each check monthly from April through August at CVCA Phases 2 and 3, CVCA Phase 4, CVCA Phase 5, and PVER Phases 4 and 5. Sootywings were generally absent throughout the season. Seven sootywings were counted at the CVCA, and 13 were counted at the PVER. In FY13, planted quail bush

habitat was surveyed for adult sootywings during June–September in plots at the CVCA and PVER. Vegetation was monitored to document characteristics of host and nectar plants, including species, plant height, and width. Six sootywings were counted at the CVCA during 2013, and 98 were observed at the PVER.

FY14 Accomplishments: Sootywings were monitored at PVER Phases 4 and 6, the CVCA, and Hart Mine Marsh. Each site was surveyed from May through August to determine presence by surveying five randomly selected quail bush within a patch. Four other sites off the conservation areas were also surveyed to validate the method. Sootywings were detected at all sites despite variable quail bush plant height and width. Adults and larvae were detected at all four conservation areas, and eggs were found at both PVER locations.

Habitat information was collected at plots within PVER Phases 4 and 6, the CVCA, and Hart Mine Marsh, and it included measures of quail bush (*Atriplex lentiformis*) (sootywing larval host plant), nectar plant metrics, information on soil moisture, and air temperature and relative humidity. Eggs or caterpillars were found on shrubs that ranged in width from 3–25 feet (0.9–7.6 m). Quail bush was recorded as a new nectar plant for sootywings.

Repeated surveys at the PVER 4 plot provided data on the time needed for detection. Data indicated that 1 hour of survey time (at the appropriate time of day) would be needed to detect adult sootywings in 90% of the sampled intervals. Examination of time of day and effort needed for detection suggested that there was a lull in adult activity that occurred late in the afternoon (c. 14:00–16:00). This break in activity seemed to correspond with peaks in air temperature.

FY15 Activities: Sootywing monitoring will continue in FY15 using the FY14 methods. All conservation areas will be surveyed for patches of quail bush and sootywings to document species presence and validate previously documented habitat characteristics such as vegetation dryness and patch size.

Proposed FY16 Activities: Sootywing monitoring will continue in FY16.

Pertinent Reports: Annual reports will be posted on the LCR MSCP Web site.

Work Task F7: Marsh Bird Monitoring at Conservation Areas

FY14 Estimates	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$30,000	$29,476.43	$49,275.05	$30,000	$30,000	$30,000	$30,000

Contact: Joe Kahl, (702) 293-8568, jkahl@usbr.gov

Start Date: FY11

Expected Duration: FY55

Long-Term Goal: The purpose of this work task is to determine whether marsh land cover types created under the LCR MSCP are used by California black rail, Yuma clapper (Ridgway's) rail, and least bittern.

Conservation Measures: MRM1, MRM2 (CLRA, BLRA, and LEBI), LEBI1, BLRA1, and CLRA1

Location: Presence/absence surveys will be conducted at newly developed marsh habitat sites, including Hart Mine Marsh, Cibola NWR; IPCA, Imperial NWR; Beal Lake and Willow Marsh, Havasu NWR; BBCA, Nevada; and the Yuma East Wetlands and Hunters Hole, Arizona

Purpose: To monitor the use of created marsh habitat by covered marsh bird species

Connections with Other Work Tasks (Past and Future): System-wide marsh bird surveys have been conducted by Reclamation on existing marsh habitat since 1996 under Work Task D1.

Project Description: Surveys for Yuma clapper rail in existing habitat have been conducted in Topock Gorge by Reclamation since 1996 (D1). Since 2006, LCR MSCP staff have participated in the National Marsh Bird Monitoring Program, which involves surveying for several species, including the LCR MSCP covered marsh species, while simultaneously using taped recordings of the species calls. Surveys of marsh habitat created under the LCR MSCP utilize this same protocol. Marsh bird survey data on the LCR is utilized by the USFWS for baseline population estimates and habitat suitability analyses.

Previous Activities: Hart Mine Marsh and the IPCA have been surveyed for marsh birds prior to development. Marsh bird surveys were conducted at the BBCA, Hart Mine Marsh on the Cibola NWR, and Field 18 and the Imperial Ponds of the IPCA on the Imperial NWR after inclusion into the LCR MSCP.

FY14 Accomplishments: Marsh bird surveys were conducted during March, April, and May at Hart Mine Marsh and at the IPCA (Field 18 and the Imperial Ponds). At the BLCA, surveys were conducted at Beal Lake once in March and at Beal Lake and Willow Marsh twice in April. Surveys at the BBCA, Yuma East Wetlands, and Hunters Hole were conducted once in March and twice in April. This was the first year that Reclamation conducted marsh bird surveys at Yuma East Wetland and Hunters Hole.

California black rail detections

Conservation Area	Survey 1 (March)	Survey 2 (April)	Survey 3 (April – May)
Hart Mine Marsh	0	0	1
Imperial Ponds Conservation Area			
Field 18	1	1	3
Imperial Ponds	0	0	0
Big Bend Conservation Area	0	0	0
Beal Lake Conservation Area			
Beal Lake	0	0	0
Willow Marsh	No Survey	0	0
Yuma East Wetlands	0	0	0
Hunters Hole	0	0	0

Least bittern detections

Conservation Area	Survey 1 (March)	Survey 2 (April)	Survey 3 (April – May)
Hart Mine Marsh	1	6	10
Imperial Ponds Conservation Area			
Field 18	0	1	1
Imperial Ponds	0	1	1
Big Bend Conservation Area	0	0	0
Beal Lake Conservation Area			
Beal Lake	0	4	3
Willow Marsh	No survey	1	5
Yuma East Wetlands	4	2	0
Hunters Hole	0	0	0

Yuma clapper rail detections

Conservation Area	Survey 1 (March)	Survey 2 (April)	Survey 3 (April – May)
Hart Mine Marsh	1	5	6
Imperial Ponds Conservation Area			
Field 18	3	1	0
Imperial Ponds	0	1	3
Big Bend Conservation Area	0	0	0
Beal Lake Conservation Area			
Beal Lake	0	0	0
Willow Marsh	No survey	0	0
Yuma East Wetlands	0	5	4
Hunters Hole	0	0	0

FY15 Activities: Marsh bird surveys on conservation areas will be conducted in cooperation with the USFWS. These sites will include Beal Lake and Willow Marsh (Havasu NWR), Hart Mine Marsh (Cibola NWR), Field 18 and the Imperial Ponds (Imperial NWR), BBCA, Yuma East Wetlands, and the LDCA. Data will be entered into the LCR MSCP database and analyzed, comparing pre- and post-development.

Proposed FY16 Activities: Marsh bird surveys on conservation areas will be conducted in cooperation with the USFWS. They will be conducted on conservation areas that have a marsh habitat component in sufficient acreage, vegetation type, and suitability. These sites will include Beal Lake and Willow Marsh (Havasu NWR), Hart Mine Marsh (Cibola NWR), Field 18 and the Imperial Ponds (Imperial NWR), BBCA, Yuma East Wetlands, and the LDCA. Data will be entered into the LCR MSCP database and analyzed, comparing pre- and post-development.

Pertinent Reports: Results of the surveys will be reported in the annual reports for each associated restoration site as well as one report for all conservation areas.

WORK TASKS – SECTION G

Adaptive Management Program

Work Task G1: Data Management

FY14 Estimates	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$800,000	$878,992.90	$3,745,078.72	$850,000	$1,000,000	$1,000,000	$1,000,000

Contact: Sonja Kokos, (702) 293-8033, skokos@usbr.gov

Start Date: FY07

Expected Duration: FY55

Long-Term Goal: Data management will be an ongoing task for species research, system monitoring, habitat creation, post-development monitoring, and habitat maintenance programs.

Conservation Measures: All

Location: Program-wide

Purpose: To develop and maintain an accessible, multi-disciplinary, spatially referenced, relational database to consolidate, organize, document, store, and distribute scientific information related to the LCR MSCP

Connections with Other Work Tasks (Past and Future): Database management is integral for the successful completion of the work tasks undertaken: Fish Augmentation (Section B), Species Research (Section C), System Monitoring (Section D), Conservation Area Development and Management (Section E), Post-Development Monitoring (Section F), Adaptive Management Program (Section G), and Funding Accounts (Section H).

Project Description: Under this work task, the data management team manages all aspects of the LCR MSCP that are related to the database, data collection, applications development, and software management. To fully implement the program, a database management system is being developed to handle the data collected through the species research, system monitoring, habitat creation, post-development monitoring, adaptive management, and habitat maintenance programs. Database design, initial implementation, and maintenance are funded under this work task.

Previous Activities: Hardware was purchased to increase data storage for the implementation of the centralized database. The Intranet/document/calendar (SharePoint) management system was upgraded and modified to accommodate

the future needs of the LCR MSCP. Implementation of remote data collection from field data loggers began at Beal Lake for the fish program. The Native Fish Augmentation Database was maintained.

Database design and implementation of the LCR MSCP centralized database management system was completed. Data modules for the database were acquired and phased in according to priority for implementation of the HCP. The modules consist of an application for data entry that is standardized for input into the database. On an annual phased approach, all standardized projects will be incorporated into the database.

The Minckley Library project was completed in March 2012. The library is now available as a searchable database that houses over 11,000 total documents, including a variety of literature types, which were digitized and organized using bibliographic software. Error checking was performed not only to ensure consistency and accuracy when accessing the database but also to ensure that individual electronic copies of all documents had been received and serve as a backup.

The new LCR MSCP Web site was completed. The data management requirements document was drafted, which provided contractors with metadata standards.

It was determined in FY12 that the entire planning area needed to be delineated in terms of standardizing locations where data collection would be conducted using past and present site naming conventions. This delineation was completed in June 2012 and will be updated as needed throughout the LCR MSCP term. Data structures and Microsoft Access forms for 2012 bird monitoring collection protocols were developed and deployed. The data structures and forms for the 2011 and 2012 vegetation monitoring data collection protocols were revised.

The master LCR MSCP database was revised to reflect current schema environments and to develop a collection data import process and its supporting documentation. A developer program and project documentation were developed and maintained. FTP protocols for LCR MSCP form deployment and contractor data retrieval were developed and distributed. Contractors and Project Managers were assisted with the development of quality assurance queries and reporting.

Mobile data loggers and software for collection of data in the field were acquired. These units standardize all data collection across LCR MSCP projects. MEFFs/data dictionaries for data collection were developed and are now used while in the field. The development of remote sensing data collection from field data loggers will continue.

FY14 Accomplishments: Additional funds were expended under this work task to complete the previous years' work activities. The projects included: southwestern willow flycatcher system monitoring (D2), yellow-billed cuckoo monitoring (D7 and F2) and bat monitoring (D9 and F4). The Native Fish Augmentation Database continued to be maintained. Maintenance and updates to the LCR MSCP Web site continued. Support continued to be offered for users of Microsoft Access forms as well as for queries and reports as needed. Field data collection devices and supporting software were purchased to support data collection activities. Two training sessions were conducted for program staff related to the use of GIS technologies and MEFF GPS devices.

Data collection processes were reviewed, updated, and maintained, and MEFFs were tested for the following projects: southwestern willow flycatcher (D2, D3, and F2), lowland leopard frog (C62 and D12), Colorado River toad (C62 and D12), Colorado River/Yuma hispid cotton rats (D10 and F3), demographic studies (C27), bat surveys and research (C35, D9, and F4), yellow-billed cuckoo (D7 and F2), and vegetation monitoring (F1).

The LCR MSCP centralized database continued to be maintained and upgraded for location, species, project-related reference tables, and utility procedures to centralize processing of project data, with emphasis on the support of MEFF needs (e.g., MEFF locations, codes, etc.). Database schemas and data/photo import/conversion codes were designed, built and tested in support of the MEFFs for vegetation monitoring and bat monitoring. Support continued to offered for users of Microsoft Access data entry forms, including form and code updates, data merging, internal quality queries, and assistance in the design and creation of contractor-required queries for vegetation monitoring and avian system-wide surveys. Quality assurance measures for the Structured Query Language (SQL) database were developed, with full audit trails from raw field data to final production data.

The use of remote and continuous data collection from data loggers continued to be developed and supported. An external SharePoint site was developed for U.S. Department of the Interior internal and external users of contracts in order to improve data flow. Sections of the LCR MSCP Data Management Plan were drafted, and additional sections are planned to be drafted in FY16.

FY15 Activities: The LCR MSCP Web site will continue to be maintained and updated. The planning, acquisition, and data modules for the LCR MSCP centralized database continues. LiDAR data and aerial image acquisition for selected conservation areas will be supported under Work Tasks F1 and G1.

MEFFs are being evaluated, developed, and tested for the following projects: elf owl (C24), MacNeill's sootywing (F6), fish augmentation (B1), and fish monitoring (F5). The data collection processes will continue to be updated and/or maintained, and MEFFs will be tested for the following projects: southwestern willow flycatcher (D2, and F2), lowland leopard frog (C62 and D12), Colorado

River toad (C62 and D12), Colorado River/Yuma hispid cotton rats (D10 and F3), demographic studies (C27), bat surveys and research (C35, D9, and F4), yellow-billed cuckoo (D7 and F2), and bat surveys and research (C35, D9, and F4). Support for the purchase of MEFFs, GPS devices, and supporting software will continue.

Under the LCR MSCP, the following will be reviewed and developed: (1) program-wide standards for data collection, (2) documentation for data collection processes in the field, and (3) automated data collection requirements when using mobile devices, which will ensure that data collection is consistent regardless of who is collecting it. Maintenance of the Native Fish Augmentation Database will continue, with other fish project data modules being constructed following standardization of individual projects.

Development of database schema, data mapping, and coding will continue in order to support importation of collected MEFF data into the standardized LCR MSCP SQL database for the following projects: fish (B1 and D8), bats (C35, D9, and F4), cotton rats (D10 and F3), yellow-billed cuckoo (D7 and F2), and southwestern flycatcher (D2 and F2). This effort included the creation of new and/or evaluation of queries to support each project. Accompanying process flow documentation was also created/updated for overall database maintenance and project-specific operations.

Proposed FY16 Activities: Existing MEFFS will continue to be updated, and new MEFFs will continue to be developed. Additionally, the search for and testing of more advanced methods of electronic field data collection methods will continue.

The LCR MSCP centralized database will continue to be maintained. In FY16, LiDAR data acquisition will be moved under Work Task F1, but the raw data will be managed and maintained under Work Task G1.

Database schemas and data import/conversion codes will continue to be designed or updated in support of the MEFFs for projects as appropriate. The Native Fish Augmentation Database will continue to be maintained, with other fish project data modules being constructed following standardization of individual projects.

Efforts to provision software that will enable project coordinators to access LCR MSCP SQL database tables and continue the import/conversion process of raw data will continue. LCR MSCP staff will design, establish, and test quality assurance procedures that provide the necessary audit trails from raw field data to final production data.

Drafting additional sections of the LCR MSCP Data Management Plan will resume in FY16.

Pertinent Reports: N/A

Work Task G3: Adaptive Management Research Projects

FY14 Estimates	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$300,000	$260,667.43	$2,326,051.38	$300,000	$300,000	$300,000	$300,000

Contact: Sonja Kokos, (702) 293-8033, skokos@usbr.gov

Start Date: FY06

Expected Duration: FY55

Long-Term Goal: Effective conservation of native species and their habitats

Conservation Measures: All conservation measures relating to habitat creation, species research, system monitoring, and fish augmentation

Location: System-wide

Purpose: To develop tools to effectively evaluate conservation actions

Connections with Other Work Tasks (Past and Future): Research projects initiated under this work task may be continued as Species Research (Section C). Information obtained may be used for Fish Augmentation (Section B), System Monitoring (Section D), Conservation Area Development and Management (Section E), Post-Development Monitoring (Section F), or Funding Accounts (Section H) work tasks.

Project Description: The AMP process is an assurance that the conservation actions presented in the HCP are effectively accomplished. Tools by which the conservation actions can be measured will be developed and evaluated, and data to improve the efficacy of techniques to successfully create habitat will be provided.

LCR MSCP staff will be able to initiate priority research projects in a timely manner. For example, opportunistic research proposals (e.g., time sensitive, such as spawning or breeding season dependent) can be considered and initiated during the funding year and then be elevated to full research or monitoring status (Section C, D, or F work tasks) the following year. Also, experimental techniques can be evaluated through research to assess their utility, and if found to be useful, they would be incorporated into monitoring activities.

Previous Activities: All previous activities were moved to other work tasks after the initial year of funding.

FY14 Accomplishments:

Flannelmouth Sucker Radio Telemetry Testing: Field testing of low-frequency radio tags showed limited use of this technology in its current state; depth and conductivities proved to be the biggest obstacles to good reception. Short-term surgical effects on juvenile flannelmouth sucker implanted with appropriate sized tags showed no adverse impacts on health or swimming. Conversations with the manufacturer of the tags provided some additional opportunities to optimize this technology for use on juvenile flannelmouth sucker in Reach 3. It was suggested that the transmitting signal could be boosted in exchange for a shortened tag life, or the trailing antenna could be extended to maximize the signal. Both of these tradeoffs greatly increased the viability of the technology, and it was implemented in FY15 for the research being conducted under Work Task C53.

Reach 3 Juvenile Razorback Sucker Monitoring: Additional effort was expended targeting juvenile razorback sucker in Reach 3. Small mesh nets and larval surveys were conducted throughout Topock Gorge. No juvenile native fish were contacted during the surveys, and larvae were present throughout the study reach but decreased in abundance the further downstream the surveys were conducted. The downstream decrease in abundance indicated that the majority of spawning was occurring above Topock Gorge and was likely larval drift from the Needles spawning aggregation. The lack of juvenile fish in the netting surveys was not unexpected; flannelmouth sucker are known to reproduce in this reach and, they too, are extremely rare as juveniles. Small mesh netting continue to be incorporated into general monitoring surveys in order to maintain the potential to detect juvenile life stages for all native species. The field work will be completed through Work Task C64 beginning FY15.

Evaluation of Immediate Post-Stocking Survival of Razorback Sucker and Bonytail: Preliminary investigations to assess the potential sources and relative magnitude of immediate post-stocking mortality were initiated in FY14. A study plan was developed to assess latent mortality of stocked fish in LCR MSCP Reaches 2 and 3. This protocol had been drafted to determine latent mortality associated with transport and handling stress, building on the knowledge gained from Work Task C46 (closed). These data may be important to assess the effect of stocking treatments relative to stress-related mortality; stress may be accounting for immediate post-stocking mortality. In addition, a bioenergetics model of piscivorous bird predation has been initiated. The model will be a first step in assessing the relative effect that bird predation is having on the survival of stocked fish. The field work for both these investigations of post-stocking latent mortality will be completed through Work Task C65 beginning FY15.

Pilot Releases of Sonic-Tagged Bonytail: FY14 funding from this work task was used to acquire sonic tags, manual tracking equipment, and SURs for use in the FY15 pilot release of sonic-tagged bonytail in Lake Mohave (C64). Additional sonic tags were also purchased for use with Lake Mohave razorback sucker, as this work can be performed concurrently and will help to maximize this effort and the use of acquired equipment. Data gathered from this effort will be used to inform managers of future stocking needs of bonytail in Lake Mohave to meet program commitments.

FY15 Activities: Research questions identified during fish augmentation, species research, system-wide monitoring, habitat creation, and post-development monitoring will be evaluated for development into adaptive management research projects under this work task.

Assessment of Avian Predation on Native Fish: Monitoring data from current research projects show that cormorants can be implicated as major predators of recently released bonytail, and under other projects, razorback sucker PIT tags have been detected at known avian roosting sites for both herons and cormorants. The current knowledge base for this predation pressure has primarily been from anecdotal observations during monitoring and research projects. Funding will be provided this year to evaluate various techniques designed to detect and document avian predation through observation and monitoring of roosting sites. This information will assist in quantifying the avian pressure on native fish. Quantification of this pressure will provide for more robust modeling and estimates for survival and may assist ongoing work under Work Task C65.

Proposed FY16 Activities: Research questions identified during fish augmentation, species research, system-wide monitoring, habitat creation, and post-development monitoring will be evaluated for development into adaptive management research projects under this work task.

Pertinent Reports: The report titled *Development and Characterization of Microsatellite PCR Primers for Bonytail Chub for use in Assessing Relatedness of Fishes Produced in Off-Channel Habitats* is posted on the LCR MSCP Web site.

Work Task G4: Science/Adaptive Management Strategy

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$250,000	$275,414.62	$918,791.70	$400,000	$600,000	$600,000	$600,000

Contact: Sonja Kokos, (702) 293-8033, skokos@usbr.gov

Start Date: FY06

Expected Duration: FY55

Long-Term Goal: Ensure successful and efficient implementation of the LCR MSCP conservation measures

Conservation Measures: All conservation measures related to habitat creation, species research, system monitoring, and fish augmentation

Location: LCR MSCP planning area

Purpose: To define the procedure for implementing the LCR MSCP using the best available science and adaptive management processes

Connections with Other Work Tasks (Past and Future): All science-based work tasks

Project Description: The HCP conservation measures were designed to meet the biological needs of 26 covered species and to benefit 5 evaluation species. A science strategy, developed in FY06, defined the processes for ensuring implementation of the LCR MSCP using the best available science, and it described a two-tier planning process to ensure effective implementation of research and monitoring actions: first, a 5-year planning cycle and, second, annual work plans covering a 3-year cycle.

Every 5 years, a plan will be developed that describes the current knowledge of covered species, establishes the monitoring and research priorities for that 5-year period, and describes potential challenges that may inhibit successful implementation of the conservation measures. During each 5-year cycle, the accumulated data from ongoing research and monitoring will be reviewed along with existing species accounts. The highest priority for the next 5-year period is to complete any ongoing research and monitoring activities. Second priority will be given to new research and monitoring needs identified by ongoing work.

Third priority will be given to refining and updating life history datasets. Additional work may be generated from the evaluation of research conducted under Work Task G3.

LCR MSCP staff will participate in interagency meetings and workshops held to discuss natural resource conservation along the LCR. These meetings bring together scientists, managers, and resource users interested in the LCR ecosystem. Additional special topic workshops will be held for covered species or their habitats as needed to revisit the status of one or more of these species within the LCR MSCP area.

Recently completed, ongoing, and proposed research and monitoring activities will be reviewed as they relate to the current 5-year monitoring and research priority plan.

Previous Activities: The Science Strategy was developed in FY06–07. CRTR Group and CRAB meetings were attended. The *Habitat Creation Conservation Measure Accomplishment Tracking Process* was developed for tracking conservation measure accomplishment pertaining to the habitat creation conservation measures and approved by the Steering Committee in FY12. The *LCR MSCP Five-Year Monitoring and Research Priorities: 2008–2012* was completed in FY13.

FY14 Accomplishments: A habitat creation accomplishment analysis was conducted to show acreage totals for each species at each conservation area where applicable. These totals can be found in table 1-9.

An independent program review was completed on the bat monitoring projects; recommendations were made to better connect habitat data collection with managing conservation areas for covered bat species. Each bat research and monitoring project will be evaluated through the adaptive management process; recommendations for changes will be reported here and under the research and monitoring work task.

Conceptual ecological models (CEMs) are widely recognized and utilized in natural resource management and structured decisionmaking, as they provide a clear framework for guiding management actions. CEMs were developed for southwestern willow flycatcher, yellow-billed cuckoo, and razorback sucker at the end of 2014 in which a collection of hypotheses, such as species' life cycles, species habitat requirements and limitations, factors that control abundance, spatial and temporal distribution, quality of habitat conditions, and the causal relationships among them, were compiled. Understanding these elements and how they relate vary, with a high level of certainty in some cases and a great deal of uncertainty in others. CEMs collectively and individually provide managers with a record of the current knowledge, decisions made, and the next steps to be implemented.

CEMs were developed during this fiscal year for the following species: bonytail, flannelmouth sucker, western least bittern, western red bat, western yellow bat, gilded flicker, and Sonoran yellow warbler. These models are intended to be used to track species research and monitoring priorities related to conservation measure accomplishment.

In FY14, recommendations for three minor modifications to conservation measures were approved by the Steering Committee on April 23. The western yellow bat research and monitoring activities provided habitat information to adjust Conservation Measure WYBA1 to include the creation of roosting "or foraging" habitat since western yellow bats primarily roost in palm trees and forage in cottonwood-willow habitats. Research and monitoring for the Arizona Bell's vireo provided a greater understanding of the variety of structural types the species uses. Conservation Measure BEVI1 was adjusted to include cottonwood-willow structure types I and II to the current III and IV. Colorado River cotton rat monitoring supported that Conservation Measure CRCR2 be adjusted to include cottonwood-willow and mesquite habitats because the species have been routinely found in all riparian habitats.

FY15 Activities: Research and monitoring activities will continue to be reviewed and evaluated internally as well as through independent reviewers.

Through recommendations from the independent program review of the bat research and monitoring program, it was decided to adjust system-wide acoustic monitoring to collect data seasonally when bats are most active and for covered species only as opposed to year round.

Development of CEMs continues for the following species: bonytail, flannelmouth sucker, western least bittern, western red bat, western yellow bat, gilded flicker, and Sonoran yellow warbler. Development of CEMs for the following species have begun: Yuma clapper rail, California black rail, Colorado River cotton rat, Yuma hispid cotton rat, elf owl, Gila woodpecker, vermilion flycatcher, Arizona Bell's vireo, summer tanager, and MacNeill's sootywing. These models are intended to be used to track species research and monitoring priorities related to conservation measure accomplishment.

A study designed to compare population estimates of razorback sucker using data from traditional trammel netting versus remote PIT tag scanners will be implemented in Lake Mohave in 2015. Population estimates have historically required mark-recapture data from trammel netting during the March roundup, but these are imprecise due to low recapture rates, and they require handling fish during the spawning season. Remote PIT scanning started in 2010 and has provided more precise estimates due to higher contact rates. However, the accuracy of these estimates is uncertain because scanners have not yet been deployed at all sites targeted by netting at the same time of year. Over the next 3 years, the area sampled with scanning will be expanded to more closely match

that of netting for the same time period used for developing population estimates. Scanning will also be done for a longer period of time to determine how population estimates vary with scanning effort and to track trends in fish activity on the spawning beds. Information from this study will be used to determine whether and how the frequency of trammel netting can be reduced to help avoid disturbing razorback sucker spawning activity.

As described in the "Fish Augmentation, Monitoring, and Research" overview in Species Research (Section C), efforts will begin in FY15 to better assess the current genetics of razorback sucker in Lake Mohave and develop a standardized long-term fisheries genetic monitoring program. Additional data will be gathered by collecting genetic samples at the time of tagging. This change in collection protocol, combined with the expanded use of remote PIT scanners, may greatly increase the precision of genetic stock assessment of Lake Mohave over time. This additional information is intended to assist the adaptive management process by defining the needs of the program with respect to the collection genetic information. A pilot demonstration is planned for early in FY16 to determine the feasibility and potential cost effectiveness of fully implementing this change. As part of the adaptive management process, an independent review of the genetic research will be initiated to help identify the appropriate level of effort and long-term needs for monitoring fisheries genetics.

Coordination with landowners and agency partners for development of conservation area managements plans will continue.

Proposed FY16 Activities: A prioritized program review of research and monitoring activities will be conducted and evaluated internally as well as through independent reviewers. Specific programs include: a fish genetics monitoring program, avian monitoring programs, and vegetation monitoring.

Following completion of all species-specific CEMs, a pilot spatial analysis will be conducted at select conservation areas using all relative data to assess proposed management guidelines. Once management guidelines have been established, the development of conservation area management plans is expected to begin.

Pertinent Reports: The reports titled *Final Science Strategy; LCR MSCP Five-Year Monitoring and Research Priorities—2008-2012, LCR MSCP Five-Year Monitoring and Research Priorities—2013-2017,* and *Final Habitat Creation Conservation Measure Accomplishment Tracking Process* are posted on the LCR MSCP Web site.

Work Task G5: Conceptual Ecological Models

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$0	$0	$0	$0	$60,000	$20,000	$10,000

Contact: Sonja Kokos, (702) 293-8033, skokos@usbr.gov

Start Date: FY16

Expected Duration: FY55

Long-Term Goal: Species research and monitoring

Conservation Measures: MRM1, MRM2, MRM3, CLRA1, CLRA2, WIFL1, WIFL2, BONY2, RASU2, WRBA1, WRBA2, WYBA1, WYBA3, DPMO1, CRCR1, CRCR2, YHCR1, YHCR2, LEBI1, BLRA1, BLRA2, YBCU1, YBCU2, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, FLSU1, MNSW1, MNSW2, CLNB1, CLNB2, PTBB1, PTBB2, CRTO1, CRTO2, CRTO3, LLFR1, LLFR2, and LLFR3

Location: System-wide, Arizona, California, Nevada

Purpose: To assess and organize existing knowledge on each LCR MSCP covered and evaluation species to determine research, monitoring, and habitat requirements for current and future fish augmentation, research, monitoring, and habitat creation projects

Connections with Other Work Tasks (Past and Future): Previous work was done through Work Tasks C3, G3, and G4. Information collected under this work task is currently being used to develop future work tasks and research projects, design monitoring programs and habitat creation projects, and to implement the adaptive management process. Information from this work task will be used under Fish Augmentation (Section B), Species Research (Section C), System Monitoring (Section D), Conservation Area Development and Management (Section E), and Post-Development Monitoring (Section F).

Project Description: To successfully create and manage habitats for LCR MSCP covered species, CEMs are being developed to better direct research and monitoring efforts as well as direct management.

CEMs integrate and organize existing knowledge concerning: (1) what is known about an ecological resource, with what certainty, and the sources of this information; (2) critical areas of uncertain or conflicting science that demand

resolution to better guide management planning and action; (3) crucial attributes to use while monitoring system conditions and predicting the effects of experiments, management actions, and other potential agents of change; and (4) how the characteristics of the resource are expected to change as a result of altering its shaping/controlling factors, including those resulting from management actions.

Previous Activities: This is a new start in FY16.

FY14 Accomplishments: This is a new start in FY16.

FY15 Activities: This is a new start in FY16.

Proposed FY16 Activities: The information previously reported under Work Task C3 will be reported here. Development of CEMs under Work Tasks G3 and G4 will be moved and also reported here in FY16.

Development of CEMs for the evaluation species will begin in FY16.

Pertinent Reports: N/A

WORK TASKS – SECTION H

Funding Accounts

Work Task H1: Existing Habitat Maintenance

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$6,928,680	$7,604,720.64	$26,986,720.64	$4,848,060	$0	$0	$0

Contact: Sonja Kokos, (702) 293-8033, skokos@usbr.gov

Start Date: FY06

Expected Duration: FY55

Long-Term Goal: Maintenance of existing habitat

Conservation Measures: CLRA2, BLRA2, WIFL2 and YBCU2

Location: LCR (Reaches 1–7)

Purpose: To maintain existing habitat areas, excluding newly created habitat within conservation areas, by implementing actions that will prevent the further degradation or loss of habitat for LCR MSCP covered species

Connections with Other Work Tasks (Past and Future): These are stand-alone conservation measures as described in the LCR MSCP HCP.

Project Description: A $25 million interest-bearing fund, to be fully funded by the end of FY15, is being established over a 10-year period to restore habitats suitable for LCR MSCP covered species in the planning areas that have become degraded since the program was initiated. Funding contributions during the initial 5 years of the LCR MSCP were established at $500,000 per year. Funding contributions in years 6–10 were established at $5,000,000 per year. Both values are indexed to 2003 dollars and adjusted annually for inflation. The habitat was degraded by past river operations and maintenance that are going to continue. The HMF will be administered by the Program Manager. A process for requesting, reviewing, selecting, disbursing, and tracking dollars from this fund was drafted in consultation with the USFWS and approved by the Steering Committee in April 2012.

The funds required to administer the HMF under the LCR MSCP will be tracked under Work Task A1. The lead agencies and planning participants are expected to use their own funds in the development of proposals and for participation in planning teams. Funding for design, construction, and inspection would be part of the applicant's proposal.

The HMF specifies a priority for projects to be funded. Marsh is the top priority; in the first 10 years of the HMF, the core population areas will be the primary focus, with additional smaller projects that ensure connectivity of source populations. Priority 1 for use of the fund is the protection of marsh, and specifically marsh complexes, occupied by LCR MSCP covered rail species that serve as key source populations. The four key source population areas are Topock Marsh and Topock Gorge within the Havasu NWR, the Imperial Division primarily within the Imperial NWR, and Mittry Lake, which is located on Reclamation withdrawn lands. The focus of the first 10 years of expenditures from the HMF (FY16–25) is: (1) the evaluation of infrastructure changes to manage water levels for rail species at both Topock Marsh and Mittry Lake and (2) the identification of riverine portions of Topock Gorge and the Imperial Divisions, which are becoming degraded, and development of proposals to provide maintenance of these areas.

Previous Activities: Annual contributions were made through FY13.

FY14 Accomplishments: A total of $7,604,720.64 was deposited into interest-bearing accounts by Arizona, California, and Nevada partners. It consisted of $5,742,000 of required funding, $1,186,680 of additional funding, $654,015 of required underfunding payments from Arizona and Nevada, and $22,025.64 in overpayments from Arizona and Nevada. Both Arizona and Nevada will use these overpayments to reduce their required contribution in FY15. California will pay its underfunding amount in FY15.

FY15 Activities: A total of $5,480,049.36 will be deposited into interest-bearing accounts among Arizona, California, and Nevada partners, which will complete the funding requirement for the HMF. It will consist of $4,826,034.36 in required funding and California's underfunding payment of $654,015.00

In coordination with the USFWS Ecological Service's Office, planning teams, comprised of representatives of appropriate resource agencies, will be assembled in order to investigate the option of using the HMF to maintain key population centers at both Topock Gorge and Mittry Lake.

Proposed FY16 Activities: In coordination with the USFWS Ecological Service's Office, work will continue with planning teams, comprised of representatives of appropriate resource agencies, to investigate the option of using the HMF to maintain key population centers at both Topock Gorge and Mittry Lake.

In addition, LCR MSCP staff will actively solicit small, specific actions (e.g., burning or other small marsh restoration projects) both in Topock Gorge and within the Imperial Division to restore habitat for rail populations and ensure connectivity of source populations. Fiscal year 2016 will be the first year in

which no contributions to the HMF are made, and no expenditures from the fund are anticipated in FY16. Costs to administer the HMF, participation in the planning teams, and development of proposals will be tracked under Work Task A1.

Pertinent Reports: N/A

Work Task H2: Remedial Measures Fund

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$339,416	$1,434,267.44	$2,432,565.44	$361,228	$1,104,052	$1,104,052	$1,104,052

Contact: John Swett, (702) 293-8555, jswett@usbr.gov

Start Date: FY13

Expected Duration: FY55

Long-Term Goal: Remedial measures for changed circumstances

Conservation Measures: CLRA1, WIFL1, BONY2, BONY3, RASU2, RASU3, WRBA2, WYBA3, CRCR2, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, FLSU1, and MNSW2

Location: LCR (Reaches 1–7)

Purpose: To implement remedial measures to respond to changed circumstances as necessary

Connections with Other Work Tasks (Past and Future): Any Fish Augmentation (Section B) and Conservation Area Development and Management (Section E) work tasks that may be affected by changed circumstances

Project Description: To address the potential for changed circumstances, a contingency fund was established to implement remedial measures identified in the HCP. On April 25, 2012, the Steering Committee passed Program Decision Document 12-001, which approved establishment of State interest-bearing RMFs. The total funds allocated to remedial measures was $13,270,000 (in 2003 dollars and indexed to inflation).

In the event that changed circumstances occur, the Program Manager will implement remedial measures identified in the HCP. The measures will be implemented within the available LCR MSCP budget, including contingency funds allocated through this work task. The Program Manager will administer the RMF.

Previous Activities: A RMF process was established and approved by the Steering Committee in FY12.

FY14 Accomplishments: A total of $1,434,267.44 was deposited into three non-Federal interest-bearing accounts among Arizona, California, and Nevada. It consisted of $339, 416.00 in required funding, $1,056,219.00 of required underfunding payments from Arizona and Nevada, and $38,632.44 in overpayments from Arizona and Nevada. Both Arizona and Nevada will use these overpayments to reduce their required contribution in FY15.

FY15 Activities: A total of $1,758,866.56 will be deposited into three non-Federal interest-bearing accounts among Arizona, California, and Nevada. It will consist of $322,595.56 of required funding from Arizona, Nevada, and California, and $1,436,271.00 in underfunding payments from California.

Proposed FY16 Activities: A total of $1,104,052 is expected to be deposited into three non-Federal interest-bearing accounts among Arizona, California, and Nevada.

Pertinent Reports: N/A

WORK TASKS – SECTION I

Public Outreach

Work Task I1: Public Outreach

FY14 Estimate	FY14 Actual Obligations	Cumulative Expenditures Through FY14	FY15 Approved Estimate	FY16 Proposed Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate
$100,000	$104,431.22	$410,400.36	$100,000	$100,000	$100,000	$100,000

Contact: Nathan Lenon, (702) 293-8015, nlenon@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-Term Goal: To increase education and support for the LCR MSCP

Conservation Measures: N/A

Location: N/A

Purpose: To communicate, coordinate, and educate LCR MSCP Steering Committee members, internal and external stakeholders, and the general public about LCR MSCP implementation activities

Connections with Other Work Tasks (Past and Future): All LCR MSCP work tasks

Project Description: Under this work task, an outreach program for the LCR MSCP will be implemented. Activities are widely varied and include the creation of educational materials, participation at conferences and other public events, interaction with some school events, and coordination with youth conservation corps groups. Outreach may be specific to a project but more typically addresses the overall focus of the LCR MSCP and general conservation issues.

Previous Activities: Two regional science annual meetings, CRTR and CRAB, have been sponsored under the LCR MSCP to provide centralized forums for scientists and resource managers to discuss current research and monitoring projects taking place on the LCR. Space is devoted within the LCR MSCP Web site to highlight both of these meetings.

A wide range of printed materials, videos, and reports has been created to explain various program features in both summary (fact sheet) format as well as more lengthy reports. Several banner displays have been created; these materials have been used extensively to promote the program at conferences, conservation area dedications, and other events.

FY14 Accomplishments: Valley High School (Las Vegas) students participated in a tour of the Lake Mead Fish Hatchery with the NDOW, learning about native fish conservation. LCR MSCP staff partnered with various southern Nevada agencies to participate in International Migratory Bird Day (Clark County Wetlands Park) and National Public Lands Day (Laughlin, Nevada) events. The Water Education Foundation toured the BBCA. A Webinar was conducted with Phoenix-based Bioscience High School to discuss the LCR operation, water management, and habitat conservation.

LCR MSCP information was exhibited at numerous science education events throughout Las Vegas and Laughlin, which included the fourth annual Las Vegas Science Expo. LCR MSCP staff participated in educational events at schools in Henderson, Las Vegas, and Boulder City.

Classes from Arizona State University in Lake Havasu City participated in post-development monitoring at some sites and included bat mist netting, small mammal trapping, MAPS bird banding, and razorback sucker monitoring. These educational field trips provided some volunteer labor while also enriching the students' curriculum and fostering a relationship between them, the community, and the program. Arizona State University students volunteered 88 hours of labor during the year.

LCR MSCP staff partnered with the NPS (Lake Mead) to support three Project WET (Water Education for Teachers) continuing education workshops. These workshops focused on explaining water science and related issues. Through support of these workshops, the NPS was able to educate southern Nevada teachers about the LCR MSCP within the context of the LCR.

FY15 Activities: In FY15, a new set of indoor displays for conferences and other indoor exhibits will be created and will include four individual informational panels and a custom-printed table wrap. Several additional species cards, focusing primarily on birds, have been added this year.

Planning for the 10-year program anniversary tour is a focus in FY15. Emphasis will be placed on developing additional project displays and materials to enhance the tour, as well as to provide logistical support for the tour itself.

LCR MSCP staff will continue the partnership with the NPS to support the Project WET continuing education workshops.

Proposed FY16 Activities: Emphasis for outreach will continue to focus on LCR MSCP stakeholder education, with interaction in local communities. LCR MSCP staff will continue to support one to three large events per year, such as the Colorado River Water Users Association and the Las Vegas Science and

Technology Festival, which present opportunities to expand stakeholder knowledge of the program. Outreach to local community schools and colleges will continue.

Pertinent Reports: The annual reports for public outreach are posted on the LCR MSCP Web site for years 2011–12. The 2013 report has been completed and is awaiting review and posting. The 2014 report is being developed.

ATTACHMENTS

A Letter from Central Arizona Water Conservation District

B Description of Take

B-1: Federal Flow-Related Covered Actions and Accomplishments, Calendar Year 2014

B-2: Federal Non-Flow-Related Covered Actions and Incidental Take Summary, Fiscal Year 2014

B-3: LCR MSCP Non-Federal Covered Activities and Incidental Take Summary, Fiscal Year 2014

C Recommendations from Resource Agencies

D Financial Statement

D-1: Required Contributions
D-2: Funding Credits
D-3: Funding Accounts
D-4: Cumulative Program Accomplishment

E Reports Published in Fiscal Year 2014

Attachment A – Letter from Central Arizona Water Conservation District

CAP
CENTRAL ARIZONA PROJECT

June 4, 2015

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Gentlemen:

The Multi-Species Conservation Program (MSCP) Non-Federal share for the Federal Fiscal Year 2016, both annually and quarterly, are shown by state below. The inflation index used is 1.387.

FY16 is year 11 of the program and the first year of Arizona's 20 year payback period.

FY 2016 Non-Federal Share (2003 $)	$11,082,000
FY 2016 Inflation Index	1.387
FY 2016 Non-Federal Share (Escalated $)	$15,370,734

FY 2016 Non-Fed	Arizona Payback	Other Work Tasks	Remedial Measures	Total Non-Fed Payment Due
Arizona	$ 730,224.30	$3,566,670.50	$ 276,013.00	$ 4,572,907.80
Nevada	(365,112.15)	3,566,670.50	276,013.00	3,477,571.35
California	(365,112.15)	7,113,341.00	552,026.00	7,320,254.85
Totals	$ 0.0	$14,266,682.00	$1,104,052.00	$15,370,734.00

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FY 2015 Quarterly Payments		Arizona Payback	Other Work Tasks	Remedial Measures	Total Non-Fed Payment Due
Arizona	Q1	$ 182,556.08	$ 891,667.63	$ 69,003.25	$1,143,226.96
	Q2	182,556.08	891,667.63	69,003.25	1,143,226.96
	Q3	182,556.08	891,667.63	69,003.25	1,143,226.96
	Q4	182,556.06	891,667.61	69,003.25	1,143,226.92
	FY Totals	$ 730,224.30	$3,566,670.50	$276,013.00	$4,572,907.80
Nevada	Q1	$ (91,278.04)	$ 891,667.63	$ 69,003.25	$ 869,392.84
	Q2	(91,278.04)	891,667.63	69,003.25	869,392.84
	Q3	(91,278.04)	891,667.63	69,003.25	869,392.84
	Q4	(91,278.03)	891,667.61	69,003.25	869,392.83
	FY Totals	$ (365,112.15)	$3,566,670.50	$276,016.00	$3,477,571.35
California	Q1	$ (91,278.04)	$1,783,335.25	$138,006.50	$1,830,063.71
	Q2	(91,278.04)	1,783,335.25	138,006.50	1,830,063.71
	Q3	(91,278.04)	1,783,335.25	138,006.50	1,830,063.71
	Q4	(91,278.03)	1,783,335.25	138,006.50	1,830,063.72
	FY Totals	$ (365,112.15)	$7,133,341.00	$552,026.00	$7,320,254.85

If you have any questions, please call or e-mail either Dana Sedig, 623-869-2148 (dsedig@cap-az.com) or myself, 623-869-2167 (tcooke@cap-az.com).

Sincerely,

Theodore Cooke
Interim General Manager
Central Arizona Project

Attachments

Cc John Swett, MSCP Program Manager, Bureau of Reclamation
Laura Vecerina, MSCP Program Deputy Manager, Bureau of Reclamation
Linda Carbone, MSCP Management & Program Analyst
Douglas Dunlap, Manager-Finance and Accounting, CAP
Dana Sedig, Supervisor-Financial Operations, CAP

Section 8.1.1 - Fiscal Year 2016 Inflation Calculation for Lower Colorado River Multi-Species Conservation Program (Actual Indices through September 2014)

Item		Description / Formula		Values		Result
FY	=	Federal Fiscal Year Being Adjusted for Inflation		2016		2016
FY-2	=	Federal Fiscal Year for 2 years prior to Federal Fiscal Year Being Adjusted for Inflation		2014		2014
PPI Inflation Index for FY	=	Producer Price Index for Materials and Components for Const Sept FY-2 / Producer Price Index for Materials and Components for Const Sept 2002	=	228.5/ 152.1	=	1.502
Base Year for PPI	=	*Validate or change base year for PPI Index (Original index year = 1982)*	=	1982		
		Validate or change PPI index value for September 2002 according to the validated base year	=	152.1		
		Save a copy of the PPI index				
GDPIP Inflation Index for FY	=	Gross Domestic Product Implicit Price Deflator September 30, FY-2 / Gross Domestic Product Implicit Price Deflator September 30, 2002		132.625 / 104.243	=	1.272
Base Year for GDPIP	=	*Validate base year of GDPIP (Original index year = 2000)*	=	2009		
		Adjust published numbers for 2016 (108.603) to match base of 2000 (130.398)		108.603	=	132.625
		Save a copy of the GDPIP index and calcuations to adjust published numbers				
Inflation Index for FY	=	(PPI Inflation Index for FY + GDPIP inflation Index for FY)/2		(1.502+1.272)/2	=	**1.387**
Non-Federal Funding Obligation for FY	=	(5 - year Amount from Table 7-1 of HCP 2003 dollars adjusted to yearly amount)/2	=	$110,820 / 5 = $22,164 $22,164 / 2	=	$11,082
Federal Funding Obligation for FY	=	(5 - year Amount from Table 7-1 of HCP 2003 dollars adjusted to yearly amount)/2	=	$110,820 / 5 / 2	=	$11,082
Non-Federal Indexed Funding Obligation for FY	=	(Non-Federal Funding Obligation for FY) X (Inflation Index for FY)		$11,082 X 1.387	=	$15,370,734
Federal Indexed Funding Obligation for FY	=	(Federal Funding Obligation for FY) X (Inflation Index for FY)		$11,082 X 1.36087	=	$15,370,734

All $ are in thousands

Individual State's share in $			
California Share - 50%		50%	$ 7,685,367.00
Arizona Share - 25%		25%	$ 3,842,683.50
Nevada Share - 25%		25%	$ 3,842,683.50
Total Non-Federal Share			$ 15,370,734.00

Arizona Payback ($10,529,550/20yrs = $526,477.50 X 1.387 =	$ 730,224.30
California	$ (365,112.15)
Nevada	$ (365,112.15)

Total Non-Federal Share for FY16	
California Share	$ 7,320,254.85
Arizona Share	$ 4,572,907.80
Nevada Share	$ 3,477,571.35
Total Non-Federal Share	$ 15,370,734.00

G:\MSCP\MSCP - DTM\FY 16\MSCP FY16 Rebased Inflation Index.xlsx 6/11/2015

Instructions on how to rebase a published index include:

- When a base year for an Inflation Index changes, it is necessary to perform a mathematical calculation to return the index back to the original base year (2000 for GDPIPD and 1982 for PPI)

Gross Domestic Product Implicit Price Deflator Index Procedures

- For example, in 2013 the base year for the GDPIPD Inflation Index (Table 1.1.9) changed from 2005 to 2009. To return the quarterly index back to a year 2000 base, the published index is divided by the four-quarter average for year 2000. Below is an illustration of how the published GDPIPD Inflation Index for third quarter 2014 was adjusted from a year 2009 base to a year 2000 base. Prior to the adjustment, the index was 108.603. Following the rebasing to year 2000, the index increased to 132.625.

Table 1.1.9 Implicit Price Deflators for Gross Domestic Product
[Index numbers, 2009 = 100]; Seasonally adjusted
Quarterly data from 1969 to 2014
Bureau of Economic Analysis
Data published April 29, 2015

Year	2000	2000	2000	2000	2014	2014	2014
Quarter	1	2	3	4	1	2	3
Index	81.165	81.625	82.156	82.600	107.658	108.231	108.603
Average for 2000 =		81.887					

Avg for 2000				2014 Q3 Rebased Index
108.603 / 81.887	X	100	=	132.625

- Verify the accuracy of the calculations by performing two tests.
  - The first test verifies that percentage changes between the two indices remained constant.

Compare the old index percent change with the rebased index percent changes. They should equal.

[Index numbers, 2009=100]

Year	2000	2000	2000	2000	2001, 2002,...	2013	2014	2014	2014
Quarter	1	2	3	4		4	1	2	3
2009 Base	81.165	81.625	82.156	82.600		107.301	107.658	108.231	108.603

[Index numbers, 2000=100]

Year	2000	2000	2000	2000	2001, 2002,...	2013	2014	2014	2014
Quarter	1	2	3	4		4	1	2	3
2000 Base	99.119	99.681	100.329	100.871		131.035	131.471	132.17	132.625

	2000			2001, 2002,...	2014		
Percent Changes	Q1-Q2	Q2-Q3	Q3-Q4		13Q4-14Q1	14Q1-14Q2	14Q2-14Q3
2009 Base	0.6%	0.7%	0.5%		0.3%	0.5%	0.3%
2000 Base	0.6%	0.7%	0.5%		0.3%	0.5%	0.3%

  - The second test verifies the average of the new base year quarterly indices equaled 100.

Average the new base year quarterly indices to ensure they average to 100.

2000	2000	2000	2000	
1	2	3	4	AVG 2000
99.119	99.681	100.329	100.871	100.000

PPI Index Change Procedures

- If the PPI base period changes, Financial Planning and Analysis will need to contract the Bureau of Labor Statistics to obtain the specific rebasing factors needed for the computation. In 2013 the base year for the GDPIPD Inflation Index (Table 1.1.9) changed from 2005 to 2009. To return the quarterly index back to a year 2000 base, the published index is divided by the four-quarter average for year 2000.

Bureau of Economic Analysis

Table 1.1.9. Implicit Price Deflators for Gross Domestic Product

[Index numbers, 2009=100] Seasonally adjusted

Last Revised on: April 29, 2015 - Next Release Date May 29, 2015

Line		2013 I	2013 II	2013 III	2013 IV	2014 I	2014 II	2014 III	2014 IV	2015 I
1	**Gross domestic product**	**106.204**	**106.488**	**106.923**	**107.301**	**107.658**	**108.231**	**108.603**	**108.647**	**108.618**
2	**Personal consumption expenditures**	**106.949**	**107.072**	**107.517**	**107.787**	**108.153**	**108.780**	**109.113**	**108.998**	**108.457**
3	Goods	106.639	105.988	106.303	105.919	105.771	106.242	106.280	104.948	102.583
4	Durable goods	95.530	95.069	94.458	93.828	93.156	92.719	92.224	91.450	90.793
5	Nondurable goods	112.231	111.477	112.315	112.074	112.230	113.229	113.586	111.932	108.555
6	Services	107.119	107.637	108.150	108.755	109.385	110.093	110.580	111.101	111.510
7	**Gross private domestic investment**	**103.011**	**103.341**	**103.778**	**104.193**	**104.875**	**105.174**	**105.606**	**106.026**	**106.108**
8	Fixed investment	102.932	103.534	104.059	104.721	105.448	105.739	106.331	106.630	106.870
9	Nonresidential	102.617	103.052	103.356	103.694	104.051	104.362	104.635	104.711	104.864
10	Structures	106.854	108.168	108.741	109.787	110.409	110.800	111.447	111.745	111.726
11	Equipment	100.195	100.231	100.338	100.287	100.477	100.754	101.025	101.334	101.646
12	Intellectual property products	103.043	103.484	103.898	104.337	104.767	105.073	105.087	104.649	104.673
13	Residential	104.239	105.541	106.954	108.940	111.215	111.422	113.371	114.628	115.241
14	Change in private inventories	---	---	---	---	---	---	---	---	---
15	**Net exports of goods and services**	---	---	---	---	---	---	---	---	---
16	Exports	112.530	111.666	111.872	111.948	112.719	112.669	112.477	110.586	107.702
17	Goods	113.904	112.739	112.797	112.633	113.483	113.088	112.548	109.855	106.082
18	Services	109.608	109.400	109.929	110.539	111.136	111.843	112.434	112.355	111.406
19	Imports	114.502	113.054	113.292	113.291	114.088	113.868	113.714	111.660	106.764
20	Goods	116.778	115.104	115.383	115.182	116.049	115.776	115.582	113.100	107.305
21	Services	104.480	104.038	104.097	104.984	105.467	105.486	105.514	105.369	104.460
22	**Government consumption expenditures and gross investment**	**108.144**	**108.313**	**108.692**	**109.331**	**109.432**	**109.806**	**110.211**	**110.057**	**109.597**
23	Federal	106.835	107.104	107.419	108.805	108.119	108.577	108.735	108.620	108.535
24	National defense	106.833	106.989	107.244	108.060	108.075	108.522	108.641	108.419	108.156
25	Nondefense	106.845	107.305	107.723	110.073	108.225	108.701	108.925	108.988	109.199
26	State and local	109.051	109.153	109.571	109.728	110.331	110.651	111.214	111.035	110.338
	Addendum:									
27	Gross national product	106.324	106.608	107.044	107.423	107.778	108.350	108.722	108.760	---

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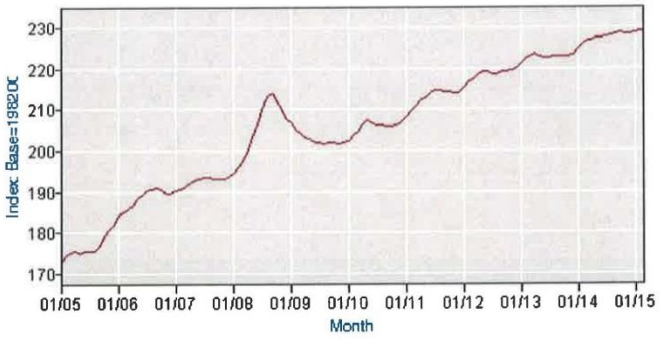

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Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2005	173.1	174.7	175.1	175.4	175.0	175.5	175.7	175.4	177.0	179.2	180.8	181.7
2006	184.2	185.0	185.5	186.7	188.2	189.2	190.2	190.7	191.0	190.4	189.6	189.6
2007	190.3	190.6	191.2	192.1	192.8	193.1	193.5	193.5	193.2	193.2	193.2	193.4
2008	194.4	195.7	197.3	200.2	203.3	206.5	209.8	212.9	214.0	212.2	210.2	207.9
2009	207.0	204.8	204.2	203.2	202.8	202.0	201.9	201.5	202.0	201.9	201.7	202.0
2010	202.3	203.5	204.6	206.1	207.4	206.6	206.3	206.2	205.9	205.9	206.3	207.0
2011	208.3	209.5	210.9	212.1	212.8	213.7	214.7	214.6	214.5	214.4	214.2	214.2
2012	215.3	216.8	217.4	218.3	219.1	219.1	218.5	218.7	219.2	219.1	219.5	219.9
2013	221.2	222.2	222.7	223.4	222.9	222.6	222.4	223.0	222.9	222.9	223.0	223.1
2014	224.8	225.8	226.6	226.8	227.4	227.4	227.7	228.2	**228.5**	228.6	228.5	228.3(P)

P : Preliminary. All indexes are subject to revision four months after original publication.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	228.8(P)	228.9(P)	229.2(P)									

P : Preliminary. All indexes are subject to revision four months after original publication.

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Attachment B – Description of Take

B-1: Federal Flow-Related Covered Actions and Accomplishments, Calendar Year 2014

Federal Covered Actions *Biological Assessment* Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions[1]	2014 Accomplishments[2, 3]
2.2 BUREAU OF RECLAMATION				
2.2.1 Ongoing Flow-Related Actions				
2.2.1.1 Flood Control (page 2-3; Table 2-1, page 2-5)	• Prescribed flood control releases per Field Working Agreement and Water Control Manual for Lake Mead/Hoover Dam	• Timing of required releases may be varied within the month • Anticipatory flood control releases • Available flood control space in Lake Mead can be reduced to 1.5 million acre-feet (maf) August 1 to January 1 if prescribed space is available in upstream reservoirs • Management of target elevations for Lake Mohave (Davis Dam) and Lake Havasu (Parker Dam)	• None	No flood control releases were made from Lake Mead. The hourly elevation of Lake Mead provided for flood control space, which was well above that space required. In 2014, the Lake Mead elevation varied between 1,080.19 and 1,108.96 feet above mean sea level. Elevations at Lake Mohave and Lake Havasu were managed to target elevations.
2.2.1.2 State Apportionment and Water Contracts (page 2-5; Table 2-2, page 2-6)	• Delivery of water to water users in the United States pursuant to applicable Federal law, including the Boulder Canyon Project Act (BCPA and the Supreme Court Consolidated Decree of 2006 in *Arizona* v. *California*, 547 U.S. 150 (Decree) • Delivery of a State's unused entitlement to a junior entitlement holder within that State on an annual basis	• Determinations and delivery of post-2016 unused apportionment water from one State to another within the Lower Basin on an annual basis	• Delivery of water to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree	Water deliveries were made to water users in Arizona, California, and Nevada to satisfy the basic entitlements for delivery of Colorado River water. In 2014, Nevada and Arizona did not use their entire apportionments. Arizona used 2,774,661 acre-feet and Nevada used 224, 616 acre-feet. Unused water within a State's apportionment was delivered to junior priority holders in that State.

Federal Covered Actions *Biological Assessment* Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions[1]	2014 Accomplishments[2, 3]
2.2.1.3 Annual Operations Normal, Surplus, Shortage, and Unused Apportionment (page 2-6; Table 2-3, page 2-9)	• Issuance of an annual operating plan • Delivery of water to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree • Delivery of water to Mexico pursuant to the 1944 Water Treaty • Determination of shortage conditions based on the Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead (Interim Guidelines) • Determination of surplus conditions based on the Interim Guidelines	• Revision of annual operations through the Annual Operating Plan (AOP), pursuant to the Long-Range Operation of Colorado River Reservoirs (LROC) within the year to reflect current hydrologic conditions • Determinations and delivery of post-2016 unused apportionment water from one State to another within the Lower Basin on an annual basis • Execution of agreements and the delivery of surplus water pursuant to the Reclamation Reform Act (RRA) and the Reclamation States Emergency Drought Relief Act • Periodic review of the LROC	• Delivery of water to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree	The Annual Operating Plan for 2014, which governed releases, was issued on December 24, 2014. Annual operations were revised through the AOP pursuant to the LROC and the Interim Guidelines to reflect current hydrologic conditions. An intentionally created surplus (ICS) condition was declared for 2014. ICS was created and delivered in 2014. Water was delivered to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree. Water was delivered to Mexico pursuant to the 1944 Water Treaty. No review of the LROC was conducted in 2014. In 2014, Nevada and Arizona did not use their entire apportionments.
2.2.1.4 Daily Hoover Dam Operations (Table 2-4, page 2-10)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States, deliver 1944 Water Treaty water to Mexico, and generate hydropower with these water releases	• Monthly energy targets are set prior to each month based on the best information available with respect to downstream water demands and lake elevation targets at Lakes Mohave and Havasu; energy targets may be revised during the month to meet changing water demands and other constraints (e.g., to benefit native fish in Lake Mohave)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States and to generate hydropower with these water releases	Water releases from Hoover Dam were made to satisfy beneficial use requirements of entitlement holders in the United States, to deliver 1944 Water Treaty water, and to generate hydropower with these water releases. Energy targets were set monthly based on the best information available with respect to downstream water demands and lake elevation targets at Lakes Mohave and Havasu. Energy targets were revised during the month (if needed) to meet changing water demands and other constraints.

Federal Covered Actions *Biological Assessment* Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions[1]	2014 Accomplishments[2, 3]
2.2.1.4 Daily Davis Dam Operations (Table 2-5, page 2-11)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States, deliver 1944 Water Treaty water to Mexico, and generate hydropower with these water releases	• Timing of releases, to a limited degree, may be varied by a few days based on available downstream storage, Lake Mohave and Lake Havasu operational constraints, downstream water requirements, and hydropower needs	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States and generate hydropower with these water releases	Water releases from Davis Dam were made to satisfy beneficial use requirements of entitlement holders in the United States, to deliver 1944 Water Treaty water to Mexico, and to generate hydropower with these water releases. The timing of releases was varied based on available downstream storage, operational constraints for Lakes Mohave and Havasu, downstream water requirements, and hydropower needs.
2.2.1.4 Daily Parker Dam Operations (Table 2-6, page 2-11)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States, deliver 1944 Water Treaty water to Mexico, and generate hydropower with these water releases	• Timing of releases, to a limited degree, may be varied by the hour based on hydropower needs, water requirements, or other operational constraints immediately downstream from the dam	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States and generate hydropower with these water releases	Water releases from Parker Dam were made to satisfy beneficial use requirements of entitlement holders in the United States, to deliver 1944 Water Treaty water to Mexico, and to generate hydropower with these water releases. The timing of releases was varied based on available downstream water requirements, hydropower needs, and other operational constraints immediately downstream from Parker Dam.
2.2.1.4 Daily Senator Wash, Imperial Dam, Laguna Dam, and Warren H. Brock Reservoir Operations (Table 2-7, page 2-11)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States, deliver 1944 Water Treaty water to Mexico, and generate hydropower with water releases for Senator Wash	• Senator Wash, Imperial Dam, and Laguna Dam operations to prevent over-deliveries, to release water to entitlement holders, for sluicing operations, to deliver a portion of the 1944 Water Treaty deliveries to Mexico, and for flood control purposes	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States	Water releases from Senator Wash, Imperial and Laguna Dams, and Brock Reservoir were made to satisfy beneficial use requirements of entitlement holders in the United States and to deliver 1944 Water Treaty water to Mexico. Water releases from Senator Wash and Imperial and Laguna Dams were made to prevent water passing to Mexico in excess of treaty requirements, to release water to entitlement holders, for sluicing operations, and to deliver a portion of the 1944 Water Treaty water deliveries to Mexico.
2.2.1.5 Electric Power Generation (page 2-11) **43 CFR PART 431 (page 2-14)**	• Operational requirements to satisfy 43 CFR Part 431 requirements	—	—	Hydroelectric power generated: • Hoover Dam: 3,705,574,280 kilowatt hours (kWh) • Davis Dam: 1,130,209,000 kWh • Parker Dam: 458,594,527 kWh Operations met the requirements to satisfy 43 CFR Part 431.

Federal Covered Actions *Biological Assessment* Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions[1]	2014 Accomplishments[2, 3]
2.2.1.6 Lower Colorado Water Supply Project - California (page 2-15; Table 2-8, page 2-16)	• Delivery of water under executed Lower Colorado Water Supply Project (LCWSP) contracts	• The Bureau of Reclamation's (Reclamation) execution and administration of individual LCWSP contracts	• Participate in the development of, and consult in the execution of, individual contracts under the LCWSP	In 2014, 7,195 acre-feet were pumped by the LCWSP well field. Imperial Irrigation District reduced its consumptive use of Colorado River water by this amount, and the water was made available for use by the LCWSP contractors.
2.2.1.7 1944 Water Treaty Deliveries (page 2-17; Table 2-9, page 2-20)	• Delivery of Mexico allotment (1.5 maf) pursuant to the 1944 Water Treaty and related minutes • Delivery of Mexico allotment (up to 1.7 maf) when surplus water is determined by the United States Section of the International Boundary Water Commission to be available beyond the needs of U.S. users • Delivery of Mexico allotment pursuant to the 1944 Water Treaty and related Minutes under extraordinary drought conditions • Compliance with the salinity requirements of Minute No. 242 of the 1944 Water Treaty • Delivery of emergency water to Tijuana pursuant to Minute No. 314 of the 1944 Water Treaty and contract	• Routing of water through the Yuma Division for delivery to Northerly International Boundary (NIB) • Determination of quantity of water delivered at Southerly International Boundary (SIB) up to 140,000 acre-feet per year • Drainage pumping and delivery of drainage return flows at NIB and SIB • Operation of variable-speed pumps and diversion canal at SIB to reduce salinity • Execution of contracts to deliver a portion of Mexico's allotment to Tijuana pursuant to Minute No. 314 of the 1944 Water Treaty • Routing of water through the Yuma Division during flood control conditions	• Delivery of emergency water to Tijuana pursuant to Minute No. 314 of the 1944 Water Treaty and contract • Retention of a portion of Metropolitan Water District's (MWD) entitlement in Lake Mead to accommodate delivery of water pursuant to Minute No. 314 of the 1944 Water Treaty	Water delivery met the Mexico allotment (1.5 maf) pursuant to the 1944 Water Treaty and related minutes. Reclamation complied with the salinity requirements of Minute No. 242. Pursuant to criteria outlined in IBWC Minute No. 319, water deliveries to Mexico in 2014, included a pulse flow delivery of 105,068 acre-feet and a downward adjustment of 56, 009 acre-feet. Delivery of water at SIB totaled 127,974 acre-feet, and delivery at NIB totaled 1,309,004 acre-feet. A total of 32,151 acre-feet passed to Mexico in excess of treaty requirements, and 144,602 acre-feet were bypassed pursuant to Minute No. 242 of the 1944 Water Treaty. Drainage pumping and delivery of drainage return flows were made at NIB and SIB.

Federal Covered Actions *Biological Assessment* Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions[1]	2014 Accomplishments[2, 3]
2.2.1.8 Decree Accounting (page 2-21; Table 2-10, page 2-22)	• Annual preparation of official records of the diversion, return flow, and consumptive use of Colorado River water pursuant to Article V of the Decree	• None	• Report data for Decree accounting records	The *Colorado River Accounting and Water Use Report, Arizona, California, Nevada for Calendar Year 2013*, was published on May 15, 2014. A summary of diversions, return flows, and consumptive use is provided below. The final report is available at http://www.usbr.gov/lc/region/g4000/wtracct.html. **Arizona**: Diversions = 3,605,944 acre-feet Measured returns = 684,004 acre-feet Unmeasured returns = 147,279 acre-feet Consumptive use = 2,774,661 acre-feet **California**: Diversions = 5,221,631 acre-feet Measured returns = 634,840 acre-feet Unmeasured returns = 85,424 acre-feet Consumptive use = 4,649,734 acre-feet **Nevada**: Diversions = 441,124 acre-feet Measured returns = 215,229 acre-feet Unmeasured returns = 1,279 acre-feet Consumptive use = 224,616 acre-feet
2.2.2 Future Flow-Related Covered Actions				
2.2.2.1 Specific Surplus and Shortage Guidelines (page 2-22; Table 2-11, page 2-24)	• Delivery of surplus water pursuant to Article II(B)(2) of the Decree • Delivery of water pursuant to the Article II(B)(3) of the Decree (shortage) • Determination of shortage conditions based on criteria developed in the Interim Guidelines • Determination of surplus conditions based on criteria listed in the Interim Guidelines	• Adoption of specific post-2026 surplus guidelines • Adoption of specific post-2026 shortage guidelines	• Consult with States on development of specific post-2026 surplus guidelines or specific post-2026 shortage guidelines • Delivery of water to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree	No surplus water was delivered pursuant to Article II(B)(2) of the Decree. The Metropolitan Water District of Southern California (MWD) took delivery of 320,992 acre-feet of ICS pursuant to the criteria listed in the Interim Guidelines. There were no reductions in deliveries pursuant to Article II(B)(3) of the Decree.

Federal Covered Actions *Biological Assessment* Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions[1]	2014 Accomplishments[2, 3]
2.2.2.2 Flood Release Contracts (page 2-24; Table 2-12, page 2-25)	• Delivery of water under executed flood release contracts	• Execution of contracts for water released during flood control operations	• Participate in the development of, and consult in the execution of, flood release contracts	No water deliveries were made under flood release contracts.
2.2.2.3 Changes in the Storage and Delivery of State Entitlement Waters through Various Administrative Actions (page 2-25; Table 2-13, page 2-26)	—	—	—	No administrative actions were taken to reduce the water deliveries as listed in Table 2-13 of the biological assessment.
Flow Changes Below Hoover Dam to Davis Dam (Table 2-14, after page 2-26)	—	—	—	Deliveries to IID, the Cocopah Indian Tribe, and Beattie Farms Southwest were reduced by 117,391 acre-feet, 150 acre-feet, and 72 acre-feet, respectively, for repayment of Inadvertent Overrun and Payback Policy (IOPP) overruns. Deliveries to IID were reduced by 18,867 acre-feet for the creation of Intentionally Created Surplus (ICS) pursuant to the Interim Guidelines. The Central Arizona Water Conservation District (CAWCD) intentionally did not divert 6,827 acre-feet of Colorado River water conserved by the Yuma Mesa Irrigation and Drainage District (YMIDD)/CAGRD Pilot Fallowing Program. CAWCD intentionally did not divert 18,290 acre-feet to retain this volume in Lake Mead as system storage pursuant to the MOU for Pilot Drought Response Actions dated 12-10-14. Pursuant to criteria outlined in IBWC Minute No. 319, water deliveries to Mexico in 2014 included a pulse flow delivery of 105,068 acre-feet and a downward adjustment of 56,009 acre-feet. MWD took delivery of 320,992 acre-feet of ICS and 65,000 acre-feet of Nevada unused apportionment. Collectively, these actions resulted in a net increase in flow below Hoover Dam of 273,454 acre-feet. [All values in terms of consumptive use.]

Federal Covered Actions *Biological Assessment* Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions[1]	2014 Accomplishments[2, 3]
Flow Changes Below Davis Dam to Parker Dam (Table 2-15, after page 2-26)	—	—	—	Deliveries to IID, the Cocopah Indian Tribe, and Beattie Farms Southwest were reduced by 117,391 acre-feet, 150 acre-feet, and 72 acre-feet, respectively, for repayment of IOPP overruns. Deliveries to IID were reduced by 18,867 acre-feet for the creation of Extraordinary Conservation ICS pursuant to the Interim Guidelines. CAWCD intentionally did not divert 6,827 acre-feet of Colorado River water conserved by the YMIDD/CAGRD Pilot Fallowing Program. CAWCD intentionally did not divert 18,290 acre-feet to retain this volume in Lake Mead as system storage pursuant to the MOU for Pilot Drought Response Actions dated 12-10-14. Pursuant to criteria outlined in IBWC Minute No. 319, water deliveries to Mexico in 2014 included a pulse flow delivery of 105,068 acre-feet and a downward adjustment of 56,009 acre-feet. MWD took delivery of 320,992 acre-feet of ICS and 65,000 acre-feet of Nevada unused apportionment. Collectively, these actions resulted in a net increase in flow below Davis Dam of 273,454 acre-feet. [All values in terms of consumptive use.]

Federal Covered Actions *Biological Assessment* Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions[1]	2014 Accomplishments[2, 3]
Flow Changes Below Parker Dam to Imperial Dam (Table 2-16, after page 2-26)	—	—	—	IID conserved the following amounts, which were diverted by MWD at Lake Havasu: 84,305 acre-feet under the amended 1988 IID/MWD Conservation Agreement; 100,000 acre-feet under the IID/San Diego County Water Authority (SDCWA) transfer agreement; 67,700 acre-feet from the All-American Canal Lining Project; and 18,868 acre-feet of additional conservation delivered to MWD's system pursuant to the California Agreement for the Creation and Delivery of Extraordinary Conservation Intentionally Created Surplus. Coachella Valley Water District (CVWD) conserved 28,423 acre-feet from the Coachella Canal Lining Project, which was diverted by MWD at Lake Havasu. Deliveries to IID, the Cocopah Indian Tribe, and Beattie Farms Southwest were reduced by 117,391 acre-feet, 150 acre-feet, and 72 acre-feet, respectively, for repayment of IOPP overruns. CAWCD intentionally did not divert 6,827 acre-feet of Colorado River water conserved by the YMIDD/CAGRD Pilot Fallowing Program. Deliveries to IID were reduced by 18,867 acre-feet for the creation of Extraordinary Conservation ICS pursuant to the Interim Guidelines. Pursuant to criteria outlined in IBWC Minute No. 319, water deliveries to Mexico in 2014 included a pulse flow delivery of 105,068 acre-feet and a downward adjustment of 56,009 acre-feet. Collectively, these actions resulted in a net reduction in flow below Parker Dam of 393,544 acre-feet. [All values in terms of consumptive use.]

Federal Covered Actions *Biological Assessment* Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions[1]	2014 Accomplishments[2, 3]
Water Conservation Field Services Program (page 2-27; Table 2-17, page 2-28)	• Develop water conservation program pursuant to RRA section 210(a)	• Implementation of the Field Services Program	• Consult in the development of conservation plans pursuant to RRA Section 210(a)	All water conservation plans for the Lower Colorado Region are complete.
Unlawful Use (page 2-28; Table 2-18, page 2-30)	• BCPA requires all Colorado River water users to have a contract with the Secretary of the Interior	• Implementation of appropriate policy or rule to address unlawful use of Colorado River water • Execution of water delivery contracts with entities or individuals identified as unlawful users	• Consult with States in the development of policies or rules to address unlawful use of Colorado River water • Consult with the States on the execution of water delivery contracts with entities or individuals identified as unlawful users	A proposed guidance document is currently under development.
Unallocated Colorado River Water in Arizona, Exclusive of Central Arizona Project (CAP) (page 2-30; Table 2-19, page 2-31) **Note: Changed title from "Unallocated or Noncontract Water in Arizona, Exclusive of CAP"**	• Delivery of water pursuant to executed contracts for unallocated water in Arizona (non-CAP)	• Execution of water delivery contracts for unallocated water in Arizona (non-CAP)	• Review of water delivery contracts and consultation with Arizona on contract recommendations	Unallocated non-CAP Arizona water was delivered to Central Arizona Water Conservation District (CAWCD) as allowed under CAWCD's contract with the United States. This water is unallocated because it is not yet placed under permanent contract. Arizona Department of Water Resources will recommend to the Secretary of the Interior the entities with which the Secretary should contract for the unallocated Arizona water upon completion of the well inventory. The well inventory is being performed for Reclamation by the U.S. Geological Survey to identify wells that draw water directly from the lower Colorado River or pump water that would be replaced by water drawn from the lower Colorado River.

Federal Covered Actions *Biological Assessment* Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions[1]	2014 Accomplishments[2, 3]
Central Arizona Project Contract Actions (page 2-31; Table 2-20, page 2-31)	• Delivery of water pursuant to executed contracts	• Completion of allocation and execution of contracts for delivery of CAP water subject to congressional direction	• Review of contracts and consultation on proposed allocation	Water was delivered to the CAP for use by CAP subcontractors and Indian tribes in satisfaction of water delivery contracts. On October 14, 2014, an amended and restated CAP Exchange Agreement among the Gila River Indian Community (GRIC) and the Arizona Public Service Company was entered into to provide for the exchange of CAP Indian priority water at a Groundwater Savings Facility for up to 5,000 acre-feet of long-term storage credits accrued by GRIC. On December 29, 2014, an Amendment No. 4 to a CAP water lease among the United States, San Carlos Apache Tribe (SCAT), and the Town of Gilbert, Arizona (Gilbert) was entered into to extend the term of the lease in order for SCAT to lease 20,000 acre-feet of its CAP water to Gilbert during calendar year 2015.
Changes in Delivery Related to Water Transfers (page 2-32; Table 2-21, page 2-32)	•Delivery of water pursuant to contracts that recognize temporary or permanent transfers of water entitlements	•Approval of new contracts or contract changes to recognize temporary or permanent transfers of water entitlements	•Review of contracts and consultation on new or amended contracts that recognize transfers of water entitlements	The following conservation and transfers were made pursuant to the Colorado River Water Delivery Agreement (CRWDA). They represent changes in delivery amounts and points of diversion required to implement the Quantification Settlement Agreement. IID conserved 100,000 acre-feet of water for transfer to SDCWA via exchange with MWD. IID conserved 104,100 acre-feet under the amended 1988 IID/MWD Conservation Agreement, of which 84,305 acre-feet were diverted by MWD and 19,795 acre-feet were diverted by CVWD. IID conserved 67,700 acre-feet from the All-American Canal Lining Project; of this amount 56,200 acre-feet were transferred to SDCWA via exchange with MWD and 11,500 acre-feet were made available to MWD. IID conserved, and CVWD diverted, 31,000 acre-feet to meet the Intra-priority 3 Transfer. CVWD conserved 30,850 acre-feet from the Coachella Canal Lining Project; of this amount, 23,923 acre-feet were transferred to SDCWA via exchange with MWD; 4,500 acre-feet were made available to MWD; and 2,427 acre-feet were used for environmental mitigation purposes.
Changes in Delivery Related to Off-Stream Storage (page 2-32; Table 2-22, page 2-33)	• Delivery of water under executed off-stream storage agreements pursuant to 43 CFR Part 414	• Execution of Storage and Interstate Release Agreements (SIRA) pursuant to 43 CFR Part 414	• Delivery of water under executed off-stream storage agreements pursuant to 43 CFR Part 414	MWD diverted 65,000 acre-feet of Nevada unused apportionment pursuant to a SIRA executed under 43 CFR Part 414.

Federal Covered Actions *Biological Assessment* Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions[1]	2014 Accomplishments[2, 3]
Changes in Amount of Delivery(page 2-33; Table 2-23, page 2-34)	• Delivery of water pursuant to executed contracts or amendments to recognize changes in amounts of delivery or changes in points of diversion	• Execution of contract amendments or amendments to recognize changes in amounts of delivery or changes in points of diversion	• Review of contracts and consultation on new or amended contracts	On December 3, 2014, a Partial Assignment from Cibola Valley Irrigation and Drainage District (CVIDD) to GSC Farm, LLC (GSC) was approved, which assigned 240 acre-feet of CVIDD's Arizona fourth-priority Colorado River water entitlement to GSC. CVIDD's annual entitlement was reduced from 9,366 acre-feet to 9,126 acre-feet and GSC's annual entitlement was increased by 240 acre-feet from 2,673 to 2,913 acre-feet.
Changes in Type of Water Use (page 2-34; Table 2-24, page 2-34)	• Delivery of water pursuant to executed contracts or contract amendments that recognize changed water use types	• Execution of contracts or contract amendments that recognize changed water use types	• Review of contracts and consultation with Reclamation on new or amended contracts	No changes.
Inclusions and Exclusions to Service Areas (page 2-34; Table 2-25, page 2-35)	• Delivery of water pursuant to executed contract amendments or new contracts that includes or excludes lands in service areas	• Execution of contract amendments or new contracts that includes or excludes lands in service areas	• Review of contracts and consultation on new or amended contracts	
Contract Terminations (page 2-35; Table 2-26, page 2-36)	• None	• Termination of water contract due to abandonment • Execution of contract amendments when entitlement holder has relinquished water	• Consultation on the disposition of any water allocated for use, but not consumptively used within, a State	No water contracts were terminated.
2.3 WESTERN AREA POWER ADMINISTRATION	—	—	—	See section 2.2.1.5 accomplishments in this table.
2.4 NATIONAL PARK SERVICE	—	—	• Water entitlement holder	See section 2.2.1.8 accomplishments in this table.
2.5 BUREAU OF INDIAN AFFAIRS				
2.5.2.2 Ongoing Water Conservation Practices (page 2-77)	—	• Conduct conservation measures for efficient water use	—	Existing practices were continued.
2.5.2.6 Flow-Related Actions (page 2-82)	—	—	• Water entitlement holder	See section 2.2.1.8 accomplishments in this table.
2.5.3.2 Future Water Conservation Practices (page 2-77)	—	• Institute new conservation measures for efficient water use	—	No implementation in 2014.

Federal Covered Actions *Biological Assessment* Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions[1]	2014 Accomplishments[2, 3]
2.5.3.5 Headgate Rock Dam Operation and Maintenance (page 2-88)	—	• Water releases and generate hydropower with these water releases	—	Existing practices were continued.
2.6 U.S. FISH AND WILDLIFE SERVICE	—	—	• Water entitlement holder	See section 2.2.1.8 accomplishments in this table.
2.7 BUREAU OF LAND MANAGEMENT	—	—	• Water entitlement holder	See section 2.2.1.8 accomplishments in this table.

[1] See *LCR MSCP Habitat Conservation Plan*, Section 2.1.1, Relationship of Non-Federal Covered Activities to Federal Nondiscretionary Actions. This can be accessed at http://www.lcrmscp.gov/publications/hcp_volii_dec04.pdf

[2] Reporting for the non-Federal flow-related covered activities (attachment B, table B-3) is included in the Federal flow-related covered actions and accomplishments.

[3] Flow-related Federal covered actions and flow-related non-Federal covered activities are reported for calendar year 2014.

B-2: Federal Non-Flow-Related Covered Actions and Incidental Take Summary, Fiscal Year 2014

Federal Covered Actions *Biological Assessment* Chapter 2	Covered Actions Summary			Covered Actions Implemented						Notes
	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions	Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.2 BUREAU OF RECLAMATION										
2.2.3 Ongoing Non-Flow-Related (Facilities and Channel Activities) (page 2-36; Table 2-27, page 2-37)	• Operate, maintain, and control river in Arizona, California, and Nevada • Construct, maintain, and improve drainage works for water projects • Maintain floodway to accommodate floodflows for 100-year event or 40,000 cubic feet per second (cfs), whichever is greater • Measure diversions and return flows to and from the main stem of the Colorado River	—	• Administration of contracts for water district operation and maintenance of federally owned facilities							See line items in this table
2.2.3.1 Channel Maintenance (page 2-38)	—	—	—							
Wash Fans (page 2-40; Table 2-30, page 2-42)	—	• Wash fan removal	—		Mule Wash and Paradise Point	110.1 and 141.7	None	0.5	1,3, and 4	Removed two wash fans in FY14
Protected Bankline Maintenance and Care of Unprotected Banklines (page 2-43)	—	• Protected bankline location and maintenance	—	3	Mohave Division	252 and 240	Salt cedar / arrowweed	0.5	1, 3, and 4	Needles Bankline Repair (CA Side) – rain storm damage. Approximately 500 feet of bankline.

Federal Covered Actions *Biological Assessment* Chapter 2	Covered Actions Summary			Covered Actions Implemented						Notes
	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions	Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
Levee Maintenance (page 2-44)	—	• Levee location and maintenance	—							No implementation in FY14
Desilting Basins (page 2-46; Table 2-32, page 2-46)	—	• Sediment dredging upstream of principal canal diversions and disposal sites • Maintenance of settling basins to remove sediment and maintain flows; four principal basins	—							No implementation in FY14
Jetties and Training Structures (page 2-47; Tables 2-33 – 2-34, page 2-48)	—	• Jetty and training structure location and maintenance	—							No implementation in FY14
Stockpiles (page 2-49; Table 2-37, page 2-49)	—	• Location of three future stockpiles	—							No implementation in FY14
Riprap Placement and Haul Roads (page 2-50)	—	• Haul roads and riprap storage location and maintenance	—	7 6 6 6 4 4 4 3	Limitrophe Yuma Laguna Gila Area Cibola Palo Verde Parker Mohave Valley	0 to 24 24 to 50 24 to 50 24 to 50 87 to 193 87 to 193 87 to 193 193 to 276	None None None None None None None None	0 0 0 0 0 0 0 0	1, 3, and 6 1, 3, and 6 1,3, and 6 1, 3, and 6 1, 3, and 6 1, 3, and 6 1, 3, and 6 1, 3, and 6	Limitrophe: 47.7 mi Yuma: 69.1 mi Laguna: 2.2 mi Gila River: 19.4 mi Cibola: 66.4 mi Palo Verde: 0.0 mi Parker: 100.3 mi Mohave Valley: 49.4 mi

Federal Covered Actions *Biological Assessment* Chapter 2	Covered Actions Summary			Covered Actions Implemented						Notes
	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions	Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.2.3.2 Major Federal Facilities and Miscellaneous Operation, Maintenance, and Replacement (page 2-50; Table 2-36, after page 2-50)	—	• Maintenance of Yuma area drainage wells and conveyance facilities, including maintenance and access roads	—	7	MODE Wasteway	30	None	0	1, 3, and 6	MODE – Upgrade the MODE Wasteway structure located above the Prison Hill inlet.
		• Maintenance of open channel drains and outfall channels		7	Yuma Mesa conduit (YMC0	27	None	0	1, 3, and 6	YMC operations and maintenance activities and redrilling of Yuma Mesa well nos. 8 & 11.
		• Maintenance and replacement of gaging stations, survey line markers, and boat ramps		7	DPOC 2	32	None	0	1, 3, and 6	Located just east of the Gila and Colorado River confluence. Replaced concrete panels and repaired outlet.
Maintenance Activities at the SIB (page 2-52)	—									No implementation in FY14
2.2.3.3 Backwater Maintenance (page 2-53; Table 2-37, page 2-54)	—	• Backwater maintenance	—							
Mohave Division (page 2-55; Table 2-38, page 2-56)	—	• Backwater maintenance	—							No implementation in FY14

Federal Covered Actions *Biological Assessment* Chapter 2	Covered Actions Summary			Covered Actions Implemented						Notes
	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions	Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
Parker Division (page 2-57; Table 2-39, page 2-57)	—	• Backwater maintenance	—							No implementation in FY14
Palo Verde Division (page 2-58; Table 2-40, page 2-58)	—	• Backwater maintenance	—	4	C-8	120.5 to 118.4	Salt cedar/ arrowweed	0.5	1,3, and 6	Completed improvements to the inlet and outlet structures
Cibola Division (page 2-58; Table 2-41, page 2-59)	—	• Backwater maintenance	—							No implementation in FY14
Imperial Division (page 2-59; Table 2-42, page 2-59)	—	• Backwater maintenance	—							No implementation in FY14
Laguna Division (page 2-60; Table 2-43, page 2-60)	—	• Backwater maintenance	—							No implementation in FY14
Yuma Division (page 2-60; Table 2-44, page 2-61)	—	• Backwater maintenance	—							No implementation in FY14
Limitrophe Division Mitigation Obligations (page 2-61; Table 2-45, page 2-62)	—	—	—							No implementation in FY14
2.2.3.4 Limitrophe Division Maintenance (page 2-62)	—	—	—							No implementation in FY14
2.2.4 Future Non-Flow-Related Actions (page 2-63)	—	—	—							
2.2.4.1 Topock Marsh (page 2-63)	—	—	—							No implementation in FY14

Federal Covered Actions *Biological Assessment* Chapter 2	Covered Actions Summary			Covered Actions Implemented						Notes
	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions	Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.2.4.2 Laguna Reservoir (page 2-63)	—	—	—	6	Laguna Dam	49.0	Cattails	7	1, 3, and 6	Laguna Reservoir Restoration Project. On-going dredging activities above Laguna Dam
2.2.4.3 Bankline Maintenance - Unprotected Banklines (page 2-65; Table 2-46, page 2-66)	—	—	—							No implementation in FY14
2.2.4.4 Proposed Jetties (page 2-67; Table 2-48, page 2-67)	—	—	—							No implementation in FY14
2.3 WESTERN AREA POWER ADMINISTRATION										No implementation in FY14
2.4 NATIONAL PARK SERVICE										
2.4.2 Riparian Habitat Restoration (page 2-70)		• Riparian habitat restoration on Lake Mead and Lake Mohave			Lake Mead Lake Mohave		Sarah Mustard Tree Tobacco Fountain grass Mexican Palo Verde oleander, tamaris, California fan palm Cottonwood Goodding's willow	21 acres 0.01 acres 0.18 acre Individual 12 4		Habitat restoration through removal of exotic plants (gross infested acres). Habitat restoration Mid-Basin , Tamarisk, Nine-Mile, Nellis Coves

Federal Covered Actions *Biological Assessment* Chapter 2	Covered Actions Summary			Covered Actions Implemented						Notes
	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions	Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.4.3 Fishery Management (page 2-71)		• Habitat modifications on Lake Mead and Lake Mohave, including development and enhancement of grow-out ponds, construction of docks, and creation of angler enhancement structures			Lake Mohave			0.15 acre		Creation of fish habitat at Solicitor Prospect and Princess Coves in partnership with Nevada Division of Wildlife
2.4.4 Boating Access (page 2-72)		• Maintenance and enhancement of boating access on Lake Mead and Lake Mohave								No implementation in FY14
2.5 BUREAU OF INDIAN AFFAIRS										
2.5.2.1 Ongoing Irrigation System Operation and Maintenance (page 2-74)		• Irrigation system operation and maintenance for existing irrigation projects		3	Fort Mohave	—	None	0	1 and 3	Continued existing practices
				3	Chemehuevi	—	None	0	1 and 3	Continued existing practices
				4	CRIT	—	None	0	1 and 3	Continued existing practices
				6	Fort Yuma	—	None	0	1 and 3	Continued existing practices
				7	Cocopah	—	None	0	1 and 3	Continued existing practices
2.5.2.2 Ongoing Water Conservation Practices (page 2-77)		• Operation and maintenance of existing equipment								Continued existing practices

Federal Covered Actions *Biological Assessment* Chapter 2	Covered Actions Summary			Covered Actions Implemented						Notes
	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions	Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.5.2.4 Ongoing Wildland Fire Management (page 2-88)		•Implementation of fuel management projects								No implementation in FY14
2.5.2.5 Ongoing Woodland and Shoreline Maintenance (page 2-82)		• Maintenance on Chemehuevi Woodlands Project								Continued existing practices
2.5.3.1 Future Canal Lining (page 2-84)		• Repair, reline, and line irrigation canals								No implementation in FY14
2.5.3.2 Future Water Conservation Practices (page 2-85)		• Installation, operation, and maintenance of new equipment								No implementation in FY14
2.5.3.3 Future Farmland Development (page 2-85)		• Develop additional agricultural acreage, including construction of irrigation systems								No Implementation in FY14
2.5.3.6 Future Wildland Fire Management (page 2-88)		• Implementation of new fuel management projects								No implementation in FY14
2.6 U.S. FISH AND WILDLIFE SERVICE										No non-flow-related actions are covered by the LCR MSCP
2.7 BUREAU OF LAND MANAGEMENT										No non-flow-related actions are covered by the LCR MSCP

B-3: LCR MSCP Non-Federal Covered Activities and Incidental Take Summary, Fiscal Year 2014

Non-Federal Covered Activities *Habitat Conservation Plan* Chapter 2	Covered Activities Summary	Covered Activities Implemented						Notes
		Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.2 ARIZONA								
2.2.1 Ongoing Flow-Related Covered Activities[1] (page 2-4)	• Diversion of up to 2.8 million acre-feet (maf) of Arizona's full annual entitlement, plus surplus, plus Arizona's share of any unused apportionment, plus the volume of return flow, as applicable • Generation and transmission of hydroelectric power • Power contracting							Non-Federal flow-related covered activities are included in the Federal flow-related covered actions and accomplishments (see attachment B, table B-1).
2.2.2 Future Flow-Related Covered Activities[1] (page 2-6)	Future Arizona water contract holder activities may include: • Diversions, discharges, and return flows through existing facilities • Changes to points of diversion • New points of diversion • Interstate water banking • Water marketing • Water transfers • Any other actions as made possible from any future agreements and/or measures taken by the Arizona Department of Water Resources or contract holder(s) Future Arizona hydroelectric power contract holder activities may include: • Execution, administration, and operation of extended, renewed, new, or additional contracts for hydroelectric power from hydroelectric facilities at Hoover Dam, Davis Dam, Parker Dam, Headgate Rock Dam, Siphon Drop Power Plant, and Pilot Knob Power Plant							Non-Federal flow-related covered activities are included in the Federal flow-related covered actions and accomplishments (see attachment B, table B-1).

Non-Federal Covered Activities *Habitat Conservation Plan* Chapter 2	Covered Activities Summary	Covered Activities Implemented						Notes
		Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.2.3 Ongoing Non-Flow-Related Covered Activities (page 2-7)	Operation, maintenance, and replacement of: • The facilities and equipment through which water is diverted and conveyed • The facilities through which return flows are returned to the river • Drainage wells in the Yuma area • The facilities and equipment through which electric power is generated and transmitted • The appurtenant works that support these facilities, including access and service roads, electric power and communication transmission lines, and substations, docks, boat ramps, and bankline protection	6	Yuma Valley	—	—	—	1 and 3	195 miles of canal maintenance and 60 miles of open drain maintenance
2.2.3.1 Arizona Game and Fish Department Programs and Activities								
Vegetation and Habitat Management Programs (page 2-8)	• Aquatic, wetland, and riparian habitat maintenance and restoration activities							No implementation in FY14.
Fish Surveys (page 2-8)	• Surveys for non-native fish species							**Kingman Region:** Lake Mead: 2 nights gillnets, 4 nights electrofishing Lake Mohave: 32 nights gillnets, 2 nights electrofishing Topock Marsh: 2 nights gillnets **Yuma Region:** 12 nights electrofishing, 7 days electrofishing from Lake Havasu to Laguna Dam

Non-Federal Covered Activities *Habitat Conservation Plan* Chapter 2	Covered Activities Summary	Covered Activities Implemented						Notes
		Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
Fish Stocking (page 2-9)	• Stocking of trout							No fish stocking activity
Maintenance of Aids to Navigation and Boating Access (page 2-9)	• Place and maintain aids to navigation							Maintained 132 buoys, 1 boat dock, and 1 boat ramp
Law Enforcement Patrol Activities (page 2-9)	• Administer law enforcement and boating safety program using watercraft patrols							4,340 hours of watercraft law enforcement. Includes all Arizona Game and Fish Department (AGFD) Regions III and IV watercraft law enforcement patrols
2.3 CALIFORNIA								
2.3.1 Ongoing Flow-Related Covered Activities[1] (page 2-11)	• Diversion of up to 4.4 maf of California's full annual entitlement (consistent with the Quantification Settlement Agreement), plus California's share of any unused apportionment and designated surpluses, plus volume of return flows, as applicable • Generation and transmission of hydroelectric power • Power contracting							Non-Federal flow-related covered activities are included in the Federal flow-related covered actions and accomplishments (see attachment B, table B-1)

Non-Federal Covered Activities *Habitat Conservation Plan* Chapter 2	Covered Activities Summary	Covered Activities Implemented						Notes
		Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.3.2 Future Flow-Related Covered Activities[1] (page 2-13)	Future California water contract holder activities may include: • Diversions, discharges, and return flows through existing facilities • Changes to points of diversion • New points of diversion • Interstate water banking • Water marketing • Water transfers • Any other actions as made possible from any future agreements and/or measures taken by the Colorado River Board of California or contract holder(s) Future California hydroelectric power contract holder activities may include: • Execution, administration, and operation of extended, renewed, new, or additional contracts for hydroelectric power from hydroelectric facilities at Hoover Dam, Davis Dam, Parker Dam, Headgate Rock Dam, Siphon Drop Power Plant, and Pilot Knob Power Plant							Non-Federal flow-related covered activities are included in the Federal flow-related covered actions and accomplishments (see attachment B, table B-1)

Non-Federal Covered Activities *Habitat Conservation Plan* Chapter 2	Covered Activities Summary	Covered Activities Implemented						Notes
		Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.3.3 Ongoing Non-Flow-Related Activities	Operation, maintenance, and replacement of: • The facilities and equipment through which water is diverted and conveyed • The facilities through which return flows are returned to the river • The facilities and equipment through which electric power is generated and transmitted • The appurtenant works that support these facilities, including access and service roads, electric power and communication transmission lines, and substations, docks, boat ramps, and bankline protection	4 6	Palo Verde Irrigation District Bard Water District	—	—	—	1 and 3 1 and 3	9.78 acres 5.7 acres Only emergency work during marsh bird breeding season 3/15 – 1/31
2.4 NEVADA								
2.4.1 Ongoing Flow-Related Covered Activities[1] (page 2-15)	• Diversion of up to 0.3 maf of Nevada's full annual entitlement, plus surplus flows, plus Nevada's share of any unused apportionment, plus volume of return flows, as applicable • Generation and transmission of hydroelectric power • Power contracting							Non-Federal flow-related covered activities are included in the Federal flow-related covered actions and accomplishments (see attachment B, table B-1)

Non-Federal Covered Activities *Habitat Conservation Plan* Chapter 2	Covered Activities Summary	Covered Activities Implemented						Notes
		Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.4.2 Future Flow-Related Covered Activities (page 2-17)	Future Nevada water contract holder activities may include: • Diversions, discharges, and return flows through existing facilities • Changes to points of diversion • New points of diversion • Interstate water banking • Water marketing • Water transfers • Any other actions as made possible from any future agreements and/or measures taken by the Colorado River Commission of Nevada or contract holder(s) Future Nevada hydroelectric power contract holder activities may include: • Execution, administration, and operation of extended, renewed, new, or additional contracts for hydroelectric power from hydroelectric facilities at Hoover Dam, Davis Dam, Parker Dam, and Headgate Rock Da							Non-Federal flow-related covered activities are included in the Federal flow-related covered actions and accomplishments (see attachment B, table B-1)

Non-Federal Covered Activities *Habitat Conservation Plan* Chapter 2	Covered Activities Summary	Covered Activities Implemented						Notes
		Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.4.3 Ongoing Non-Flow-Related Activities (page 2-18)	Operation, maintenance, and replacement of: • The facilities and equipment through which water is diverted and conveyed • The facilities through which return flows are returned to the river • The facilities and equipment through which electric power is generated and transmitted • The appurtenant works that support these facilities, including access and service roads, electric power and communication transmission lines, and substations, docks, boat ramps, and bankline protection							No implementation in FY14.
2.4.3.1 Nevada Department of Wildlife Programs and Activities (page 2-18)	Implementation of select federally funded:							
	• Aquatic, wetland, and riparian habitat maintenance and restoration activities	—	—	—	—	—	—	A total of 84 habitat modules were placed on approximately 0.2 acre at Princess, Prospect, Shoshone, and Solicitor Coves on Lake Mohave. Cooperative project with the National Park Service and AGFD.
	• Aquatic, wetland, and riparian revegetation enhancement activities	—	—	—	—	—	—	No implementation in FY14.
	• Place and maintain aids to navigation and boating access	3	Clark County, downstream from Davis Dam	257.5 – 275.0	None	0	1 and 3	Performed routine maintenance and inspection of aids to navigation.
	• Administer law enforcement and boating safety program using watercraft patrols	1 and 2	—	Lake Mead – 275.0	None	0	1 and 3	Conducted routine law enforcement patrols on Lake Mead, Lake Mohave, main stem of LCR below Davis Dam, and limited patrol activities in Laughlin Lagoon.

[1] See *LCR MSCP Habitat Conservation Plan*, Section 2.1.1, Relationship of Non-Federal Covered Activities to Federal Nondiscretionary Actions. This can be accessed at http://www.lcrmscp.gov/publications/VolumeII.pdf

Attachment C. Recommendations from Resource Agencies

United States Department of the Interior
U.S. Fish and Wildlife Service
Arizona Ecological Services Office
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
Telephone: (602) 242-0210 Fax: (602) 242-2513

In reply refer to:
AESO/SE
22410-2004-F-0161

July 30, 2014

Memorandum

To: Program Manager, Lower Colorado River Multi-Species Conservation Program, Bureau of Reclamation, Boulder City, Nevada (LC-8000)

From: Field Supervisor

Subject: Acceptance of Lower Colorado River Multi-Species Conservation Program Fiscal Year 2013 Accomplishment Report and Consistency Review of Fiscal Year 2015 Work Plan and Budget

This responds to your memorandum of July 16, 2014, requesting review by the Fish and Wildlife Service (FWS) of the combined document containing the Fiscal Year 2013 Accomplishment Report and the Fiscal Year 2015 Work Plan and Budget for the Lower Colorado River Multi-Species Conservation Program (LCR MSCP). This combined document encompasses the reporting requirements of the LCR MSCP section 10(a)(1)(A) permit dated April 4, 2005, (TE-086834-0) and the biological and conference opinion dated March 4, 2005, and requirements of the Funding and Management Agreement sections 7.4.2. and 7.4.3.

The Fiscal Year 2013 Accomplishment Report details the activities undertaken by the Bureau of Reclamation (Reclamation) to implement the LCR MSCP in accordance with the section 10 permit and biological opinion. The report also lists the Federal actions and non-Federal activities included in the LCR MSCP as covered actions that were implemented during Fiscal Year 2013 covered by the LCR MSCP (October 1, 2012-September 31, 2013), including the measurement of incidental take that occurred during this period.

We have reviewed the information provided and conclude that the document meets the requirements for the annual report for the LCR MSCP under the section 10(a)(1)(A) permit and the incidental take section of the biological and conference opinion. All covered actions and activities and implementation of the Conservation Plan are suitably described and documented.

The Fiscal Year 2015 Work Plan and Budget contains the work tasks and estimated costs for LCR MSCP implementation during Fiscal Year 2015 beginning on October 1, 2014. We have reviewed the Work Plan and determined that its implementation is directly applicable to meet the conservation requirements and is consistent with the LCR MSCP section 10(a)(1)(A) permit and biological opinion.

We understand that the issue of underfunding of payments to the LCR MSCP in Fiscal Years 2011-2014 was discussed with the state parties and that the payment amounts due from Reclamation and the state parties are being finalized and scheduled. The FWS appreciates the cooperative work that went into identifying and addressing this issue.

We appreciate the positive working relationship between the FWS and Reclamation on the implementation of the LCR MSCP. The opportunity to review and contribute to the development of the Accomplishment Report and Work Plan is greatly appreciated. Thank you for your significant efforts to conserve listed and special-status species through the LCR MSCP. If there are any questions or concerns about this response, please contact Lesley Fitzpatrick at (x236) or me (x244) at (602) 242-0210.

Steven L. Spangle

cc (electronic):
Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES: Marty Tuegel)

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United States Department of the Interior
U.S. Fish and Wildlife Service
Arizona Ecological Services Office
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
Telephone: (602) 242-0210 Fax: (602) 242-2513

In reply refer to:
AESO/SE
22410-2004-F-0161

September 16, 2014

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DATE 9/21/14 INITIAL CODE 8000
CLASSIFICATION
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CONTACT
FOLLOW-UP
NOTES

Memorandum

To: Program Manager, Lower Colorado River Multi-Species Conservation Program, Bureau of Reclamation, Boulder City, Nevada (LC-8000)

From: Field Supervisor

Subject: Request for Approval of Minor Modifications to the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) Habitat Conservation Plan (HCP)

This responds to your memorandum of September 2, 2014, requesting review by the Fish and Wildlife Service (FWS) of three Program Decision Documents (PDD) from the LCR MSCP Steering Committee containing minor modifications to the conservation actions for western yellow bat (WYBA3) in PDD 14-001, Arizona Bell's vireo (BEVI1) in PDD 14-002, and Colorado River cotton rat (CRCR2) in PDD 14-003.

I have reviewed the proposed modifications and believe these minor changes do not alter the amount or intent of the subject conservation measures, and will assist in providing for the delivery of appropriate conservation for these three species. These changes are consistent with the adaptive-management principles upon which the LCR MSCP is founded. I approve these modifications.

Thank you for your continued efforts to ensure that the LCR MSCP functions as a stellar example of a successful HCP; providing benefits to the covered species, increasing the knowledge base for riparian restoration efforts applicable to other programs, and meeting the water and power needs of the partners. We appreciate the close working relationship between you and Ms. Lesley Fitzpatrick of my staff that contributes to the success of the program. If you have any questions concerning this approval, please contact Ms. Fitzpatrick at (602) 242-0210 x 236 or me at x244.

Steven L. Spangle

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES: Marty Tuegel)

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United States Department of the Interior
U.S. Fish and Wildlife Service
Arizona Ecological Services Office
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
Telephone: (602) 242-0210 Fax: (602) 242-2513

In reply refer to:

AESO/SE
22410-2004-F-0161

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DATE	INITIALS	CODE
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CLASSIFICATION		
PROJECT		
FOLDER I.D.		
KEYWORD		

December 19, 2014

Memorandum

To: Program Manager, Lower Colorado River Multi-Species Conservation Program, Bureau of Reclamation, Boulder City, Nevada (LC-8000)

From: Acting Field Supervisor

Subject: Request for Concurrence on the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) Resolution 15-001 "Underfunding Make Up Strategy"

This responds to your memorandum of December 5, 2014, requesting concurrence by the Fish and Wildlife Service (FWS) of Resolution 15-001dated October 22, 2014 that contains the strategy to be used to make up the inadvertent funding shortfall to the LCR MSCP program in Fiscal Years 2011-2014. The FWS participated in the discussions and evaluation of the subject strategy with Reclamation and the Steering Committee and is in agreement with the final version contained in Resolution 15-001.

I have reviewed the resolution and concur that the requested payment amounts and schedule meet each funding party's commitments under the Program Documents, including Sections 6.4, 12, and 15.10 of the Implementing Agreement.

Thank you for your continued efforts to ensure that the LCR MSCP functions as a stellar example of a successful HCP; the effort to move quickly to address the underfunding is an example of the cooperative and positive relationship within the LCR MSCP that contributes to its success. If you have any questions concerning this concurrence, please contact Ms. Fitzpatrick at (602) 242-0210 x 236 or me at x 244.

Kris Rowdall
for Steven L. Spangle

cc (electronic):
Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES: Marty Tuegel)

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Attachment D – Financial Statement

D-1: Required Contributions

	FY06	FY07	FY08	FY09	FY10	Subtotal
Reclamation						
Cash	6,072,381.00	6,291,054.00	6,655,509.00	6,784,470.00	7,255,458.00	33,058,872.00
Total	**6,072,381.00**	**6,291,054.00**	**6,655,509.00**	**6,784,470.00**	**7,255,458.00**	**33,058,872.00**
Arizona						
Cash	471,863.10	488,855.40	517,175.90	866,420.50	926,568.70	3,270,883.60
HMF	135,375.00	140,250.00	148,375.00	151,250.00	161,750.00	737,000.00
Total	**607,238.10**	**629,105.40**	**665,550.90**	**1,017,670.50**	**1,088,318.70**	**4,007,883.60**
Nevada						
Cash	1,838,148.82	1,904,342.55	2,014,665.43	1,884,091.00	1,578,887.40	9,220,135.20
HMF	135,375.00	140,250.00	148,375.00	151,250.00	161,750.00	737,000.00
In-Kind Credit	0	0	0	0	436,000.00	436,000.00
Total	**1,973,523.82**	**2,044,592.55**	**2,163,040.43**	**2,035,341.00**	**2,176,637.40**	**10,393,135.20**
California						
Cash	**3,220,869.08**	**3,336,856.05**	**3,530,167.67**	**3,266,131.22**	**3,492,870.91**	**16,846,894.93**
MWD	1,887,361.54	1,955,327.46	2,068,604.00	1,939,074.72	2,073,688.19	9,924,055.91
IID	500,971.43	519,011.96	549,079.48	559,718.78	598,575.29	2,727,356.94
CVWD	273,257.15	283,097.43	299,497.92	305,301.15	326,495.61	1,487,649.26
LADWP	154,845.72	160,421.88	169,715.48	173,003.99	185,014.18	843,001.25
SDCWA	145,737.14	150,985.30	159,732.19	0	0	456,454.63
PVID	122,067.53	126,463.31	133,789.60	136,382.00	145,849.84	664,552.28
SCPPA	63,760.00	66,056.07	69,882.84	71,236.94	76,182.31	347,118.16
SCE	54,651.43	56,619.49	59,899.60	61,060.23	65,299.11	297,529.86
Bard	6,072.38	6,291.05	6,655.52	6,784.47	7,255.46	33,058.88
CRBC	6,072.38	6,291.05	6,655.52	6,784.47	7,255.46	33,058.88
Needles	6,072.38	6,291.05	6,655.52	6,784.47	7,255.46	33,058.88
Funding Credit						
SDCWA	**0**	**0**	**0**	**162,827.28**	**174,130.99**	**336,958.27**
MWD	**0**	**0**	**0**	**0**	**0**	**0**
HMF	**270,750.00**	**280,500.00**	**296,750.00**	**302,500.00**	**323,500.00**	**1,474,000.00**
Total	**3,491,619.10**	**3,617,356.05**	**3,826,917.67**	**3,731,458.50**	**3,990,501.90**	**18,657,853.20**
TOTAL	**12,144,762.00**	**12,582,108.00**	**13,311,018.00**	**13,568,940.00**	**14,510,916.00**	**66,117,744.00**

	FY11	FY12	FY13	FY14	Under funding	FY15
Reclamation						
Cash	16,400.070.00	16,661,700.00	17,226,270.00	17,570,520.00	0	
Funding Credit					3,800,520.00	
Total	**16,400.070.00**	**16,661,700.00**	**17,226,270.00**	**17,570,520.00**	**3,800,520.00**	
Arizona						
Cash	1,120,135.50	1,138,005.00	926,991.00	818,554.00	0	
HMF	1,339,875.00	1,361,250.00	1,407,375.00	1,732,170.00	327,007.50	
RMF	0	0	249,574.50	84,854.00	243,070.50	
Total	**2,460,010.50**	**2,499,255.00**	**2,583,940.50**	**2,635,578.00**	**570,078.00**	
Nevada						
Cash	3,144,146.00	3,637,260.00	3,510,931.50	3,454,132.00	0	
HMF	1,339,875.00	1,361,250.00	1,407,375.00	1,732,170.00	327,007.50	
RMF	0	0	249,574.50	84,854.00	813,148.50	
In-Kind Credit	436,000.00	0	0	0		
Total	**4,920,021.00**	**4,998,510.00**	**5,167,881.00**	**5,271,156.00**	**1,140,156.00**	
California						
Cash	**5,333,036.34**	**5,418,114.16**	**5,102,554.16**	**5,608,045.52**	**0**	
MWD	2,320,583.58	2,357,603.81	1,938,340.56	2,380,598.24	0	
IID	1,353,005.78	1,374,590.25	1,421,167.27	1,449,567.90	0	
CVWD	738,003.15	749,776.50	775,182.15	790,673.40	0	
LADWP	418,201.78	424,873.35	439,269.89	448,048.26	0	
SDCWA	0	0	0	0	0	
PVID	134,240.47	136,382.00	141,003.21	143,821.02	0	
SCPPA	172,200.74	174,947.85	180,875.84	184,490.46	0	
SCE	147,600.63	149,955.30	155,036.43	158,134.68	0	
Bard	16,400.07	16,661.70	17,226.27	17,570.52	0	
CRBC	16,400.07	16,661.70	17,226.27	17,570.52	0	
Needles	16,400.07	16,661.70	17,226.27	17,570.52	0	
Funding Credit						
SDCWA	**393,601.68**	**399,880.80**	**413,430.48**	**421,692.48**	**105,624.14**	
MWD	**613,650.48**	**623,440.04**	**644,564.86**	**0**	**91,212.48**	
HMF	**2,679,750.00**	**2,722,500.00**	**2,814,750.00**	**3,464,340.00**	**654,015.00**	
RMF	**0**	**0**	**499,149.00**	**169,708.00**	**1,239,434.38**	
Total	**9,020,038.50**	**9,163,935.00**	**9,474,448.50**	**9,663,786.00**	**2,090,286.00**	
TOTAL	**32,800,140.00**	**33,323,400.00**	**34,452,540.00**	**35,141,040.00**	**7,601,040.00**	

D-1a: Underfunding and Makeup Strategy – Current Year Dollars

Total Underfunding FY11 – FY14

FY	Arizona	Nevada	California	Federal	Total
FY11 Required Original i=1.191	$2,460,010.50	$4,920,021.00	$9,020,038.50	$16,400,070.00	$32,800,140.00
FY11 Required Revised i=1.258	$2,598,399.00	$5,196,798.00	$9,527,463.00	$17,322,660.00	$34,645,320.00
FY11 Underfunding	**$138,388.50**	**$276,777.00**	**$507,424.50**	**$922,590.00**	**$1,845,180.00**
FY12 Required Original i=1.210	$2,499,255.00	$4,998,510.00	$9,163,935.00	$16,661,700.00	$33,323,400.00
FY12 Required Revised i=1.278	$2,639,709.00	$5,279,418.00	$9,678,933.00	$17,598,060.00	$35,196,120.00
FY12 Underfunding	**$140,454.00**	**$280,908.00**	**$514,998.00**	**$936,360.00**	**$1,872,720.00**
FY13 Required Original i=1.251	$2,583,940.50	$5,167,881.00	$9,474,448.50	$17,226,270.00	$34,452,540.00
FY13 Required Revised i=1.321	$2,728,525.50	$5,457,051.00	$10,004,593.50	$18,190,170.00	$36,380,340.00
FY13 Underfunding	**$144,585.00**	**$289,170.00**	**$530,145.00**	**$963,900.00**	**$1,927,800.00**
FY14 Required Original i=1.276	$2,635,578.00	$5,271,156.00	$9,663,786.00	$17,570,520.00	$35,141,040.00
FY14 Required Revised i=1.347	$2,782,228.50	$5,564,457.00	$10,201,504.50	$18,548,190.00	$37,096,380.00
FY14 Underfunding	**$146,650.50**	**$293,301.00**	**$537,718.50**	**$977,670.00**	**$1,955,340.00**
Total Underfunding	**$570,078.00**	**$1,140,156.00**	**$2,090,286.00**	**$3,800,520.00**	**$7,601,040.00**

Habitat Maintenance Fund Underfunding

FY	(1) Required 2003 Dollars	(2) Additional 2003 Dollars	(3) Original i	(4) (1+2) x (3) Total Current Year Dollars	(5) Revised i	(6) (1+2) x (5) Revised Total Current Year Dollars	(7) (6) - (4) Underfunding Current Year Dollars
2011	$4,500,000	$0	1.191	$5,359,500	1.258	$5,661,000	$301,500
2012	$4,500,000	$0	1.210	$5,445,000	1.278	$5,751,000	$306,000
2013	$4,500,000	$0	1.251	$5,629,500	1.321	$5,944,500	$315,000
2014	$4,500,000	$930,000	1.276	$6,928,680	1.347	$7,314,210	$385,530
Total	**$18,000,000**	**$930,000**		**$23,362,680**		**$24,670,710**	**$1,308,030**

Remedial Measures Fund Underfunding

FY	(1) Required 2003 Dollars	(2) Additional 2003 Dollars	(3) Original i	(4) (1 + 2) x (3) Total Current Year Dollars	(5) Revised i	(6) (1 + 2) x (5) Revised Total Current Year Dollars	(7) (6) - (4) Underfunding Current Year Dollars
2011	$266,000	$0	1.191	0	1.258		
2012	$266,000	$0	1.210	0	1.278		
2013	$266,000	$532,000	1.251	$998,298	1.321	$1,054,158	$55,860
2014	$266,000		1.276	$339,416	1.347	$358,302	$18,886
Total				**$1,337,714**		**$1,412,460**	**$74,746**

Distribution of Non-Federal Underfunding Makeup Funds

Entity	(1) (2) + (5) Total	(2) Habitat Maintenance Fund Makeup	(3) Remedial Measures Fund Makeup	(4) Additional Remedial Measures Fund	(5) (3) + (4) Total Remedial Measures Fund
Arizona	**$570,078.00**	**$327,007.50**	$18,686.50	$224,384.00	**$243,070.50**
Nevada	**$1,140,156.00**	**$327,007.50**	$18,686.50	$794,462.00	**$813,148.50**
California	**$2,090,286.00**	**$654,015.00**	$37,373.00	$1,398,898.00	**$1,436,271.00**
Total	**$3,800,520.00**	**$1,308,030.00**	$74,746.00	$2,417,744.00	**$2,492,490.00**

Distribution of California Underfunding Makeup Funds by FY

FY	(1) (2) + (5) Total CA Underfunding	(2) Habitat Maintenance Fund Makeup	(3) Remedial Measures Fund Makeup	(4) Additional Remedial Measures Fund	(5) (3) + (4) Total Remedial Measures Fund
2011	**$507,424.50**	**$150,750.00**	$0	$356,674.50	**$356,674.50**
2012	**$514,998.00**	**$153,000.00**	$0	$361,998.00	**$361,998.00**
2013	**$530,145.00**	**$157,500.00**	$27,930	$344,715.00	**$372,645.00**
2014	**$537,718.50**	**$192,765.00**	$9,443	$335,510.50	**$344,953.50**
Total	**$2,090,286.00**	**$654,015.00**	$37,373.00	$1,398,898.00	**$1,436,271.00**

Distribution of Nevada Underfunding Makeup Funds by FY

FY	(1) (2) + (5) Total NV Underfunding	(2) Habitat Maintenance Fund Makeup	(3) Remedial Measures Fund Makeup	(4) Additional Remedial Measures Fund	(5) (3) + (4) Total Remedial Measures Fund
2011	**$276,777.00**	**$75,375.00**	$0	$201,402.00	**$201,402.00**
2012	**$280,908.00**	**$76,500.00**	$0	$204,408.00	**$204,408.00**
2013	**$289,170.00**	**$78,750.00**	$13,965.00	$196,455.00	**$210,420.00**
2014	**$293,301.00**	**$96,382.50**	$4,721.50	$192,197.00	**$196,918.50**
Total	**$1,140,156.00**	**$327,007.50**	$18,686.50	$794,462.00	**$813,148.50**

Distribution of Arizona Underfunding Makeup Funds by FY

FY	(1) (2) + (5) Total AZ Underfunding	(2) Habitat Maintenance Fund Makeup	(3) Remedial Measures Fund Makeup	(4) Additional Remedial Measures Fund	(5) (3) + (4) Total Remedial Measures Fund
2011	**$138,388.50**	**$75,375.00**	$0	$63,013.50	**$63,013.50**
2012	**$140,454.00**	**$76,500.00**	$0	$63,954.00	**$63,954.00**
2013	**$144,585.00**	**$78,750.00**	$13,965.00	$51,870.00	**$65,835.00**
2014	**$146,650.50**	**$96,382.50**	$4,721.50	$45,546.50	**$50,268.00**
Total	**$570,078.00**	**$327,007.50**	$18,686.50	$224,384.00	**$243,070.50**

D-2: Funding Credits

San Diego County Water Authority:

Credits Earned

FY	Credits Earned	Composite i	2003 Dollars	Total 2003 Dollars
2005	145,737.14	1.019	143,019.76	143,019.76
2006	500,000	1.083	461,680.51	604,700.27
2007	250,000	1.122	222,816.39	827,516.66
2008	3,298,069.94	1.187	2,778,491.95	3,606,008.61

Credits Used

FY	Total 2003 Credits Available	2003 Credits Used	Composite i	Current Year Credits
2009	3,606,008.61	134,568.00	1.210	162,827.28
2010	3,471,440.61	134,568.00	1.294	174,130.99
2011	3,336,872.61	330,480.00	1.191	393,601.68
2012	3,006,392.61	330,480.00	1.210	339,880.80
2013	2,675,912.61	330,480.00	1.251	413,430.48
2014	2,345,432.61	330,480.00	1.276	421,692.48
2015	2,014,952.61			

Credits Used – Revised Inflation Rate

FY	Total 2003 Credits Available	2003 Credits Used	Composite i	Current Year Credits	Difference
2009	3,606,008.61	134,568.00	1.210	162,827.28	
2010	3,471,440.61	134,568.00	1.294	174,130.99	
2011*	3,336,872.61	330,480.00	1.258	415,743.84	22,142.16
2012*	3,006,392.61	330,480.00	1.278	422,353.44	22,472.64
2013*	2,675,912.61	330,480.00	1.321	436,564.08	23,133.60
2014*	2,345,432.61	330,480.00	1.347	445,156.56	23,464.08
2015	2,014,952.61				91,212.48

* Difference between current year credits with revised inflation rate and credits with original inflation rate of $91,212.48 used to reduce California's required underfunding.

The Metropolitan Water District of Southern California:

Credits Earned

FY	Credits Earned	Composite i	2003 Dollars	Total 2003 Dollars
2008	1,834,768.57	1.187	1,545,719.10	1,545,719.10

Credits Used

FY	Total 2003 Credits Available	2003 Credits Used	Composite i	Current Year Credits
2011	1,545,719.10	515,239.70	1.191	613,650.48
2012	1,030,479.40	515,239.70	1.210	623,440.04
2013	515,239.70	515,239.70	1.251	644,564.86
2014	0			

Credits Used – Revised Inflation Rate

FY	Total 2003 Credits Available	2003 Credits Used	Composite i	Current Year Credits	Difference
2011*	1,545,719.10	515,239.70	1.258	648,171.54	34,521.06
2012*	1,030,479.40	515,239.70	1.278	658,476.34	35,036.30
2013*	515,239.70	515,239.70	1.321	680,631.64	36,066.78
2014*	0				
					105,624.14

* Difference between current year credits with revised inflation rate and credits with original inflation rate of $105,624.14 used to reduce California's required underfunding.

Nevada:

Credits Earned

FY	Credits Earned	Composite i	2003 Dollars	Total 2003 Dollars
2014	40,438.72	1.347	30,021.32	30,021.32

Credits Used

FY	Total 2003 Credits Available	2003 Credits Used	Composite i	Current Year Credits
2015	30,021.32	30,021.32	1.358	40,768.95
2016	0			

Arizona:

Credits Earned

FY	Credits Earned	Composite i	2003 Dollars	Total 2003 Dollars
2014	20,219.36	1.347	15,010.66	15,010.66

Credits Used

FY	Total 2003 Credits Available	2003 Credits Used	Composite i	Current Year Credits
2015	15,010.66	15,010.66	1.358	20,384.48
2016	0			

Bureau of Reclamation:

Credits/Debits

FY	Credits/Debits Earned	Composite i	2003 Dollars	Total 2003 Dollars
2004	1,559,739.07	1.000	1,559,739.07	1,559,739.07
2005	4,112,477.11	1.019	4,035,796.97	5,595,536.04
2006	(2,871,624.04)	1.083	(2,651,545.74)	2,943,990.30
2007	2,314,455.02	1.122	2,062,794.14	5,006,784.44
2008	(495,025.15)	1.187	(417,038.88)	4,589,745.56
2009	1,833,416.80	1.210	1,515,220.50	6,104,966.06
2010	4,335,477.54	1.294	3,350,446.32	9,455,412.38
2011	796,149.37	1.191	668,471.34	10,123,883.72
2012	(3,105,120.42)	1.210	(2,566,215.22)	7,557,668.50
2013	(2,174,507.51)	1.251	(1,738,215.44)	5,819,453.06

Credits/Debits – Revised Inflation Rate

FY	Credits/Debits Earned	Composite i	2003 Dollars	Total 2003 Dollars
2004	1,559,739.07	1.000	1,559,739.07	1,559,739.07
2005	4,112,477.11	1.019	4,035,796.97	5,595,536.04
2006	(2,871,624.04)	1.083	(2,651,545.74)	2,943,990.30
2007	2,314,455.02	1.122	2,062,794.14	5,006,784.44
2008	(495,025.15)	1.187	(417,038.88)	4,589,745.56
2009	1,833,416.80	1.210	1,515,220.50	6,104,966.06
2010	4,335,477.54	1.294	3,350,446.32	9,455,412.38
2011*	796,149.37	1.258	632,869.13	10,088,281.51
2012*	(3,105,120.42)	1.278	(2,429,671.69)	7,658,609.82
2013*	(2,174,507.51)	1.321	(1,646,107.12)	6,012,502.70
Underfunding 2014*	(3,800,520.00)	1.347	(2,821,469.93)	3,191,032.77
2014*	(1,054,326.44)	1.347	(782,721.93)	2,408,310.84

D-3: Funding Accounts

Habitat Maintenance Fund:

Contributions

FY	Required 2003 Dollars	Additional 2003 Dollars	Composite i	Total Current Year Dollars	Cumulative	Cumulative With Interest
2006	$500,000		1.083	$541,500.00	$541,500.00	$555,372.00
2007	$500,000		1.122	$561,000.00	$1,102,500.00	$1,235,238.00
2008	$500,000		1.187	$593,500.00	$1,696,000.00	$1,893,821.21
2009	$500,000		1.210	$605,000.00	$2,301,000.00	$2,552,586.47
2010	$500,000		1.294	$647,000.00	$2,948,000.00	$3,346,682.94
2011	$4,500,000		1.191*	$5,359,500.00	$8,307,500.00	$9,474,028.54
2012	$4,500,000		1.210*	$5,445,000.00	$13,752,500.00	$15,484,305.53
2013	$4,500,000		1.251*	$5,629,500.00	$19,382,000.00	$20,192,843.59
2014	$4,500,000	$930,000	1.276*	$6,928,680.00	$26,310,680.00	
2014 Under funding				$676,040.64	$26,986,720.64	
2015	$3,570,000		1.358	$4,826,034.36	$31,848,755.00	
2015 Under funding				$654,015.00	$32,502,770.00	
Total	**$25,000,000**				**$32,502,770.00**	

* Original inflation index. Difference between original inflation index and revised inflation index is shown as underfunding makeup.

Remedial Measures Fund:

Contributions

FY	Required 2003 Dollars	Additional 2003 Dollars	Composite i	Total Current Year Dollars	Cumulative	Cumulative With Interest
2011	$266,000			0	0	
2012	$266,000			0	0	
2013	$266,000	$532,000	1.251*	$998,298.00	$998,298.00	
2014	$266,000		1.276*	$339,416.00	$1,337,714.00	
2014 Under funding				$1,094,851.44	$2,432,565.44	
2015	$266,000		1.358	$361,228.00	$2,793,793.44	
2015 Under funding				$1,436,271.00	$4,230,064.44	
2016	$796,000		1.387	$1,104,052.00		

* Original inflation index. Difference between original inflation index and revised inflation index is shown as underfunding makeup.

Land and Water Fund:

FY	Current Year Contributions	Cumulative Contributions
2011	$8,900,000	$8,900,000
2012	$4,600,000	$13,500,000
2013	0	$13,500,000
2014	0	$13,500,000
2015	$6,100,000	$19,600,000
2016	$4,100,000	$23,700,000

D4: Cumulative Program Accomplishment

Work Task	2004 Obligations	2004 Expenditures	2005 Obligations	2005 Expenditures	Subtotal Expenditures
A1	$0.00	$0.00	$421,740.74	$403,953.57	$403,953.57
G2	$0.00	$0.00	$0.00	$0.00	$0.00
Total A	**$0.00**	**$0.00**	**$421,740.74**	**$403,953.57**	**$403,953.57**
B1	$55,223.00	$55,223.00	$115,645.72	$115,645.72	$170,868.72
B2	$0.00	$0.00	$155,810.60	$145,568.04	$145,568.04
B3	$200,000.00	$0.00	$0.00	$14,527.30	$14,527.30
B4	$0.00	$0.00	$100,000.00	$9,857.95	$9,857.95
B5	$0.00	$0.00	$108.50	$40,720.81	$40,720.81
B6	$0.00	$0.00	$25,878.76	$25,878.76	$25,878.76
B7	$0.00	$0.00	$186,003.61	$186,003.61	$186,003.61
B8	$54,762.00	$54,762.00	$70,030.00	$70,030.00	$124,792.00
B9	$0.00	$0.00	$3,073.11	$3,073.11	$3,073.11
B10	$0.00	$0.00	$0.00	$0.00	$0.00
B11	$0.00	$0.00	$0.00	$0.00	$0.00
Total B	**$309,985.00**	**$109,985.00**	**$656,550.30**	**$611,305.30**	**$721,290.30**
C1	$0.00	$0.00	$45,276.00	$45,276.00	$45,276.00
C2	$0.00	$0.00	$0.00	$0.00	$0.00
C3	$0.00	$0.00	$0.00	$0.00	$0.00
C4	$0.00	$0.00	$0.00	$0.00	$0.00
C5	$0.00	$0.00	$0.00	$0.00	$0.00
C6	$0.00	$0.00	$0.00	$0.00	$0.00
C7	$0.00	$0.00	$0.00	$0.00	$0.00
C8	$0.00	$0.00	$177,053.00	$136,060.00	$136,060.00
C9	$0.00	$0.00	$43,816.00	$43,816.00	$43,816.00
C10	$0.00	$0.00	$0.00	$0.00	$0.00
C11	$0.00	$0.00	$0.00	$0.00	$0.00
C12	$0.00	$0.00	$0.00	$0.00	$0.00
C13	$0.00	$0.00	$99,996.80	$99,996.80	$99,996.80

Work Task	2004 Obligations	2004 Expenditures	2005 Obligations	2005 Expenditures	Subtotal Expenditures
C14	$0.00	$0.00	$0.00	$0.00	$0.00
C15	$0.00	$0.00	$22,255.00	$22,255.00	$22,255.00
C16	$0.00	$0.00	$0.00	$0.00	$0.00
C17	$0.00	$0.00	$45,000.00	$9,750.00	$9,750.00
C18	$0.00	$0.00	$41,981.82	$41,981.82	$41,981.82
C19	$0.00	$0.00	$0.00	$0.00	$0.00
C20	$64,011.00	$0.00	$53,779.96	$53,779.96	$53,779.96
C21	$0.00	$0.00	$95,534.00	$70,000.00	$70,000.00
C22	$0.00	$0.00	$48,096.00	$0.00	$0.00
C23	$0.00	$0.00	$0.00	$0.00	$0.00
C24	$0.00	$0.00	$0.00	$0.00	$0.00
C25	$0.00	$0.00	$0.00	$0.00	$0.00
C26	$0.00	$0.00	$0.00	$0.00	$0.00
C27	$0.00	$0.00	$0.00	$0.00	$0.00
C28	$0.00	$0.00	$0.00	$0.00	$0.00
C29	$0.00	$0.00	$0.00	$0.00	$0.00
C30	$0.00	$0.00	$0.00	$0.00	$0.00
C31	$0.00	$0.00	$0.00	$0.00	$0.00
C32	$0.00	$0.00	$0.00	$0.00	$0.00
C33	$0.00	$0.00	$0.00	$0.00	$0.00
C34	$0.00	$0.00	$0.00	$0.00	$0.00
C35	$0.00	$0.00	$0.00	$0.00	$0.00
C36	$0.00	$0.00	$0.00	$0.00	$0.00
C37	$0.00	$0.00	$0.00	$0.00	$0.00
C38	$0.00	$0.00	$0.00	$0.00	$0.00
C39	$0.00	$0.00	$0.00	$0.00	$0.00
C40	$0.00	$0.00	$0.00	$0.00	$0.00
C41	$0.00	$0.00	$0.00	$0.00	$0.00
C42	$0.00	$0.00	$0.00	$0.00	$0.00
C43	$0.00	$0.00	$0.00	$0.00	$0.00

Work Task	2004 Obligations	2004 Expenditures	2005 Obligations	2005 Expenditures	Subtotal Expenditures
C44	$0.00	$0.00	$0.00	$0.00	$0.00
C45	$0.00	$0.00	$0.00	$0.00	$0.00
C46	$0.00	$0.00	$0.00	$0.00	$0.00
C47	$0.00	$0.00	$0.00	$0.00	$0.00
C48	$0.00	$0.00	$0.00	$0.00	$0.00
C49	$0.00	$0.00	$0.00	$0.00	$0.00
C50	$0.00	$0.00	$0.00	$0.00	$0.00
Total C	**$64,011.00**	**$0.00**	**$672,788.58**	**$522,915.58**	**$522,915.58**
D1	$0.00	$0.00	$29,367.09	$29,367.09	$29,367.09
D2	$0.00	$0.00	$750,000.00	$370,174.62	$370,174.62
D3	$0.00	$0.00	$0.00	$0.00	$0.00
D4	$0.00	$0.00	$60,520.00	$60,520.00	$60,520.00
D5	$0.00	$0.00	$247,118.33	$247,118.33	$247,118.33
D6	$0.00	$0.00	$0.00	$0.00	$0.00
D7	$0.00	$0.00	$0.00	$0.00	$0.00
D8	$0.00	$0.00	$134,246.08	$134,246.08	$134,246.08
D9	$55,000.00	$0.00	$0.00	$0.00	$0.00
D10	$0.00	$0.00	$0.00	$0.00	$0.00
D11	$400,000.00	$168,133.36	$341,866.45	$100,963.76	$269,097.12
D12	$0.00	$0.00	$0.00	$0.00	$0.00
Total D	**$455,000.00**	**$168,133.36**	**$1,563,117.95**	**$942,389.88**	**$1,110,523.24**
E1	$1,077,729.33	$835,629.33	$348,991.39	$388,028.39	$1,223,657.72
E2	$0.00	$0.00	$147,333.85	$147,333.85	$147,333.85
E3	$1,037,791.00	$400,290.00	$31,268.45	$83,721.77	$484,011.77
E4	$0.00	$0.00	$17,278.54	$17,278.54	$17,278.54
E5	$0.00	$0.00	$80,058.95	$100,548.43	$100,548.43
E6	$110,004.00	$0.00	$109,927.52	$79,586.39	$79,586.39
E7	$0.00	$0.00	$370,437.68	$312,199.68	$312,199.68
E8	$0.00	$0.00	$1,035.50	$1,035.50	$1,035.50
E9	$0.00	$0.00	$53,320.19	$53,320.19	$53,320.19

Work Task	2004 Obligations	2004 Expenditures	2005 Obligations	2005 Expenditures	Subtotal Expenditures
E10	$0.00	$0.00	$0.00	$0.00	$0.00
E11	$0.00	$0.00	$0.00	$0.00	$0.00
E12	$6,673.38	$6,673.38	$70,893.38	$25,754.05	$32,427.43
E13	$0.00	$0.00	$48,482.00	$25,912.33	$25,912.33
E14	$0.00	$0.00	$84,309.07	$84,309.07	$84,309.07
E15	$0.00	$0.00	$0.00	$0.00	$0.00
E16	$0.00	$0.00	$134,814.86	$5,392.59	$5,392.59
E17	$0.00	$0.00	$0.00	$0.00	$0.00
E18	$0.00	$0.00	$0.00	$0.00	$0.00
E19	$0.00	$0.00	$0.00	$0.00	$0.00
E20	$95,000.00	$35,000.00	$0.00	$0.00	$35,000.00
E21	$0.00	$0.00	$19,729.97	$19,739.97	$19,739.97
E22	$5,088.00	$4,028.00	$0.00	$0.00	$4,028.00
E23	$0.00	$0.00	$0.00	$0.00	$0.00
E24	$0.00	$0.00	$0.00	$0.00	$0.00
E25	$0.00	$0.00	$0.00	$0.00	$0.00
E25 In-Kind	$0.00	$0.00	$0.00	$0.00	$0.00
E26	$0.00	$0.00	$0.00	$0.00	$0.00
E27	$0.00	$0.00	$0.00	$0.00	$0.00
E28	$0.00	$0.00	$0.00	$0.00	$0.00
E29	$0.00	$0.00	$0.00	$0.00	$0.00
E30	$0.00	$0.00	$0.00	$0.00	$0.00
E31	$0.00	$0.00	$0.00	$0.00	$0.00
Total E	**$2,332,285.71**	**$1,281,620.71**	**$1,517,881.35**	**$1,344,160.75**	**$2,625,781.46**

Work Task	2004 Obligations	2004 Expenditures	2005 Obligations	2005 Expenditures	Subtotal Expenditures
F1	$0.00	$0.00	$199,492.67	$199,492.67	$199,492.67
F2	$0.00	$0.00	$65,235.81	$65,235.81	$65,235.81
F3	$0.00	$0.00	$23,023.55	$23,023.55	$23,023.55
F4	$0.00	$0.00	$0.00	$0.00	$0.00
F5	$0.00	$0.00	$0.00	$0.00	$0.00
F6	$0.00	$0.00	$0.00	$0.00	$0.00
F7	$0.00	$0.00	$0.00	$0.00	$0.00
Total F	**$0.00**	**$0.00**	**$287,752.03**	**$287,752.03**	**$287,752.03**
G1	$235,000.00	$0.00	$0.00	$0.00	$0.00
G3	$0.00	$0.00	$0.00	$0.00	$0.00
G4	$0.00	$0.00	$0.00	$0.00	$0.00
Total G	**$235,000.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
H1	$0.00	$0.00	$0.00	$0.00	$0.00
H2	$0.00	$0.00	$0.00	$0.00	$0.00
Total H	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
I1	$0.00	$0.00	$0.00	$0.00	$0.00
G5	$0.00	$0.00	$0.00	$0.00	$0.00
Total I	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
GRAND Totals	**$3,396,281.71**	**$1,559,739.07**	**$5,119,830.95**	**$4,112,477.11**	**$5,672,216.18**

Work Task	2006 Obligations	2006 Expenditures	2007 Obligations	2007 Expenditures	2008 Obligations	2008 Expenditures	2009 Obligations	2009 Expenditures	2010 Obligations	2010 Expenditures	Subtotal Expenditures
A1	$1,120,653.36	$1,138,440.53	$1,052,867.52	$1,037,492.71	$965,660.35	$965,660.35	$1,052,853.25	$1,052,853.25	$1,296,959.74	$1,255,046.41	$5,449,493.25
G2	$57,262.87	$57,262.87	$73,272.35	$73,272.35	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$130,535.22
Total A	**$1,177,916.23**	**$1,195,703.40**	**$1,126,139.87**	**$1,110,765.06**	**$965,660.35**	**$965,660.35**	**$1,052,853.25**	**$1,052,853.25**	**$1,296,959.74**	**$1,255,046.41**	**$5,580,028.47**
B1	$222,390.86	$216,316.31	$227,440.83	$246,686.92	$149,085.82	$144,764.64	$206,001.63	$223,658.88	$234,965.09	$234,965.09	$1,066,391.84
B2	$206,485.90	$206,485.90	$233,348.47	$149,191.21	$334,013.77	$330,768.94	$503,628.30	$417,210.83	$352,255.56	$555,904.57	$1,659,561.45
B3	$13,190.17	$13,190.17	$41,588.73	$41,588.73	$102,288.46	$77,288.46	$169,669.00	$179,239.39	$95,522.93	$106,304.52	$417,611.27
B4	$127,627.57	$54,248.17	$117,698.86	$174,269.47	$140,519.61	$86,110.71	$229,364.46	$212,292.78	$269,833.73	$318,418.43	$845,339.56
B5	$176,017.60	$121,570.05	$301,359.83	$95,138.87	$303,301.12	$186,455.13	$259,449.57	$231,055.42	$351,957.84	$481,429.95	$1,115,649.42
B6	$101,713.03	$36,713.03	$20,654.33	$50,255.33	$48,190.46	$10,897.25	$31,769.89	$59,462.10	$41,521.10	$77,031.09	$234,358.80
B7	$205,640.44	$167,528.16	$136,000.40	$171,075.40	$173,950.09	$173,950.09	$185,238.41	$185,238.41	$165,056.32	$165,056.32	$862,848.38
B8	$50,869.73	$50,869.73	$46,711.07	$46,711.07	$66,890.83	$66,890.83	$73,421.00	$26,111.00	$78,710.75	$126,020.75	$316,603.38
B9	$570.14	$570.14	-$36.00	-$36.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$534.14
B10	$57,122.00	$0.00	$260,000.00	$147,305.11	$74,191.86	$126,084.93	$89,956.67	$122,880.49	$70,053.15	$140,878.20	$537,148.73
B11	$39,704.30	$39,704.30	$67,010.31	$2,010.31	$16,879.79	$28,895.98	$119,439.72	$47,327.37	$53,930.37	$132,727.00	$250,664.96
Total B	**$1,201,331.74**	**$907,195.96**	**$1,451,776.83**	**$1,124,196.42**	**$1,409,311.81**	**$1,232,106.96**	**$1,867,938.65**	**$1,704,476.67**	**$1,713,806.84**	**$2,338,735.92**	**$7,306,711.93**
C1	$73,525.15	$72,382.15	$0.00	$29,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$101,382.15
C2	$10,000.00	$0.00	$10,000.00	$0.00	$10,000.00	$20,000.00	$10,000.00	$20,000.00	$10,000.00	$10,000.00	$50,000.00
C3	$161,445.47	$161,445.47	$34,848.11	$34,848.11	$4,637.56	$4,637.56	$11,547.48	$11,547.48	$13,285.36	$13,285.36	$225,763.98
C4	$14,128.53	$4,128.53	$11,780.56	$1,780.56	$12,667.29	$22,667.29	$15,557.23	$25,557.23	$11,532.14	$10,648.80	$64,782.41
C5	$8,583.92	$8,583.92	$47,425.58	$47,425.58	$82,971.14	$82,971.14	$83,428.78	$83,428.78	$97,189.14	$97,189.14	$319,598.56
C6	$76,875.35	$76,875.35	$26,676.33	$26,676.33	-$2,110.00	-$2,110.00	$0.00	$0.00	$0.00	$0.00	$101,441.68
C7	$189,789.41	$68,121.58	$80,818.40	$102,387.02	$88,573.21	$148,829.53	$129,403.53	$110,818.42	$58,380.22	$116,808.22	$546,964.77
C8	$187,973.54	$108,932.54	$180,751.80	$157,708.80	$190,297.91	$142,918.10	$23,606.34	$39,115.60	-$4,417.26	-$4,417.26	$444,257.78
C9	$30,253.86	$5,828.86	$38,785.76	$63,210.76	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$69,039.62
C10	$63,519.00	$47,365.78	$106,382.73	$116,382.73	$159,000.24	$156,041.84	$132,905.58	$51,983.16	$127,882.41	$204,288.36	$576,061.87
C11	$95,301.06	$44,091.06	$142,660.83	$147,083.82	$128,801.82	$121,895.64	$135,376.13	$98,043.33	$160,883.55	$137,378.89	$548,492.74
C12	$173,576.33	$122,584.33	$184,685.94	$155,160.86	$174,728.02	$155,237.02	$184,842.91	$209,012.49	$216,432.73	$171,572.67	$813,567.37
C13	$265,621.17	$160,471.22	$302,066.02	$325,075.86	$147,816.23	$170,683.76	$149,876.40	$209,148.98	$341,670.90	$266,310.38	$1,131,690.20
C14	$38,229.17	$8,229.17	$67.52	$67.52	$0.00	$0.00	$65,136.31	$13,360.30	$67,997.50	$63,679.95	$85,336.94
C15	$98,025.48	$98,025.48	$92,892.96	$92,892.96	$81,892.97	$81,892.97	$80,882.78	$80,882.78	$96,551.48	$96,551.48	$450,245.67
C16	$0.00	$0.00	$55,332.60	$18,882.60	$0.00	$36,450.00	$0.00	$0.00	$0.00	$0.00	$55,332.60
C17	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C18	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C19	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C20	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C21	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Work Task	2006 Obligations	2006 Expenditures	2007 Obligations	2007 Expenditures	2008 Obligations	2008 Expenditures	2009 Obligations	2009 Expenditures	2010 Obligations	2010 Expenditures	Subtotal Expenditures
C22	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C23	$0.00	$0.00	$138,945.21	$138,945.21	$148,207.26	$143,751.26	$70,985.95	$74,129.95	$0.00	$0.00	$356,826.42
C24	$0.00	$0.00	$0.00	$0.00	$86,935.13	$86,935.13	$377,198.25	$281,820.73	$165,079.12	$250,183.33	$618,939.19
C25	$0.00	$0.00	$0.00	$0.00	$210,841.42	$129,741.75	$228,412.27	$216,650.06	$213,756.65	$245,692.99	$592,084.80
C26	$0.00	$0.00	$0.00	$0.00	$621.85	$621.85	$74,709.00	-$291.00	$82,395.92	$49,780.55	$50,111.40
C27	$0.00	$0.00	$0.00	$0.00	$93,190.68	$39,734.64	$110,074.68	$147,061.35	$57,914.14	$71,248.65	$258,044.64
C28	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$130,739.27	$68,885.22	$26,392.77	$52,670.45	$121,555.67
C29	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$80,464.99	$80,464.99	$126,061.29	$26,061.29	$106,526.28
C30	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$94,554.39	$59,880.30	$77,335.50	$93,241.41	$153,121.71
C31	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$103,693.22	$66,655.68	$100,903.63	$73,863.03	$140,518.71
C32	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$87,893.04	$87,893.04	$85,228.77	$85,228.77	$173,121.81
C33	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$205,229.84	$5,229.84	$70,817.31	$75,956.21	$81,186.05
C34	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$42,196.13	$42,196.13	$69,518.18	$69,518.18	$111,714.31
C35	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$33,949.46	$10,688.46	$10,688.46
C36	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$21,836.95	$93,004.96	$93,004.96
C37	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$266,477.27	$113,822.56	$113,822.56
C38	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$6,250.70	$6,250.70	$6,250.70
C39	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$251,804.17	$170,403.17	$170,403.17
C40	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$71,936.76	$2,106.76	$2,106.76
C41	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,885.67	$5,885.67	$5,885.67
C42	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$49,236.73	$49,236.73	$49,236.73
C43	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C44	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C45	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C46	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C47	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C48	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C49	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C50	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total C	**$1,486,847.44**	**$987,065.44**	**$1,454,120.35**	**$1,457,528.72**	**$1,619,072.73**	**$1,542,899.48**	**$2,628,714.50**	**$2,083,474.84**	**$2,980,169.16**	**$2,728,139.86**	**$8,799,108.34**

Work Task	2006 Obligations	2006 Expenditures	2007 Obligations	2007 Expenditures	2008 Obligations	2008 Expenditures	2009 Obligations	2009 Expenditures	2010 Obligations	2010 Expenditures	Subtotal Expenditures
D1	$44,997.82	$44,997.82	$18,766.77	$18,766.77	$20,146.27	$20,146.27	$27,400.01	$27,400.01	$18,997.38	$18,997.38	$130,308.25
D2	$848,505.45	$708,099.72	$915,330.65	$711,050.40	$621,896.84	$907,303.29	$1,274,835.64	$556,069.59	$152,316.08	$719,637.66	$3,602,160.66
D3	$74,346.50	$25,199.42	$72,362.72	$78,829.48	$81,286.79	$69,400.31	$222,500.41	$140,793.91	$104,750.84	$113,389.00	$427,612.12
D4	$66,045.80	$3,058.80	$71,104.98	$111,368.21	$75,233.41	$61,170.52	$780.62	$24,973.85	$0.00	$0.00	$200,571.38
D5	$245,205.41	$245,205.41	$238,487.89	$238,487.89	$254,903.38	$254,903.38	$282,279.28	$282,279.28	$224,813.84	$224,813.84	$1,245,689.80
D6	$158,961.43	$58,961.43	$177,773.39	$192,511.07	$124,050.07	$166,931.67	$300,988.48	$148,813.20	$226,354.82	$194,266.82	$761,484.19
D7	$454,775.02	$166,600.05	$450,164.71	$463,095.44	$526,687.60	$710,350.15	$526,939.86	$447,287.78	$548,459.47	$521,922.72	$2,309,256.14
D8	$310,623.73	$302,623.73	$332,620.94	$340,620.94	$339,719.60	$339,719.60	$469,412.71	$469,412.71	$676,835.76	$636,835.76	$2,089,212.74
D9	$99,886.92	$33,254.92	$89,831.54	$79,684.54	$101,177.29	$40,618.43	$139,417.88	$153,474.97	$162,881.50	$169,968.27	$477,001.13
D10	$18,977.01	$18,977.01	$27,483.85	$12,118.85	$5,369.81	$20,734.81	$0.00	$0.00	$0.00	$0.00	$51,830.67
D11	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
D12	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$12,886.12	$7,730.12	$7,730.12
Total D	**$2,322,325.09**	**$1,606,978.31**	**$2,393,927.44**	**$2,246,533.59**	**$2,150,471.06**	**$2,591,278.43**	**$3,244,554.89**	**$2,250,505.30**	**$2,128,295.81**	**$2,607,561.57**	**$11,302,857.20**
E1	$273,378.20	$240,612.20	$230,237.45	$181,081.26	$120,026.35	$115,480.80	$195,931.36	$197,716.08	$204,821.21	$213,790.05	$948,680.39
E2	$270,978.22	$238,212.22	$0.00	$0.00	$26,446.69	$95,003.21	$86,242.83	$68,373.83	$91,981.79	$106,416.04	$508,005.30
E3	$53,581.02	$53,581.02	$94,430.60	$94,430.60	$65,565.30	$65,565.30	$97,370.14	$96,480.04	$17,434.18	$15,805.84	$325,862.80
E4	$590,485.99	$275,398.70	$782,488.02	$706,458.13	$828,982.19	$662,454.83	$1,349,593.46	$952,890.91	$1,553,565.67	$1,355,331.31	$3,952,533.88
E5	$1,292,930.68	$843,994.77	$3,322,086.06	$997,606.83	$3,611,928.60	$3,207,890.57	$789,905.06	$3,373,478.92	$770,765.54	$559,001.12	$8,981,972.21
E6	$23,437.93	$23,437.93	$16,036.43	$16,036.43	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$39,474.36
E7	$12,309.09	$12,309.09	$5,515.55	$5,515.55	$4,410.55	$597.23	$0.00	$0.00	$0.00	$0.00	$18,421.87
E8	$488,610.09	$185,255.91	$71,382.17	$317,523.58	$163,444.58	$169,788.34	$132,389.11	$104,938.56	$0.00	$59,498.19	$837,004.58
E9	$117,538.92	$77,538.92	$85,084.59	$115,256.59	$182,393.19	$184,705.20	$2,285,834.49	$1,776,712.34	$2,129,989.54	$2,072,293.39	$4,226,506.44
E10	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E11	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E12	$32,151.02	$32,151.02	$11,633.08	$11,633.08	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$43,784.10
E13	$82,438.05	$82,438.05	$18,876.44	$18,876.44	$110.00	$110.00	$0.00	$0.00	$0.00	$0.00	$101,424.49
E14	$2,114,868.58	$1,630,141.53	$3,188,676.30	$3,664,056.46	$965,430.09	$970,775.11	$540,515.32	$442,013.60	$655,197.95	$464,914.90	$7,171,901.60
E15	$265,497.38	$220,949.66	$421,634.95	$383,320.87	$433,665.01	$338,520.03	$161,470.80	$201,103.14	$4,331.69	$121,330.87	$1,265,224.57
E16	$158,330.58	$200,443.47	$103,685.80	$103,685.80	$234,994.34	$234,994.34	$203,840.83	$203,145.39	$294,547.68	$251,048.46	$993,317.46
E17	$1,287.40	$1,287.40	$4,757.28	$4,757.28	$10,480.66	$10,480.66	$7,711.94	$7,711.94	$1,013,487.38	$13,487.38	$37,724.66
E18	$0.00	$0.00	$2,376.11	$2,376.11	$25,218.68	$25,218.68	$205,056.92	$190,497.11	$197,050.80	$154,637.24	$372,729.14
E19	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E20	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E21	$0.00	$0.00	$0.00	$0.00	-$802.38	-$802.38	$83,869.06	$83,869.06	$26,129.72	$26,129.72	$109,196.40
E22	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E23	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Work Task	2006 Obligations	2006 Expenditures	2007 Obligations	2007 Expenditures	2008 Obligations	2008 Expenditures	2009 Obligations	2009 Expenditures	2010 Obligations	2010 Expenditures	Subtotal Expenditures
E24	$0.00	$0.00	$55,957.46	$51,332.46	$1,075,422.08	$389,885.00	$689,711.29	$988,219.33	$523,414.75	$590,792.33	$2,020,229.12
E25	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$137,722.25	$117,119.60	$63,672.19	$84,274.84	$201,394.44
E25 In-Kind	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$436,000.00	$436,000.00	$436,000.00
E26	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$147.62	$147.62	$0.00	$0.00	$147.62
E27	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$12,635.95	$12,635.95	$688,738.54	$283,233.36	$295,869.31
E28	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$257,890.16	$156,905.74	$156,905.74
E29	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$173,512.57	$173,512.57	$173,512.57
E30	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E31	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total E	**$5,777,823.15**	**$4,117,751.89**	**$8,414,858.29**	**$6,673,947.47**	**$7,747,715.93**	**$6,470,666.92**	**$6,979,948.43**	**$8,817,053.42**	**$9,102,531.36**	**$7,138,403.35**	**$33,217,823.05**
F1	$138,265.04	$138,265.04	$286,184.13	$255,369.52	$305,647.09	$221,016.81	$360,842.17	$344,424.98	$394,781.36	$379,228.21	$1,338,304.56
F2	$28,524.45	$28,524.45	$143,492.76	$143,492.76	$157,021.22	$78,686.22	$143,556.56	$182,724.56	$114,944.30	$125,520.30	$558,948.29
F3	$10,384.22	$10,384.22	$30,038.11	$30,038.11	$33,109.48	$33,109.48	$55,782.13	$55,782.13	$48,782.43	$48,782.43	$178,096.37
F4	$0.00	$0.00	$69,897.69	$69,897.69	$93,145.13	$93,145.13	$92,697.58	$92,697.58	$115,018.90	$115,018.90	$370,759.30
F5	$0.00	$0.00	$41,573.87	$41,573.87	$137,912.88	$129,939.88	$175,494.19	$167,068.67	$156,279.56	$169,647.12	$508,229.54
F6	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$17,076.49	$17,076.49	$41,207.42	$41,207.42	$58,283.91
F7	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total F	**$177,173.71**	**$177,173.71**	**$571,186.56**	**$540,371.95**	**$726,835.80**	**$555,897.52**	**$845,449.12**	**$859,774.41**	**$871,013.97**	**$879,404.38**	**$3,012,621.97**
G1	$97,959.45	$97,959.45	$144,443.78	$94,607.72	$145,357.59	$174,902.91	$337,661.19	$318,351.29	$484,297.71	$438,276.83	$1,124,098.20
G3	$283,189.83	$206,117.04	$342,265.08	$230,401.38	$414,505.30	$273,816.05	$388,826.06	$441,109.20	$241,728.79	$326,952.38	$1,478,396.05
G4	$82,039.77	$80,869.98	$60,549.49	$61,719.28	$8,485.07	$8,485.07	$33,419.32	$33,419.32	$33,414.42	$33,414.42	$217,908.07
Total G	**$463,189.05**	**$384,946.47**	**$547,258.35**	**$386,728.38**	**$568,347.96**	**$457,204.03**	**$759,906.57**	**$792,879.81**	**$759,440.92**	**$798,643.63**	**$2,820,402.32**
H1	$541,500.00	$541,500.00	$561,000.00	$561,000.00	$593,500.00	$593,500.00	$605,000.00	$605,000.00	$647,000.00	$647,000.00	$2,948,000.00
H2	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total H	**$541,500.00**	**$541,500.00**	**$561,000.00**	**$561,000.00**	**$593,500.00**	**$593,500.00**	**$605,000.00**	**$605,000.00**	**$647,000.00**	**$647,000.00**	**$2,948,000.00**
I1	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$16,429.75	$16,429.75	$18,946.39	$18,946.39	$35,376.14
G5	$8,789.12	$8,789.12	$35,511.43	$35,511.43	$16,759.13	$16,759.13	$0.00	$0.00	$0.00	$0.00	$61,059.68
Total I	**$8,789.12**	**$8,789.12**	**$35,511.43**	**$35,511.43**	**$16,759.13**	**$16,759.13**	**$16,429.75**	**$16,429.75**	**$18,946.39**	**$18,946.39**	**$96,435.82**
GRAND Totals	**$13,156,895.53**	**$9,927,104.30**	**$16,555,779.12**	**$14,136,583.02**	**$15,797,674.77**	**$14,425,972.82**	**$18,000,795.16**	**$18,182,447.45**	**$19,518,164.19**	**$18,411,881.51**	**$75,083,989.10**

Work Task	2011 Obligations	2011 Expenditures	2012 Obligations	2012 Expenditures	2013 Obligations	2013 Expenditures	2014 Obligations	2014 Expenditures	Expenditures Grand Total
A1	$1,138,509.80	$1,164,324.46	$917,627.80	$917,627.80	$975,426.99	$969,759.51	$985,556.40	$985,457.99	$9,890,616.58
G2	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$130,535.22
Total A	$1,138,509.80	$1,164,324.46	$917,627.80	$917,627.80	$975,426.99	$969,759.51	$985,556.40	$985,457.99	$10,021,151.80
B1	$206,468.97	$196,380.27	$203,360.50	$186,340.73	$195,004.95	$152,635.70	$193,518.74	$179,737.54	$1,952,354.80
B2	$230,585.84	$215,918.30	$298,730.97	$180,923.42	$615,852.78	$343,915.36	$305,132.56	$308,238.89	$2,854,125.46
B3	$136,901.52	$141,549.52	$145,868.05	$109,027.59	$197,235.85	$186,396.43	$183,710.01	$166,462.04	$1,035,574.15
B4	$150,310.56	$111,787.33	$148,422.27	$166,656.48	$247,640.41	$259,507.68	$606,288.45	$596,353.32	$1,989,502.32
B5	$270,542.88	$516,841.63	$306,855.83	$287,412.97	$308,173.52	$218,444.47	$300,297.40	$231,069.94	$2,410,139.24
B6	$17,692.75	$23,230.91	$66,798.28	$30,281.95	$96,823.96	$119,515.93	$135,579.70	$146,246.94	$579,513.29
B7	$246,148.11	$242,893.11	$173,805.16	$170,634.16	$190,829.84	$168,099.87	$223,986.77	$248,091.51	$1,878,570.64
B8	$83,094.77	$63,127.77	$65,514.81	$85,481.81	$96,819.84	$96,819.84	$102,290.33	$80,913.05	$767,737.85
B9	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3,607.25
B10	$3,498.01	$17,672.96	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$554,821.69
B11	$25,979.31	$72,240.61	$36,397.60	-$8,660.52	$49,516.55	$83,448.61	$50,000.00	$2,596.71	$400,290.37
Total B	$1,371,222.72	$1,601,642.41	$1,445,753.47	$1,208,098.59	$1,997,897.70	$1,628,783.89	$2,100,803.96	$1,959,709.94	$14,426,237.06
C1	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$146,658.15
C2	$11,293.33	$1,293.33	$10,731.82	$731.82	$11,341.43	$31,329.22	$21,811.11	$21,823.32	$105,177.69
C3	$10,270.70	$10,270.70	$13,408.44	$13,408.44	$19,456.71	$19,456.71	$9,297.76	$9,297.76	$278,197.59
C4	$11,705.91	$8,879.67	$10,162.78	$10,901.46	$10,506.74	$13,477.64	$10,846.42	$1,259.62	$99,300.80
C5	$95,482.79	$95,482.79	$86,835.87	$86,835.87	$48,599.65	$48,599.65	$3,360.57	$3,360.57	$553,877.44
C6	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$101,441.68
C7	-$2,315.00	-$2,315.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$544,649.77
C8	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$580,317.78
C9	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$112,855.62
C10	$132,922.93	$117,400.67	$126,121.64	$72,417.95	$120,874.14	$125,353.43	$133,266.56	$109,426.09	$1,000,660.01
C11	$57,589.11	$165,093.69	$140,147.91	$73,984.67	$152,127.61	$111,169.59	$153,129.68	$111,670.90	$1,010,411.59
C12	$196,158.23	$230,969.52	$54.45	-$8,270.02	$0.00	$0.00	$0.00	$0.00	$1,036,266.87
C13	$80,324.83	$155,096.91	$134,764.80	$135,353.24	$135,193.23	$135,193.23	$135,247.93	$8,671.93	$1,666,002.31
C14	$71,883.70	$117,164.58	$71,167.73	$12,243.41	$1,468.04	$71,205.04	$1,949.93	$1,949.93	$287,899.90
C15	$23,239.78	$23,239.78	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$495,740.45
C16	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$55,332.60
C17	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$9,750.00
C18	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$41,981.82

Work Task	2011 Obligations	2011 Expenditures	2012 Obligations	2012 Expenditures	2013 Obligations	2013 Expenditures	2014 Obligations	2014 Expenditures	Expenditures Grand Total
C19	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C20	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$53,779.96
C21	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$70,000.00
C22	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C23	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$356,826.42
C24	$183,056.69	$24,155.95	$243,998.17	$207,976.82	$187,914.63	$322,007.97	$414,350.46	$194,369.60	$1,367,449.53
C25	$252,351.95	$243,390.68	$246,544.45	$229,804.62	$226,898.52	$230,291.57	$179,807.87	$169,446.24	$1,465,017.91
C26	$4,795.46	$112,410.83	$1,165.90	-$33,711.16	$0.00	$0.00	$0.00	$0.00	$128,811.07
C27	$42,984.20	$42,984.20	$56,612.17	$36,612.17	$20,514.72	$8,968.15	$39,890.93	$44,403.27	$391,012.43
C28	-$4,261.38	$31,314.99	$483.66	$212.08	$0.00	$0.00	$0.00	$0.00	$153,082.74
C29	$0.00	$100,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$206,526.28
C30	$91,603.18	$84,466.75	$65,684.91	$68,876.25	$10,656.35	$33,249.11	$305.47	$305.47	$340,019.29
C31	$111,372.84	$175,450.98	$124,776.15	$63,276.86	$131,290.14	$151,860.69	$134,780.01	$45,850.27	$576,957.51
C32	$92,560.49	$92,560.49	$115,711.54	$115,711.54	$108,597.79	$108,597.79	$104,611.98	$104,611.98	$594,603.61
C33	$50,844.82	$245,705.92	$97,020.68	$78,504.28	$103,611.38	$80,964.08	$4,096.37	$26,374.45	$512,734.78
C34	$12,304.81	$12,304.81	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$124,019.12
C35	$146,076.28	$11,161.28	$289,115.34	$188,039.98	$25,598.83	$253,834.76	$28,887.66	$59,903.09	$523,627.57
C36	$50,440.81	$138,207.29	$13,383.19	$20,656.70	$0.00	$0.00	$0.00	$0.00	$251,868.95
C37	$53,704.86	$150,988.99	$26,351.59	$26,351.59	$0.00	$0.00	$0.00	$0.00	$291,163.14
C38	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$6,250.70
C39	$174,690.00	$201,453.00	$252,447.59	$271,872.42	$279,418.33	$291,213.50	$212,290.69	$200,152.09	$1,135,094.18
C40	$125,751.99	$125,107.76	$180,401.56	$143,503.91	$221,864.02	$89,576.45	$180,030.92	$149,088.81	$509,383.69
C41	$31,150.14	$31,150.14	$31,584.07	$31,584.07	$57,946.18	$32,946.18	$59,605.33	$84,605.33	$186,171.39
C42	$103,142.42	$32,289.92	$118,748.43	$171,949.11	$180,759.55	$145,283.37	$6,542.58	$59,670.58	$458,429.71
C43	$1,099.56	$1,099.56	$15,413.97	$11,859.12	$27,536.19	$18,536.19	$57,873.82	$51,799.42	$83,294.29
C44	$33,542.26	$33,542.26	$94,204.34	$94,204.34	$98,327.59	$98,327.59	$16,059.47	$16,059.47	$242,133.66
C45	$175,342.41	$125,969.16	$193,102.42	$187,812.06	$203,401.27	$214,788.25	$145,520.50	$169,729.36	$698,298.83
C46	$103,992.63	$56,680.51	$117,603.73	$112,123.63	$72,730.42	$119,691.78	$2,210.78	$7,562.21	$296,058.13
C47	$1,147.88	$1,147.88	$237,437.06	$50,689.87	$242,379.43	$98,332.90	$236,065.29	$229,356.08	$379,526.73
C48	$50,572.34	$50,502.41	$50,590.60	$47,752.42	-$78.00	$2,830.11	$0.00	$0.00	$101,084.94
C49	$0.00	$0.00	$59,867.17	$59,867.17	$150,247.28	$108,750.98	$111,069.75	$55,525.84	$224,143.99
C50	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C51	$0.00	$0.00	$26,532.93	$26,532.93	$16,027.17	$16,027.17	$0.00	$0.00	$42,560.10

Work Task	2011 Obligations	2011 Expenditures	2012 Obligations	2012 Expenditures	2013 Obligations	2013 Expenditures	2014 Obligations	2014 Expenditures	Expenditures Grand Total
C52	$0.00	$0.00	$22,422.40	$22,422.40	$149,568.98	$72,953.74	$290,368.44	$238,350.92	$333,727.06
C53	$0.00	$0.00	$105,869.79	$54,806.89	$112,559.64	$104,822.29	$117,501.56	$89,776.63	$249,405.81
C54	$0.00	$0.00	$0.00	$0.00	$9,110.44	$9,110.44	$0.00	$0.00	$9,110.44
C55	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C56	$0.00	$0.00	$0.00	$0.00	$22,208.29	$22,208.29	$0.00	$0.00	$22,208.29
C57	$0.00	$0.00	$0.00	$0.00	$232,247.32	$164,854.07	$229,689.31	$147,537.58	$312,391.65
C58	$0.00	$0.00	$0.00	$0.00	$30,179.14	$30,179.14	$0.00	$0.00	$30,179.14
C59	$0.00	$0.00	$0.00	$0.00	$21,530.67	$21,530.67	$23,637.54	$23,637.54	$45,168.21
C60	$0.00	$0.00	$0.00	$0.00	$58,428.29	$58,428.29	$64,680.00	$13,524.27	$71,952.56
C61	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$118,472.41	$15,602.82	$15,602.82
C62	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$192,514.27	$40,205.32	$40,205.32
Total C	$2,576,822.95	$3,046,622.40	$3,380,469.25	$2,686,898.91	$3,501,042.11	$3,465,950.03	$3,439,773.37	$2,504,908.76	$21,026,404.02
D1	$18,725.89	$18,725.89	$21,802.58	$21,802.58	$16,679.67	$16,679.67	$35,186.60	$35,186.60	$252,070.08
D2	$655,142.92	$850,868.92	$708,540.74	$654,118.74	$751,497.04	$607,541.04	$717,918.05	$780,849.57	$6,865,713.55
D3	$120,009.76	$96,376.11	$111,833.44	$123,606.98	-$355.45	$90,388.13	$536.95	$536.95	$738,520.29
D4	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$261,091.38
D5	$289,547.70	$289,547.70	$253,792.34	$253,792.34	$223,815.69	$223,815.69	$290,972.22	$290,972.22	$2,550,936.08
D6	$237,749.92	$295,090.92	$465,205.66	$282,206.66	$204,049.07	$271,954.57	$366,627.83	$447,814.76	$2,058,551.10
D7	$543,056.20	$600,256.19	$563,565.52	$569,156.61	$413,612.30	$477,418.69	$756,988.58	$677,804.89	$4,633,892.52
D8	$614,086.24	$592,711.03	$624,518.66	$617,542.15	$718,996.60	$680,269.86	$802,447.87	$707,882.53	$4,821,864.39
D9	$147,131.56	$217,528.56	$188,280.52	$141,512.52	$139,177.55	$120,617.55	$387,326.01	$266,830.50	$1,223,490.26
D10	$33,659.04	$33,659.04	$20,104.65	$20,104.65	$28,675.73	$28,675.73	$40,251.89	$40,251.89	$174,521.98
D11	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$269,097.12
D12	$117,017.13	$45,155.76	$238,443.61	$135,439.05	$27,021.18	$156,693.19	$29,627.44	$57,774.25	$402,792.37
D13	$0.00	$0.00	$0.00	$0.00	$31,431.21	$31,431.21	-$2,049.23	-$2,049.23	$29,381.98
Total D	$2,776,126.36	$3,039,920.12	$3,196,087.72	$2,819,282.28	$2,554,600.59	$2,705,485.33	$3,425,834.21	$3,303,854.93	$24,281,923.10
E1	$267,986.63	$222,156.86	$916,620.08	$890,963.41	$194,295.82	$288,427.90	$130,785.45	$140,850.75	$3,714,737.03
E2	$132,989.92	$140,484.47	-$424.29	-$424.29	$0.00	$0.00	$0.00	$0.00	$795,399.33
E3	$0.00	$61,353.62	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$871,228.19
E4	$1,483,727.80	$1,502,175.84	$1,154,766.77	$1,688,339.54	$620,712.27	$950,586.82	$487,583.25	$413,261.53	$8,524,176.15
E5	$451,820.04	$734,522.58	$361,277.27	$265,712.51	$330,356.42	$334,268.82	$505,920.13	$362,619.34	$10,779,643.89
E6	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$119,060.75
E7	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$330,621.55

Work Task	2011 Obligations	2011 Expenditures	2012 Obligations	2012 Expenditures	2013 Obligations	2013 Expenditures	2014 Obligations	2014 Expenditures	Expenditures Grand Total
E8	$0.00	$22,143.98	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$860,184.06
E9	$738,284.20	$961,222.68	$414,640.69	$449,967.31	$533,086.04	$743,401.36	$229,824.73	$124,625.32	$6,559,043.30
E10	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E11	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E12	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$76,211.53
E13	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$127,336.82
E14	$508,610.43	$683,705.92	$771,006.55	$456,991.14	$303,452.23	$211,790.86	$693,768.00	$603,003.55	$9,211,702.14
E15	$17,255.29	$17,255.29	$28,211.19	$28,211.19	$346,829.92	$346,829.92	$36,460.07	$36,460.07	$1,693,981.04
E16	$259,346.35	$186,157.60	$209,391.63	$261,624.65	$374,317.11	$340,717.17	$701,608.57	$664,262.56	$2,451,472.03
E17	$41,359.94	$730,765.63	$2,209,091.02	$332,533.05	$4,150.44	-$1,022.08	$29,544.13	$34,905.78	$1,134,907.04
E18	$205,944.26	$205,088.24	$326,234.76	$319,805.30	$320,149.03	$345,526.78	$268,053.92	$195,736.81	$1,438,886.27
E19	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E20	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$35,000.00
E21	$34,019.70	$34,019.70	$44,803.79	$44,803.79	$21,118.37	$21,118.37	$45,033.35	$41,257.95	$270,136.18
E22	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$4,028.00
E23	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E24	$639,675.70	$716,795.58	$862,441.09	$278,064.73	$486,307.81	$940,366.25	$209,836.42	$235,620.63	$4,191,076.31
E25	$10,293.25	$10,293.25	$16,826.97	$16,826.97	$33,525.59	$33,525.59	$30,349.86	$30,349.86	$292,390.11
E25 In-Kind	$436,000.00	$436,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$872,000.00
E26	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$147.62
E27	$3,060,556.46	$810,593.24	$6,562,631.03	$7,039,753.11	$9,741,932.20	$8,277,899.41	$6,081,471.60	$6,401,845.20	$22,825,960.27
E28	$258,521.17	$330,289.20	$75,792.42	$105,008.81	$407,557.78	$57,557.78	$492,318.96	$582,219.68	$1,231,981.21
E29	$59,667.12	$59,667.12	$16.19	$16.19	$0.00	$0.00	$0.00	$0.00	$233,195.88
E30	$88,884.93	$88,884.93	$166,849.05	$166,849.05	$0.00	$0.00	$0.00	$0.00	$255,733.98
E31	$21,979.16	$16,115.11	$88,198.74	$40,690.67	$180,047.99	$166,150.09	$86,326.00	$121,088.85	$344,044.72
E32	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E33	$0.00	$0.00	$0.00	$0.00	$68,671.93	$68,671.93	$344,159.32	$46,007.34	$114,679.27
E34	$0.00	$0.00	$0.00	$0.00	$31,841.15	$31,841.15	$49,616.14	$49,616.14	$81,457.29
Total E	$8,716,922.35	$7,969,690.84	$14,208,374.95	$12,385,737.13	$13,998,352.10	$13,157,658.12	$10,422,659.90	$10,083,731.36	$79,440,421.96

Work Task	2011 Obligations	2011 Expenditures	2012 Obligations	2012 Expenditures	2013 Obligations	2013 Expenditures	2014 Obligations	2014 Expenditures	Expenditures Grand Total
F1	$480,326.82	$497,781.32	$754,927.68	$534,777.49	$562,295.14	$570,240.00	$472,448.47	$556,007.87	$3,696,603.91
F2	$185,177.77	$158,354.77	$375,849.49	$144,306.35	$102,444.23	$251,596.81	$197,840.80	$219,866.33	$1,398,308.36
F3	$53,952.06	$53,952.06	$21,525.04	$21,525.04	$39,625.36	$39,625.36	$56,766.91	$56,766.91	$372,989.29
F4	$119,649.91	$118,393.86	$109,437.27	$108,730.08	$194,445.95	$115,358.44	$165,161.31	$135,657.71	$848,899.39
F5	$153,930.06	$153,930.06	$172,897.42	$172,897.42	$185,702.47	$169,462.47	$271,044.01	$282,119.71	$1,286,639.20
F6	$88,758.78	$88,758.78	$79,854.92	$79,854.92	$83,708.30	$83,708.30	$71,134.99	$71,134.99	$381,740.90
F7	$1,403.06	$1,403.06	$14,271.51	$14,271.51	$4,124.05	$4,124.05	$29,476.43	$29,476.43	$49,275.05
Total F	$1,083,198.46	$1,072,573.91	$1,528,763.33	$1,076,362.81	$1,172,345.50	$1,234,115.43	$1,263,872.92	$1,351,029.95	$8,034,456.10
G1	$678,848.47	$625,217.16	$728,250.63	$609,246.83	$735,993.97	$660,072.89	$878,992.90	$726,443.64	$3,745,078.72
G3	$54,339.42	$171,292.05	$282,786.62	$255,093.82	$276,217.73	$242,843.95	$260,667.43	$178,425.51	$2,326,051.38
G4	$137,434.07	$137,434.07	$127,754.31	$127,754.31	$260,581.13	$221,014.16	$275,414.62	$214,681.09	$918,791.70
Total G	$870,621.96	$933,943.28	$1,138,791.56	$992,094.96	$1,272,792.83	$1,123,931.00	$1,415,074.95	$1,119,550.24	$6,989,921.80
H1	$5,359,500.00	$5,359,500.00	$5,445,000.00	$5,445,000.00	$5,629,500.00	$5,629,500.00	$7,604,720.64	$7,604,720.64	$26,986,720.64
H2	$0.00	$0.00	$0.00	$0.00	$998,298.00	$998,298.00	$1,434,267.44	$1,434,267.44	$2,432,565.44
Total H	$5,359,500.00	$5,359,500.00	$5,445,000.00	$5,445,000.00	$6,627,798.00	$6,627,798.00	$9,038,988.08	$9,038,988.08	$29,419,286.08
I1	$76,251.83	$76,251.83	$96,516.90	$96,516.90	$97,824.27	$97,824.27	$104,431.22	$104,431.22	$410,400.36
G5	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$61,059.68
Total I	$76,251.83	$76,251.83	$96,516.90	$96,516.90	$97,824.27	$97,824.27	$104,431.22	$104,431.22	$471,460.04
GRAND Totals	**$23,969,176.43**	**$24,264,469.25**	**$31,357,384.98**	**$27,627,619.38**	**$32,198,080.09**	**$31,011,305.58**	**$32,196,995.01**	**$30,451,662.47**	**$194,111,261.96**

Attachment E – Reports Published in Fiscal Year 2014

Except where otherwise noted for journal articles, these reports are available on the LCR MSCP Web site at: http://www.lcrmscp.gov/steer_committee/technical_reports.html

Work Task	Report Title
C-2	Sticky Buckwheat/Threecorner Milkvetch Conservation, 2013 Annual Report
C-5	Effects of Abiotic Factors on Insect Populations in Riparian Restoration Sites, 2011 Annual Report
C-14	Humpback Chub Program Support, 2009 Progress Report
C-25	Imperial Ponds Water Management Plan, 2011–2013
C-26	Evaluation of Flow Conditioning Razorback Sucker in Flow-Through Raceways at Lake Mead Hatchery: 2010
C-35	Distribution and Roost Site Habitat Requirements of Western Yellow and Western Red Bats: 2012 Summary Findings
C-51	Vermillion Flycatchers on the LCR: A Summary of Data from 1970–2012
D-2	Southwestern Willow Flycatcher Presence/Absence Surveys, 2013 Annual Report
D-5	Monitoring Avian Productivity and Survivorship, 2012 Annual Report
D-7	Yellow-billed Cuckoo Presence/Absence Surveys, 2013 Annual Report
D-8	Lake Mead Razorback Sucker Studies, 2012–2013 Annual Report
D-9	Monitoring of LCR MSCP Bat Species as Determined by Acoustic Sampling, 2013 Summary Findings
E-5	Cibola Valley Conservation Area, 2010 Annual Report
E-24	Cibola NWR Unit #1, 2010 Annual Report
F-1	Soil Moisture Monitoring Pilot Study at Palo Verde Ecological Reserve Phase 2
G-4	Southwestern Willow Flycatcher Basic Conceptual Ecological Model for the LCR
G-4	Western Yellow-Billed Cuckoo Basic Conceptual Ecological Model for the LCR
G-4	Razorback Sucker Basic Conceptual Ecological Model for the LCR