

Lower Colorado River Multi-Species Conservation Program



Balancing Resource Use and Conservation

Final Implementation Report, Fiscal Year 2012 Work Plan and Budget, Fiscal Year 2010 Accomplishment Report



June 2011

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 County Government Coalition
Desert Wildlife Unlimited

California Participant Group

California Department of Fish and Game
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

Conservation Participant Group

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



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

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Acronyms

ACEC	Area of Critical Environmental Concern
AGFD	Arizona Game and Fish Department
AMP	Adaptive Management Program
ASU	Arizona State University
BEVI	Arizona Bell's Vireo
BHCO	Brown-headed Cowbird
BLM	Bureau of Land Management
BLRA	California Black Rail
BO	Biological and Conference Opinion
BONY	Bonytail
CAP	Central Arizona Project
CAWCD	Central Arizona Water Conservation District
CDFG	California Department of Fish and Game
CESA	California Endangered Species Act
CLRA	Yuma Clapper Rail
CNWR	Cibola National Wildlife Refuge
CRIT	Colorado River Indian Tribes
CRITER	Colorado River Terrestrial and Riparian Ecosystem
CVCA	Cibola Valley Conservation Area
ELOW	Elf Owl
ESA	Endangered Species Act
FLSU	Flannelmouth Sucker
FMA	Funding and Management Agreement
FY	Fiscal Year
GBBO	Great Basin Bird Observatory
GIFL	Gilded Flicker
GIS	Geographic Information System
GIWO	Gila Woodpecker
GPS	Global Positioning System
HCP	Habitat Conservation Plan
HUCH	Humpback Chub
IA	Implementation Agreement
ISC	Interim Surplus Criteria
ISG	Interim Surplus Guidelines
LCR	Lower Colorado River
LCR MSCP	LCR Multi-Species Conservation Program
LEBI	Western Least Bittern
LMBV	Largemouth Bass Virus
MAPS	Monitoring Avian Productivity and Survivorship
MCWA	Mohave County Water Authority
Metropolitan	The Metropolitan Water District of Southern California
MSHCP	Clark County Multi-Species Habitat Conservation Program
NAU	Northern Arizona University
NDOW	Nevada Division of Wildlife
NEPA	National Environmental Policy Act
NFH	National Fish Hatchery
NFWG	Native Fish Work Group
NPS	National Park Service

NWR	National Wildlife Refuge
PIT	Passive Integrated Transponder
PVER	Palo Verde Ecological Reserve
RASU	Razorback Sucker
Reclamation	Bureau of Reclamation
RFP	Request for Projects
SDCWA	San Diego County Water Authority
SFH	State Fish Hatchery
SIA	Secretarial Implementation Agreement
SNWA	Southern Nevada Water Authority
SUTA	Summer Tanager
SWA	State Wildlife Area
SWFL	Southwestern Willow Flycatcher
TL	Total Length
U of A	University of Arizona
UCD	University of California, Davis
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VEFL	Vermilion Flycatcher
WMA	Wildlife Management Area
YAO	Reclamation, Yuma Area Office
YBCU	Yellow-billed Cuckoo
YWAR	Yellow Warbler

Program Overview

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

This long-term program will accommodate current water diversions and power production, and optimize opportunities for future water and power development, 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 in the LCR MSCP. Of the 26 covered species, 6 are currently listed under the Federal ESA. The program addresses the biological needs of mammals, 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 (RASU) and 620,000 bonytails (BONY) to augment the existing populations of these fish in the LCR. The LCR MSCP may also participate in the recovery programs for these fish by funding other appropriate activities in lieu of stocking. In addition, the program has a substantial research and monitoring component. The program also establishes a \$25 million fund to support projects implemented by land use managers to protect and maintain existing habitat for covered species.

The program's estimated cost in 2003 dollars is \$626 million, and will be annually adjusted for inflation. The Bureau of Reclamation (Reclamation) will pay 50% 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, 2005, and April 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. Program

documents for the LCR MSCP include an Environmental Impact Statement/Environmental Impact Report, a Biological Assessment, a Biological and Conference Opinion (2005 BO), an HCP, a Record of Decision, a Funding and Management Agreement (FMA), an Implementation Agreement (IA), and a Section 10 Permit. These documents can be found on the LCR MSCP website.

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

1. In December of 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 are being implemented by Reclamation in conjunction with the LCR MSCP. Section 8.6 of the FMA states that implementation of the 2001 Biological Opinion 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 Game (CDFG). The requirements of that CESA permit are generally consistent with the LCR MSCP HCP. A copy of the Memorandum of Agreement 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 56 entities, to provide input and oversight functions in support of LCR MSCP implementation. The Steering Committee includes non-Federal and Federal entities that are receiving ESA coverage through the LCR MSCP, or stakeholders interested in the environment of the LCR. A complete list of Steering Committee membership can be viewed on the LCR MSCP website. During FY10, George Caan, Colorado River Commission, served as Chair of the Steering Committee, and Perri Benemelis, Arizona Department of Water Resources, 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 FY10, a summary of work underway during FY11, and proposed work to be performed during FY12. It also documents research and monitoring activities undertaken in support of the LCR MSCP. Incidental Take for covered actions implemented during FY10 is also documented. This Annual Report fully meets the reporting requirements outlined in Section 7.4.1 of the FMA.

LCR MSCP Program Funding

As outlined in the FMA, the total program cost in 2003 dollars is \$626 million split in a 50-50 cost share between the 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 Annual Contributions Before Inflation, Composite Inflation Indexes, and Indexed Annual 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 Appendix E-1.

Table 1-1. Federal/Non-Federal Funding Requirements for 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

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 their funding obligation for a specific year shall be treated as a credit against future funding obligations. Any shortage of the funds provided by either a Federal Party or a State Permittee will be treated as a deficit to future funding obligations. Appendix E-2 provides a summary of funding credits earned and funding credits used.

FY12 Contributions and Adjustments

As outlined in Table 1-1, the annual funding commitment for FY12 is \$27,540,000, based on the 2003 estimate, and \$33,323,400 after the Composite Inflation Index of 1.210 is applied. In accordance with Section 8.3 of the FMA, the non-Federal share of the cost by state and the Federal share of the cost for FY12 are shown below. Section 8.3 of the FMA allows for adjusted non-Federal funding during the first 10 years of the program. The FY12 adjusted funding amounts for the three states are shown below (amounts based on direction from the Central Arizona Water Conservation District (CAWCD) (see Appendix A).

Table 1-2. FY12 Contribution Schedule

Funding Entity	FY12 Contributions	FY12 Adjusted Contributions
Federal:	\$16,661,700	\$16,661,700
Non-Federal:	\$16,661,700	\$16,661,700
<i>California</i>	<i>\$8,330,850</i>	<i>\$9,163,935</i>
<i>Arizona</i>	<i>\$4,165,425</i>	<i>\$2,499,255</i>
<i>Nevada</i>	<i>\$4,165,425</i>	<i>\$4,998,510</i>
Total:	\$33,323,400	\$33,323,400

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 (Metropolitan) 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 (SIA) were completed and all remaining funds were withdrawn. In FY09, SDCWA started using their funding credits to meet their LCR MSCP annual contribution. SDCWA will continue to use their funding credits to meet their annual obligations until their funding credits are exhausted.

Habitat Maintenance Fund

As outlined in Section 8.4.2 of the FMA, a \$25 million (2003 dollars) habitat maintenance fund is being developed during the first 10 years of LCR MSCP implementation; a share of each state's contribution will be set aside in an interest-bearing account referred to as the 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 1-3 provides total funds contributed through FY10 with interest, FY11 contributions, and FY12 projected contributions. No funds have been withdrawn from any of the accounts to date.

Table 1-3. Existing Habitat Maintenance Fund

Funding Partner	FY10 Contributions	Cumulative through FY10*	FY11 Contribution	F12 Projected Contribution
California:	\$323,500	\$1,607,196.03	\$2,679,750	\$2,722,500
Arizona:	\$161,750	\$757,787.45	\$1,339,875	\$1,361,250
Nevada:	\$161,750	\$981,699.46	\$1,339,875	\$1,361,250
Total:	\$647,000	\$3,346,682.94	\$5,359,500	\$5,445,000

*Includes interest earned.

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 April 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. On April 22, 2009, the Steering Committee passed Resolution 09-001 approving in-kind credit from the Southern Nevada Water Authority (SNWA). In FY10, the SNWA provided \$436,000 of in-kind contributions.

CESA 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 between 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 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 FY12 Program and FY10 Accomplishment

The minimum funding required in the LCR MSCP program documents for FY12 is \$33,323,400. Reclamation is proposing an annual program budget totaling \$33,494,780 as shown in Table 1-4. Table 1-5 shows the following by work task: FY10 estimates and actual accomplishment, cumulative program expenditures (FY04-FY10), FY11 approved program, FY12 proposed program, and out-year funding for FY13 and FY14. Out-year funding estimates are not adjusted for future inflation.

Table 1-4. FY12 Proposed Program Funding

Program Area	FY12 Funding
Program Administration	\$1,231,780
Fish Augmentation	\$1,440,000
Species Research	\$3,478,000
System Monitoring	\$2,795,000
Conservation Area Development and Management	\$16,945,000
Post-Development Monitoring	\$1,065,000
Adaptive Management Program	\$1,025,000
Existing Habitat Maintenance	\$5,445,000
Public Involvement	\$70,000
Total:	\$33,494,780

Reclamation will ensure the minimum program accomplishment occurs that meets the Indexed Annual Contribution outlined in Table 1-1 of \$33,323,400; however, Reclamation is presenting work tasks totaling \$33,494,780 to ensure adequate flexibility in accomplishing the program. By receiving Steering Committee and USFWS input on the broad range of work, Reclamation can accomplish additional work should funds become available, or can accomplish a change in work priorities as future circumstances arise. In accordance with the FMA, a description of the work is being presented to the Steering Committee to ensure that no disputes exist, and the description will subsequently be presented to 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 FY12, 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 FY13 or FY14, 3) providing more than the minimum funding required to the Habitat Maintenance Fund, or 4) beginning activities associated with any changed circumstances as defined in Section 5.12.3 of the HCP, should any occur.

In FY10, Reclamation estimated work tasks totaling \$20,729,810.00. Actual LCR MSCP accomplishments for FY10 were \$19,518,164.19. In accordance with the FMA, Reclamation received a funding credit of \$8,121,670.47 for FY10 (Appendix E-2).

Table 1-5. Annual Funding Matrix

Work Task	Name	FY10 Approved Estimate	FY10 Actual Accomplishment¹	Cumulative Accomplishment Through FY10²	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Projected Estimate³	FY14 Projected Estimate³
A	Program Administration							
A-1	Program Administration	\$1,313,220.00	\$1,296,959.74	\$5,947,832.95	\$1,212,438.00	\$1,231,780.00	\$1,231,780.00	\$1,231,780.00
Closed ⁴	Work Tasks Pre-FY10			\$165,789.34				
		\$1,313,220.00	\$1,296,959.74	\$6,113,622.29	\$1,212,438.00	\$1,231,780.00	\$1,231,780.00	\$1,231,780.00
B	Fish Augmentation							
B-1	Lake Mohave Razorback Sucker Larvae Collections	\$200,000.00	\$234,965.09	\$1,251,286.54	\$200,000.00	\$200,000.00	\$200,000.00	\$200,000.00
B-2	Willow Beach National Fish Hatchery	\$250,000.00	\$352,255.56	\$1,809,731.63	\$250,000.00	\$250,000.00	\$250,000.00	\$250,000.00
B-3	Achii Hanyo Rearing Station	\$100,000.00	\$95,522.93	\$522,259.39	\$150,000.00	\$150,000.00	\$150,000.00	\$150,000.00
B-4	Dexter National Fish Hatchery	\$180,000.00	\$269,833.73	\$1,007,044.80	\$180,000.00	\$200,000.00	\$220,000.00	\$220,000.00
B-5	Bubbling Ponds Fish Hatchery	\$250,000.00	\$351,957.84	\$1,430,085.53	\$250,000.00	\$250,000.00	\$250,000.00	\$250,000.00
B-6	Lake Mead Fish Hatchery	\$50,000.00	\$41,521.10	\$275,848.45	\$50,000.00	\$50,000.00	\$50,000.00	\$50,000.00
B-7	Lake-Side Rearing Ponds	\$150,000.00	\$165,056.32	\$1,095,885.82	\$250,000.00	\$175,000.00	\$175,000.00	\$175,000.00
B-8	Fish Tagging Equipment	\$75,000.00	\$78,710.75	\$460,065.58	\$85,000.00	\$90,000.00	\$100,000.00	\$100,000.00
B-10	Uvalde National Fish Hatchery	\$85,000.00	\$70,053.15	\$551,323.68	\$0.00	\$0.00	\$0.00	\$0.00
B-11	Overton Wildlife Management Area	\$50,000.00	\$53,930.37	\$296,963.88	\$50,000.00	\$75,000.00	\$75,000.00	\$75,000.00

Work Task	Name	FY10 Approved Estimate	FY10 Actual Accomplishment ¹	Cumulative Accomplishment Through FY10 ²	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Projected Estimate ³	FY14 Projected Estimate ³
Closed ⁴	Work Tasks Pre-FY10	\$0.00	\$0.00	\$4,370.00	\$0.00	\$0.00	\$0.00	\$0.00
		\$1,390,000.00	\$1,713,806.84	\$8,704,865.30	\$1,465,000.00	\$1,440,000.00	\$1,470,000.00	\$1,470,000.00
C	Species Research							
C-2	Sticky Buckwheat and Threecorner Milkvetch...	\$11,000.00	\$10,000.00	\$50,000.00	\$11,000.00	\$11,000.00	\$11,000.00	\$11,000.00
C-3	MSCP Covered Species Profile Development	\$15,000.00	\$13,285.36	\$273,610.40	\$15,000.00	\$15,000.00	\$15,000.00	\$15,000.00
C-4	Relict Leopard Frog	\$11,000.00	\$11,532.14	\$65,665.66	\$11,000.00	\$11,000.00	\$11,000.00	\$11,000.00
C-5	Effects of Abiotic Factors on Insect Populations...	\$90,000.00	\$97,189.14	\$319,599.06	\$90,000.00	\$90,000.00	\$90,000.00	\$90,000.00
C-7	Survey and Habitat Characterization for MacNeill's Sootywing	\$80,000.00	\$58,380.22	\$546,963.96	\$0.00	\$0.00	\$0.00	\$0.00
C-10	Razorback Sucker Rearing Studies	\$125,000.00	\$127,882.41	\$589,689.23	\$125,000.00	\$125,000.00	\$125,000.00	\$125,000.00
C-11	Bonytail Rearing Studies	\$165,000.00	\$160,883.55	\$663,023.50	\$150,000.00	\$150,000.00	\$150,000.00	\$150,000.00
C-12	Demographics... of Repatriated RASU...	\$200,000.00	\$216,432.73	\$934,265.66	\$200,000.00	\$0.00	\$0.00	\$0.00
C-13	Lake Mead Razorback Sucker Study	\$300,000.00	\$341,670.90	\$1,305,050.53	\$125,000.00	\$125,000.00	\$125,000.00	\$125,000.00
C-14	Humpback Chub Program Support	\$70,000.00	\$67,997.50	\$171,430.81	\$75,000.00	\$11,000.00	\$11,000.00	\$11,000.00
C-15	Flannelmouth Sucker Habitat Use...	\$80,000.00	\$96,551.48	\$502,245.23	\$25,000.00	\$0.00	\$0.00	\$0.00
C-24	Avian Species Habitat...	\$200,000.00	\$165,079.12	\$629,212.50	\$175,000.00	\$200,000.00	\$200,000.00	\$200,000.00

Work Task	Name	FY10 Approved Estimate	FY10 Actual Accomplishment ¹	Cumulative Accomplishment Through FY10 ²	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Projected Estimate ³	FY14 Projected Estimate ³
C-25	Imperial Ponds Native Fish Research	\$235,000.00	\$213,756.65	\$653,010.34	\$235,000.00	\$250,000.00	\$250,000.00	\$250,000.00
C-26	Evaluation of Raceway Rearing of Razorback Sucker...	\$70,000.00	\$82,395.92	\$157,726.77	\$70,000.00	\$0.00	\$0.00	\$0.00
C-27	Small Mammal Population Studies	\$35,000.00	\$57,914.14	\$261,179.50	\$70,000.00	\$50,000.00	\$0.00	\$0.00
C-28	Nest Predation Effects on Riparian Bird Species	\$25,000.00	\$26,392.77	\$157,132.04	\$0.00	\$0.00	\$0.00	\$0.00
C-29	...Reach 3 Razorback Sucker Population	\$125,000.00	\$126,061.29	\$206,526.28	\$0.00	\$0.00	\$0.00	\$0.00
C-30	...Measures to Reduce Transport of Quagga Mussel	\$70,000.00	\$77,335.50	\$171,889.89	\$150,000.00	\$150,000.00	\$150,000.00	\$0.00
C-31	RASU Genetic Diversity Assessment	\$125,000.00	\$100,903.63	\$204,596.85	\$125,000.00	\$125,000.00	\$125,000.00	\$125,000.00
C-32	Determination of Salinity, Temperature, pH, and Oxygen Limits for BONY and RASU	\$85,000.00	\$85,228.77	\$173,121.81	\$100,000.00	\$125,000.00	\$125,000.00	\$125,000.00
C-33	Comparative Survival of 500-mm RASU Released in Reach 3	\$75,000.00	\$70,817.31	\$276,047.15	\$100,000.00	\$100,000.00	\$100,000.00	\$0.00
C-34	...Zooplankton Communities in Off-Channel Native Fish Habitats	\$60,000.00	\$69,518.18	\$111,714.31	\$10,000.00	\$0.00	\$0.00	\$0.00
C-35	Western Red Bat and Western Yellow Bat Roosting Characteristics Study	\$50,000.00	\$33,949.46	\$33,949.46	\$150,000.00	\$175,000.00	\$150,000.00	\$0.00

Work Task	Name	FY10 Approved Estimate	FY10 Actual Accomplishment ¹	Cumulative Accomplishment Through FY10 ²	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Projected Estimate ³	FY14 Projected Estimate ³
C-36	Elf Owl Detectability Study	\$50,000.00	\$21,836.95	\$21,836.95	\$50,000.00	\$20,000.00	\$0.00	\$0.00
C-37	Hydrology Studies for Avian Riparian Obligate Species	\$150,000.00	\$266,477.27	\$266,477.27	\$50,000.00	\$10,000.00	\$0.00	\$0.00
C-38	Stable Isotope and Microchemistry Analyses of Fin Rays...	\$80,000.00	\$6,250.70	\$6,250.70	\$0.00	\$0.00	\$0.00	\$0.00
C-39	Post-Stocking Distribution and Survival of Bonytail in Reach 3	\$90,000.00	\$251,804.17	\$251,804.17	\$250,000.00	\$250,000.00	\$250,000.00	\$250,000.00
C-40	Genetic and Demographic Studies to Guide Conversation Mgmt of RASU and BONY...	\$75,000.00	\$71,936.76	\$71,936.76	\$100,000.00	\$180,000.00	\$180,000.00	\$180,000.00
C-41	Role of Artificial Habitat in Survival of RASU and BONY	\$25,000.00	\$5,885.67	\$5,885.67	\$25,000.00	\$25,000.00	\$15,000.00	\$0.00
C-42	Experiments and Demonstration of Soil Amendments for Use in Restoration Sites	\$200,000.00	\$49,236.73	\$49,236.73	\$100,000.00	\$200,000.00	\$200,000.00	\$200,000.00
C-43	...Demographics and Habitat Use of the California Leaf-Nosed Bat	\$0.00	\$0.00	\$0.00	\$20,000.00	\$40,000.00	\$60,000.00	\$0.00
C-44	Management of Fish Food Resources in Off-Channel Native Fish Habitats	\$0.00	\$0.00	\$0.00	\$60,000.00	\$100,000.00	\$100,000.00	\$0.00

Work Task	Name	FY10 Approved Estimate	FY10 Actual Accomplishment ¹	Cumulative Accomplishment Through FY10 ²	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Projected Estimate ³	FY14 Projected Estimate ³
C-45	Ecology and Habitat Use of Stocked RASU in Reach 3	\$0.00	\$0.00	\$0.00	\$170,000.00	\$200,000.00	\$200,000.00	\$200,000.00
C-46	Physiological Response in BONY and RASU to Transport Stress	\$0.00	\$0.00	\$0.00	\$120,000.00	\$120,000.00	\$70,000.00	\$0.00
C-47	Genetic Monitoring and Management of Recruitment in BONY Rearing Ponds	\$0.00	\$0.00	\$0.00	\$220,000.00	\$250,000.00	\$250,000.00	\$250,000.00
C-48	Genetic Evaluation of RASU Broodstock at Dexter NFH	\$0.00	\$0.00	\$0.00	\$60,000.00	\$60,000.00	\$0.00	\$0.00
C-49	...RASU and BONY Movements... Downstream of Parker Dam	\$0.00	\$0.00	\$0.00	\$125,000.00	\$150,000.00	\$150,000.00	\$0.00
C-50	Food Habits of Adult RASU Below Hoover Dam	\$0.00	\$0.00	\$0.00	\$60,000.00	\$0.00	\$0.00	\$0.00
C-51	Vermilion Flycatcher Detectability and Distribution Study	\$0.00	\$0.00	\$0.00	\$0.00	\$20,000.00	\$150,000.00	\$150,000.00
C-52	Gilded Flicker Detectability and Distribution Study	\$0.00	\$0.00	\$0.00	\$0.00	\$20,000.00	\$150,000.00	\$150,000.00
C-53	Sonic Telemetry of Juvenile FLSU in Reach 3	\$0.00	\$0.00	\$0.00	\$0.00	\$120,000.00	\$120,000.00	\$120,000.00
Closed ⁴	Work Tasks Pre-FY10	\$0.00	-\$4,417.26	\$1,952,939.20				
		\$2,972,000.00	\$2,980,169.16	\$11,084,018.39	\$3,422,000.00	\$3,478,000.00	\$3,533,000.00	\$2,738,000.00

Work Task	Name	FY10 Approved Estimate	FY10 Actual Accomplishment ¹	Cumulative Accomplishment Through FY10 ²	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Projected Estimate ³	FY14 Projected Estimate ³
D	System Monitoring							
D-1	Marsh Bird Surveys	\$35,000.00	\$18,997.38	\$165,227.66	\$25,000.00	\$35,000.00	\$25,000.00	\$25,000.00
D-2	Southwestern Willow Flycatcher Presence/Absence Surveys	\$650,000.00	\$152,316.08	\$4,597,478.56	\$675,000.00	\$675,000.00	\$675,000.00	\$675,000.00
D-3	Southwestern Willow Flycatcher Habitat Monitoring	\$90,000.00	\$104,750.84	\$715,216.04	\$90,000.00	\$90,000.00	\$90,000.00	\$90,000.00
D-5	Monitoring Avian Productivity and Survivorship	\$250,000.00	\$224,813.84	\$1,539,731.50	\$275,000.00	\$250,000.00	\$250,000.00	\$250,000.00
D-6	System Monitoring for Riparian Obligate Avian Species	\$210,000.00	\$226,354.82	\$988,127.37	\$210,000.00	\$280,000.00	\$280,000.00	\$280,000.00
D-7	Yellow-Billed Cuckoo Presence/Absence Surveys	\$540,000.00	\$548,459.47	\$2,507,026.93	\$550,000.00	\$550,000.00	\$550,000.00	\$550,000.00
D-8	Razorback Sucker and Bonytail Stock Assessment	\$400,000.00	\$676,835.76	\$2,291,213.07	\$575,000.00	\$575,000.00	\$600,000.00	\$650,000.00
D-9	System Monitoring and Research of Covered Bat Species	\$150,000.00	\$162,881.50	\$648,195.67	\$150,000.00	\$150,000.00	\$150,000.00	\$150,000.00
D-10	System Monitoring of Rodent Populations	\$0.00	\$0.00	\$52,197.81	\$65,000.00	\$40,000.00	\$40,000.00	\$40,000.00
D-12	Lowland Leopard Frog and Colorado River Toad Surveys	\$20,000.00	\$12,886.12	\$12,886.12	\$120,000.00	\$150,000.00	\$100,000.00	\$0.00
Closed ⁴	Work Tasks Pre-FY10	\$0.00	\$0.00	\$1,003,695.03				
		\$2,345,000.00	\$2,128,295.81	\$14,520,995.76	\$2,735,000.00	\$2,795,000.00	\$2,760,000.00	\$2,710,000.00

Work Task	Name	FY10 Approved Estimate	FY10 Actual Accomplishment ¹	Cumulative Accomplishment Through FY10 ²	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Projected Estimate ³	FY14 Projected Estimate ³
E	Conservation Area Development and Management							
E-1	Beal Lake Riparian Restoration	\$130,000.00	\$204,821.21	\$2,617,313.92	\$200,000.00	\$950,000.00	\$300,000.00	\$300,000.00
E-2	Beal Lake Native Fish	\$50,000.00	\$91,981.79	\$781,408.31	\$120,000.00	\$0.00	\$0.00	\$0.00
E-3	'Ahakhav Tribal Preserve	\$241,000.00	\$17,434.18	\$1,410,099.62	\$0.00	\$0.00	\$0.00	\$0.00
E-4	Palo Verde Ecological Reserve	\$1,683,000.00	\$1,553,565.67	\$5,171,860.32	\$1,950,000.00	\$1,950,000.00	\$1,011,013.00	\$732,493.00
E-5	Cibola Valley Conservation Area	\$900,000.00	\$770,765.54	\$9,980,630.20	\$1,100,000.00	\$650,000.00	\$650,000.00	\$700,000.00
E-9	Hart Mine Marsh	\$2,380,000.00	\$2,129,989.54	\$4,854,161.22	\$500,000.00	\$300,000.00	\$750,000.00	\$200,000.00
E-14	Imperial Ponds Conservation Area	\$651,840.00	\$655,197.95	\$7,570,575.36	\$610,000.00	\$525,000.00	\$395,000.00	\$395,000.00
E-15	Backwater Site Selection	\$286,750.00	\$4,331.69	\$1,286,599.50	\$20,000.00	\$20,000.00	\$20,000.00	\$20,000.00
E-16	Conservation Area Site Selection	\$360,000.00	\$294,547.68	\$1,129,547.85	\$375,000.00	\$375,000.00	\$375,000.00	\$375,000.00
E-17	Topock Marsh Pumping	\$800,000.00	\$1,013,487.38	\$1,037,563.98	\$270,000.00	\$2,550,000.00	\$0.00	\$0.00
E-18	Law Enforcement and Fire Suppression	\$250,000.00	\$197,050.80	\$429,702.40	\$250,000.00	\$325,000.00	\$325,000.00	\$325,000.00
E-21	Planet Ranch, Bill Williams River	\$100,000.00	\$26,129.72	\$129,196.40	\$8,900,000.00	\$1,500,000.00	\$750,000.00	\$500,000.00
E-24	Cibola NWR Unit #1	\$600,000.00	\$523,414.75	\$2,344,505.12	\$636,000.00	\$1,000,000.00	\$1,100,000.00	\$1,200,000.00
E-25	Big Bend Conservation Area	\$500,000.00	\$499,672.19	\$637,394.44	\$500,000.00	\$30,000.00	\$30,000.00	\$30,000.00
E-27	Laguna Division Conservation Area	\$750,000.00	\$688,738.54	\$688,738.54	\$1,375,000.00	\$6,290,000.00	\$10,400,000.00	\$4,900,000.00
E-28	Yuma East Wetlands	\$250,000.00	\$257,890.16	\$257,890.16	\$250,000.00	\$400,000.00	\$400,000.00	\$400,000.00

Work Task	Name	FY10 Approved Estimate	FY10 Actual Accomplishment ¹	Cumulative Accomplishment Through FY10 ²	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Projected Estimate ³	FY14 Projected Estimate ³
E-29	Desert Tortoise	\$195,000.00	\$173,512.57	\$173,512.57	\$50,000.00	\$0.00	\$0.00	\$0.00
E-30	Flat-tailed Horned Lizard	\$0.00	\$0.00	\$0.00	\$195,000.00	\$50,000.00	\$0.00	\$0.00
E-31 ⁵	Hunters Hole	\$0.00	\$0.00	\$0.00	\$20,000.00	\$30,000.00	\$30,000.00	\$30,000.00
Closed ⁴	Work Tasks Pre-FY10	\$0.00	\$0.00	\$1,842,525.86				
		\$10,127,590.00	\$9,102,531.36	\$42,343,225.77	\$17,321,000.00	\$16,945,000.00	\$16,536,013.00	\$10,107,493.00
F	Post-Development Monitoring							
F-1	Habitat Monitoring	\$350,000.00	\$394,781.36	\$1,722,924.62	\$350,000.00	\$425,000.00	\$425,000.00	\$425,000.00
F-2	Avian Use of Habitat Conservation Areas	\$170,000.00	\$114,944.30	\$665,110.08	\$170,000.00	\$210,000.00	\$220,000.00	\$220,000.00
F-3	Small Mammal Colonization of Restoration Sites	\$55,000.00	\$48,782.43	\$205,473.04	\$60,000.00	\$55,000.00	\$55,000.00	\$55,000.00
F-4	Post-Development Monitoring of Covered Bat Species	\$110,000.00	\$115,018.90	\$370,759.61	\$110,000.00	\$100,000.00	\$100,000.00	\$100,000.00
F-5	Post-Development Monitoring of Fish Restoration Sites	\$150,000.00	\$156,279.56	\$511,260.63	\$175,000.00	\$175,000.00	\$200,000.00	\$200,000.00
F-6	Post-Development Monitoring of MacNeill's Sootywing in Habitat Creation Sites	\$50,000.00	\$41,207.42	\$58,283.91	\$70,000.00	\$70,000.00	\$70,000.00	\$70,000.00
F-7	Post-Development Monitoring of Marsh Birds	\$0.00	\$0.00	\$0.00	\$30,000.00	\$30,000.00	\$30,000.00	\$30,000.00
		\$885,000.00	\$871,013.97	\$3,533,811.89	\$965,000.00	\$1,065,000.00	\$1,100,000.00	\$1,100,000.00

Work Task	Name	FY10 Approved Estimate	FY10 Actual Accomplishment ¹	Cumulative Accomplishment Through FY10 ²	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Projected Estimate ³	FY14 Projected Estimate ³
G	Adaptive Management Program							
G-1	Data Management	\$650,000.00	\$484,297.71	\$1,443,767.49	\$700,000.00	\$700,000.00	\$950,000.00	\$950,000.00
G-3	Adaptive Management Research Projects	\$300,000.00	\$241,728.79	\$1,669,604.15	\$300,000.00	\$200,000.00	\$300,000.00	\$300,000.00
G-4	Science/Adaptive Management Strategy	\$50,000.00	\$33,414.42	\$218,737.81	\$125,000.00	\$125,000.00	\$150,000.00	\$200,000.00
		\$1,000,000.00	\$759,440.92	\$3,332,109.45	\$1,125,000.00	\$1,025,000.00	\$1,400,000.00	\$1,450,000.00
H	Funding Accounts							
H-1 ⁶	Existing Habitat Maintenance	\$647,000.00	\$647,000.00	\$2,948,000.00	\$5,359,500.00	\$5,445,000.00	\$5,445,000.00	\$5,445,000.00
		\$647,000.00	\$647,000.00	\$2,948,000.00	\$5,359,500.00	\$5,445,000.00	\$5,445,000.00	\$5,445,000.00
I	Public Outreach							
I-1	Public Outreach	\$50,000.00	\$18,946.39	\$96,435.27	\$70,000.00	\$70,000.00	\$70,000.00	\$70,000.00
		\$50,000.00	\$18,946.39	\$96,435.27	\$70,000.00	\$70,000.00	\$70,000.00	\$70,000.00
	Program Total:	\$20,729,810.00	\$19,518,164.19	\$92,677,084.12	\$33,674,938.00	\$33,494,780.00	\$33,545,793.00	\$26,322,273.00

¹Actual Accomplishment is reported as obligations.

²Cumulative accomplishment is reported as obligations.

³FY13 and FY14 numbers are not adjusted for inflation.

⁴Closed work tasks are shown in Appendix D.

⁵E-31 Steering Committee approved FY11 funding at the 10/27/10 Steering Committee Meeting.

⁶H-1 Cumulative Habitat Maintenance amount does not include interest.

Compliance Reporting

LCR MSCP

As required in the FMA, the following information is included in the Annual Report:

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

The LCR MSCP objectives include creating or restoring habitat for covered species. The marsh and terrestrial habitat objectives are initially based on land cover types as determined by the Anderson and Ohmart definitions. Backwater cover type is an area of open water with associated emergent vegetation. The backwater habitat is further defined as being suitable for fish. The following information outlines how Reclamation and USFWS will account for and credit the 8,132 acres of new habitat.

When vegetation is planted or a backwater is constructed, Reclamation will begin accounting for those acres in the annual report for that year. In the year that Reclamation determines the created or restored land cover types have developed or matured into suitable habitat based on current knowledge of species needs, the acreage will be credited toward the LCR MSCP objectives in the Compliance Section of the Annual Report. This will be done by moving the acres from the Year Established column of Table 1-6 to the Actual Habitat Created column, noting the year it was achieved.

Through the adaptive management process, establishment and management of habitat may evolve to reflect new knowledge of species needs. Existing created or restored habitats will not be replaced based on new knowledge, but may be modified or managed differently to reflect the current understanding of the species needs. Table 1-6 summarizes habitat creation by location, acres, and year initiated.

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.*

Table 1-7 provides a summary of fish repatriation. Table 1-8 provides a matrix showing those work tasks that work toward the completion of the Conservation Measures. Conservation Measures are still in progress. Appendix F lists technical reports that were completed in FY10.

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 FY10 is reported in Appendix C. 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 Conservation Plan, 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 types and levels of any incidental take known to have occurred in FY10. 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 (ISG), 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.

Appendix 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.

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

The consistency letter from the USFWS for the *Final Implementation Report, Fiscal Year 2011 Work Plan and Budget, Fiscal Year 2009 Accomplishment Report* is provided in Appendix C. The letter from the USFWS agreeing that funding contributions from the LCR MSCP to the USFWS would meet requirements under AMM2 is also provided in Appendix C.

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

No minor modifications to the LCR MSCP have been made through FY10.

Table 1-6. LCR MSCP Habitat Objectives

Land Cover Type		Managed Acres ¹	Year Established	Projected Year To Be Credited ²	Actual Habitat Created (Acres)	Year Achieved
Upland, Buffer, Stabilized Ground						
E4	PVER, Phase 1	30	FY06			
E5	CVCA Phase 4	187	FY09			
E5	CVCA Phase 12	37	N/A			
Total		254				
Cottonwood-Willow						
E1	Beal Lake Riparian	107	FY04	FY11		
E5	CVCA, Phase 1	91	FY06	FY11		
	CVCA, Phase 2	71	FY08	FY11		
	CVCA, Phase 3	103	FY07	FY11		
E4	PVER Nursery, Phase 1	21	FY06	FY11		
	PVER, Phase 2	78	FY07	FY11		
	PVER, Phase 3	84	FY08	FY11		
	PVER, Phase 4	100	FY09	FY11		
	PVER, Phase 5	216	FY10	FY13		
	PVER, Phase 6	220	FY11	FY14		
	PVER, Phase 7	226	FY12	FY15		
E24	Unit 1, Crane Roost	154	FY09	FY12		
	Research Plots	116	FY06	FY11		
E31	Hunters Hole	50	FY12	FY15		
Total		1,637				
Honey Mesquite						
E4	PVER Phase 1	10	FY06	FY11		
E5	CVCA, Phase 4	58	FY09	FY11		
	CVCA, Phase 5	71	FY10	FY11		
	CVCA, Phase 6	89	FY11	FY12		
Total		228				

Land Cover Type		Managed Acres ¹	Year Established	Projected Year To Be Credited ²	Actual Habitat Created (Acres)	Year Achieved
Marsh						
E14	Imperial Ponds, Field 18	12	FY08	FY11		
E9	Hart Mine Marsh – South	92	FY09	FY12		
E9	Hart Mine Marsh – North	163	FY10	FY13		
	Total	267				
Backwater						
E14	Imperial Ponds	80	FY07	FY11		
E25	Big Bend	15	FY09	FY11		
	Total	95				
Total land cover established through FY10 is 1,896 acres						
Total land cover projected to be established through FY11 is 2,205 acres						
Total land cover projected to be established through FY12 is 2,481 acres						

¹ This column represents the land to be utilized at a specific site and the targeted land cover type. The actual vegetation planted will be a variety of native plant species developed in an integrated mosaic. This development provides habitat for multiple covered LCR MSCP species at the same site. Thus, two separate areas that meet the classification of cottonwood-willow land cover may exhibit different characteristics such as vegetation density and plant species composition, depending on how the mosaic was developed and is being managed. Three potential Conservation Areas: Planet Ranch (E21), the Laguna Division Conservation Area (E27), and Yuma East Wetlands (E28) are not included in the projected acres at this time.

² Projected. A habitat credit strategy is being developed and will be finalized in FY11.

Table 1-7. Summary of Fish Augmentation

REACH	RASU FY10	RASU PROGRAM	BONY FY10	BONY PROGRAM
2	9,203	47,300	0	6,998
3	7,180	35,908	4,032	21,924
4/5	6,093	50,193	961	12,028
Subtotal	22,476	133,401	4,993	40,950
Grand Total Both Species				174,351

Table 1-8. Status of Conservation Measures

Species/Habitat/Action	Code	Description	FY10 Approved	FY11 Approved	FY12 Proposed
Yuma Clapper Rail	CLRA1	Create habitat, 512 acres	C24 E1 E4 E5 E9 E12 E13 E14 E15 E19 E20 E21 E23 E26 F1 F2	C3 E9 E14 E16 E21 E26 E27 E28 F2 F7 G1 G4	C3 E9 E14 E16 E21 E26 E27 E28 F2 F7 G1 G4
	CLRA2	Maintain existing important habitat	C24 D1 H1	C3 G1 G4 H1	C3 G1 G4 H1
	MRM1	Define habitat characteristics	C3 C21 C28 D1 D2 D5 D6 F1 F2	C3 C24 D1 E21 F2 F7 G1 G4	C3 C24 D1 E21 F2 F7 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C28 D1 D2 D5 D6 F1 F2 F4	C3 C24 D1 F1 F2 F7 G1 G4	C3 C24 D1 F1 F2 F7 G1 G4
	MRM5	Monitor selenium levels in backwater			
	CMM1	Reduce risk of loss to wildfire	E18	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire		F2 G1 G4	F2 G1 G4
Southwestern Willow Flycatcher	WIFL1	Create habitat, 4,050 acres	C5 C20 C24 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E22 E23 E24 G3 F1 F2	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4
	WIFL2	Maintain existing important habitat	C5 C20 C24 D3 D4 E21 H1	C3 D2 D3 D4 E21 F1 G1 G4 H1	C3 D2 D3 D4 E21 F1 G1 G4 H1
	MRM1	Define habitat characteristics	C3 C5 C28 D1 D2 D3 D4 D5 D6 F2	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
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C21 C28 D1 D2 D3 D4 D5 D6 F1 F2 F4	C24 D2 D3 D4 D5 D6 F1 F2 G1 G4	C24 D2 D3 D4 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation	D2	D2 G1 G4	D2 G1 G4
	CMM1	Reduce risk of loss to wildfire	E18	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire		F2 G1 G4	F2 G1 G4
Desert Tortoise	DETO1	Acquire, protect 230 acres	E16	C3 E29 G1 G4	C3 E29 G1 G4
	DETO2	Avoid impacts on individuals and burrows	C3 G1 G4	C3 G1 G4	C3 G1 G4
Bonytail	BONY1	Coordinate conservation efforts with USFWS and recovery programs			
	BONY2	Create 360 acres of bonytail habitat	C3 C25 C30 C32 C40 E2 E14 E15 E16 E25 E26 G1 G4	C3 C25 C30 C32 C40 E2 E14 E15 E16 E25 E26 G1 G4	C3 C25 C30 C32 C40 E2 E14 E15 E16 E25 E26 G1 G4

Species/Habitat/Action	Code	Description	FY10 Approved	FY11 Approved	FY12 Proposed
	BONY3	Rear/stock 620,000: 4,000-6,000 sub-adult/year for 40 years Lake Mohave 4,000 sub-adult/year for 50 years Lake Havasu 8,000 experimental augmentation at Parker-Imperial for 5 consecutive years 4,000 sub-adults/year Parker-Imperial for 45 years	B2 B3 B4 B7 B8 B10 C11 C30 C32 C39 C41 C46 C47 C49 G1 G4	C11 C30 C32 C39 C41 C46 C47 C49 G1 G4	C11 C30 C32 C39 C41 C46 C47 C49 G1 G4
	BONY4	Develop (if necessary) additional rearing capacity	B2 B3 B4 B7 B8 B10 C11 C30 G1 G4	B2 B3 B4 B7 B8 C11 C30 C46 C47 C49 G1 G4	B2 B3 B4 B7 B8 C11 C30 C46 C47 C49 G1 G4
	BONY5	Monitor and research, adaptive management populations and backwater habitat	B7 B8 C11 C23 C30 C32 C34 C39 C40 C41 D8 F5 G1 G4	B7 B8 C11 C23 C30 C32 C34 C39 C40 C41 C44 C46 C47 C49 D8 F5 G1 G4	B7 B8 C11 C23 C30 C32 C34 C39 C40 C41 C44 C46 C47 C49 D8 F5 G1 G4
	MRM5	Monitor selenium levels in backwater	G1 G4	G1 G4	G1 G4
Humpback Chub	HUCH1	\$500,000 to existing programs	C14 G1	C14 G1	C14 G1
Razorback Sucker	RASU1	Coordinate conservation efforts with USFWS and recovery programs			
	RASU2	Create 360 acres of razorback sucker habitat	C3 C25 C30 C31 C32 C40 E2 E14 E15 E16 E25 E26 G1 G4	C3 C25 C30 C31 C32 C40 E2 E14 E15 E16 E25 E26 G1 G4	C3 C25 C30 C31 C32 C40 E2 E14 E15 E16 E25 E26 G1 G4
	RASU3	Rear/stock 660,000: 24,000 sub-adult/year for 5 years (Parker, Mohave — see plan) 6,000 sub-adult/year for 45 years Lake Havasu 6,000 sub-adult/year for 45 years Parker Dam	B1 B2 B3 B4 B5 B6 B7 B8 B10 B11 C10 C26 C30 C31 C32 C33 C38 C41 G1 G4	B1 B2 B3 B4 B5 B6 B7 B8 B11 C10 C26 C30 C31 C32 C33 C41 C46 C48 C49 G1 G4	B1 B2 B3 B4 B5 B6 B7 B8 B11 C10 C26 C30 C31 C32 C33 C41 C46 C48 C49 G1 G4
	RASU4	Develop (if necessary) additional rearing capacity	B2 B3 B4 B5 B6 B7 B8 B10 B11 C10 C26 C30 G1 G4	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 C49 G1 G4
	RASU5	Support ongoing Lake Mohave conservation efforts	B1 B2 B7 B8 C12 C30 C31 C32 C41 G1 G4	B1 B2 B7 B8 C12 C30 C31 C32 C41 G1 G4	B1 B2 B7 B8 C12 C30 C31 C32 C41 G1 G4
	RASU6	Monitor and research, adaptive management populations and backwater habitat	B2 B7 B8 B11 C8 C10 C23 C29 C30 C31 C32 C33 C34 C38 C40 C41 D8 F5 G1 G4	B2 B7 B8 B11 C8 C10 C23 C30 C31 C32 C33 C34 C40 C41 C44 C45 C46 C49 C50 D8 F5 G1 G4	B2 B7 B8 B11 C8 C10 C23 C30 C31 C32 C33 C34 C40 C41 C44 C45 C46 C49 C50 D8 F5 G1 G4

Species/Habitat/Action	Code	Description	FY10 Approved	FY11 Approved	FY12 Proposed
	RASU7	Funding for ongoing Reclamation/SNWA Lake Mead Studies	B6 B11 C13 G1 G4	B6 B11 C13 G1 G4	B6 B11 C13 G1 G4
	RASU8	Continue conservation efforts identified in ISC/SIA BO	B1 B6 B11 C26 C30 G1 G4	B1 B6 B11 C26 C30 G1 G4	B1 B6 B11 C26 C30 G1 G4
	MRM5	Monitor selenium levels in backwater	G1 G4	G1 G4	G1 G4
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	C3 D9 E1 E3 E4 E5 E8 E16 E21 E24 G1 G4	C3 D9 E1 E3 E4 E5 E8 E16 E21 E24 G1 G4	C3 D9 E1 E3 E4 E5 E8 E16 E21 E24 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C35 D9 E21 F4 G1 G4	C3 C5 C35 D9 E21 F4 G1 G4	C3 C5 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	C3 D9 E1 E3 E4 E5 E8 E21 E24 F4 G1 G4	C3 D9 E1 E3 E4 E5 E8 E21 E24 F4 G1 G4	C3 D9 E1 E3 E4 E5 E8 E21 E24 F4 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C35 D9 E21 F4 G1 G4	C3 C5 C35 D9 E21 F4 G1 G4	C3 C5 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
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	C3 E9 E16 E21 G1 G4	C3 E9 E16 E21 G1 G4	C3 E9 E16 E21 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 F1 F3 G1 G4	C3 F1 F3 G1 G4	C3 F1 F3 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			
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	C3 E16 E27 E28 G1 G4	C3 E16 E27 E28 G1 G4	C3 E16 E27 E28 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 F1 F3 G1 G4	C3 F1 F3 G1 G4	C3 F1 F3 G1 G4
	CMM1	Reduce risk of loss of habitat to wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4

Species/Habitat/Action	Code	Description	FY10 Approved	FY11 Approved	FY12 Proposed
	CMM2	Replace created habitat affected by wildfire			
Western Least Bittern	LEB11	Create 512 acres	C3 E9 E14 E16 E21 E26 E27 E28 G1 G4	C3 E9 E14 E16 E21 E26 E27 E28 F7 G1 G4	C3 E9 E14 E16 E21 E26 E27 E28 F7 G1 G4
	MRM1	Define habitat characteristics	C3 C24 D1 E21 F2 G1 G4	C3 C24 D1 E21 F2 F7 G1 G4	C3 C24 D1 E21 F2 F7 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 D1 F1 F2 G1 G4	C3 C24 D1 F1 F2 F7 G1 G4	C3 C24 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
California Black Rail	BLRA1	Create 130 acres	C3 E14 E16 E26 E27 E28 G1 G4	C3 E14 E16 E26 E27 E28 F7 G1 G4	C3 E14 E16 E26 E27 E28 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 D1 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 D1 F1 F2 G1 G4	C3 C24 D1 F1 F2 G1 G4	C3 C24 D1 F1 F2 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
Yellow-billed Cuckoo	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4
	YBCU1	Create 4,050 acres	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 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 C28 C37 C42 D5 D6 D7 E21 F2 G1 G4	C3 C5 C24 C37 C42 D5 D6 D7 E21 F2 G1 G4	C3 C5 C24 C37 C42 D5 D6 D7 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 C28 D5 D6 D7 F1 F2 G1 G4	C3 C24 D5 D6 D7 F1 F2 G1 G4	C3 C24 D5 D6 D7 F1 F2 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4
Elf Owl	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4
	ELOW1	Create 1,784 acres reaches 3-5	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 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 C36 C37 C42 D5 D6 E21 F2 G1 G4

Species/Habitat/Action	Code	Description	FY10 Approved	FY11 Approved	FY12 Proposed
	MRM2	Monitor and adaptively manage created habitat	C3 C24 D5 D6 F1 F2	C3 C24 D5 D6 F1 F2	C3 C24 D5 D6 F1 F2
	MRM3	Research nest competition European starlings	C3 G1 G4	C3 G1 G4	C3 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	F2 G1 G4	F2 G1 G4	F2 G1 G4
Gilded Flicker	GIFL1	Create 4,050 acres reaches 3-7	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 C52 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4
	GIFL2	Install artificial snags until vegetation has matured			
	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 C5 C24 C37 C42 C52 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 D5 D6 F1 F2 G1 G4	C3 C24 D5 D6 F1 F2 G1 G4	C3 C24 D5 D6 F1 F2 G1 G4
	MRM3	Research nest competition European starlings	C3 G1 G4	C3 G1 G4	C3 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	F2 G1 G4	F2 G1 G4	F2 G1 G4
Gila Woodpecker	GIWO1	Create 1,702 acres reaches 3-6	C3 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 E3 E4 E5 E8 E16 E21 E24 E27 E28 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 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 D5 D6 F1 F2 G1 G4	C3 C24 D5 D6 F1 F2 G1 G4	C3 C24 D5 D6 F1 F2 G1 G4
	MRM3	Research nest competition European starlings	C3 G1 G4	C3 G1 G4	C3 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	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 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C24 C28 C37 C42 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 C51 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 C28 D5 D6 F1 F2 G1 G4	C3 C24 D5 D6 F1 F2 G1 G4	C3 C24 C51 D5 D6 F1 F2 G1 G4

Species/Habitat/Action	Code	Description	FY10 Approved	FY11 Approved	FY12 Proposed
	MRM4	Brown-headed cowbird evaluation			
	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
Arizona Bell's Vireo	BEV11	Create 2,983 acres	C3 C5 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 C5 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 C5 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4
	MRM1	Define habitat characteristics	C3 C24 C28 C37 C42 D5 D6 E21 F2 G1 G4	C3 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 C37 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 C28 D5 D6 F1 F2 G1 G4	C3 C24 D5 D6 F1 F2 G1 G4	C3 C24 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 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E27 E28 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C24 C28 C37 C42 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 C28 D5 D6 F1 F2 G1 G4	C3 C24 D5 D6 F1 F2 G1 G4	C3 C24 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation			
	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
Summer Tanager	SUTA1	Create 602 acres	C3 E1 E3 E4 E5 E8 E16 E21 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E27 E28 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C24 C28 C37 C42 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 C28 D5 D6 F1 F2 G1 G4	C3 C24 D5 D6 F1 F2 G1 G4	C3 C24 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation			
	CMM1	Reduce risk of loss of habitat affected by wildfire	E28 G1 G4	E28 G1 G4	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	C3 G1 G4	C3 G1 G4	C3 G1 G4
	FTHL2	Implement conservation measures to avoid take	C3 G1 G4	C3 E30 G1 G4	C3 E30 G1 G4
Relict Leopard Frog	RLFR1	10,000/year for 10 years to conservation program	C4 G1	C4 G1	C4 G1

Species/Habitat/Action	Code	Description	FY10 Approved	FY11 Approved	FY12 Proposed
Flannelmouth Sucker	FLSU1	85 acres Reach 3	E15 E25 G3	C3 E15 E16 E25 G1 G4	C3 C53 E15 E16 E25 G1 G4
	FLSU2	80,000/year for 5 years	C15 G1 G4	C15 G1 G4	C15 G1 G4
	FLSU3	Develop management needs/strategies	C15 G1 G4	C15 G1 G4	C15 C 53 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 G1 G4	C3 G1 G4	C3 G1 G4
	MRM5	Monitor selenium levels in backwater	G1 G4	G1 G4	G1 G4
MacNeill's Sootywing Skipper	MNSW1	Status surveys/habitat — define habitat first 5 years	C3 C7 F6 G1 G4	C3 F6 G1 G4	C3 F6 G1 G4
	MNSW2	222 acres	C3 E1 E3 E4 E5 E16 E21 G1 G4	C3 E1 E3 E4 E5 E16 E21 G1 G4	C3 E1 E3 E4 E5 E16 E21 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 MSCP HCP	C2 G1	C2 G1	C2 G1
Threecorner Milkvetch	THM1	10,000 year until 2030 to MSCP HCP	C2 G1	C2 G1	C2 G1
California Leaf-nosed Bat	CLNB1	Distribution surveys	C3 D9 G1 G4 C34		C3 D9 G1 G4 C34
	CLNB2	Create habitat near roost sites (priority when creating cottonwood-willow, mesquite habitat for other species)	C3 E1 E3 E4 E5 E8 E16 E21 E24 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 G1 G4 C34	C3 E1 E3 E4 E5 E8 E16 E21 E24 G1 G4 C34
	MRM1	Define habitat characteristics	C3 C5 D9 E21 F4 G1 G4	C3 C5 D9 E21 F4 G1 G4	C3 C5 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			
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 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4
	MRM1	Determine habitat characteristics	C3 C5 D9 E21 F4 G1 G4	C3 C5 D9 E21 F4 G1 G4	C3 C5 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			

Species/Habitat/Action	Code	Description	FY10 Approved	FY11 Approved	FY12 Proposed
Colorado River Toad	CRT01	Distribution surveys, habitat affinity, limiting factors	C3 D12 G1 G4	C3 D12 G1 G4	C3 D12 G1 G4
	CRT02	Protect existing occupied habitat	C3 G1 G4 H1	C3 G1 G4 H1	C3 G1 G4 H1
	CRT03	Research to establish in unoccupied habitat	C3 G1 G4	C3 G1 G4	C3 G1 G4
Lowland Leopard Frog	LLFR1	Distribution surveys, habitat affinity, limiting factors	C3D12 G1 G4	C3D12 G1 G4	C3D12 G1 G4
	LLFR2	Protect existing occupied habitat	C3 G1 G4 H1	C3 G1 G4 H1	C3 G1 G4 H1
	LLFR3	Research to establish in unoccupied habitat	C3 G1 G4	C3 G1 G4	C3 G1 G4
Other					
Topock Marsh Pumping	AMM2	Avoid flow-related impacts on covered species	E17	E17	E17
Law Enforcement and Fire Suppression	CMM1	Reduce effects of fire and vandalism on created habitats	E18	E18	E18

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 LCR MSCP and are being implemented by Reclamation in conjunction with the LCR MSCP. Requirements under the 2001 BO specifically related to the SIA were completed in FY08. Monitoring under Conservation Measure 4, Tier 1a will continue until 5 years after implementation of all water transfers covered under the 2001 BO.

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

Conservation Measure 4, Tier 1

Identify and monitor 372 acres of currently occupied southwestern willow flycatcher habitat that may be affected by water transfers and changes in points of delivery between Parker and Imperial dams. Soil moisture will be monitored and if levels decrease as a result of water transfer actions, management actions will be taken to maintain monitored habitat. The monitoring program will be reviewed every 5 years to determine the appropriate level of effort to monitor effects of water transfer actions. Monitoring will continue for up to 5 years after implementation of all water transfer actions unless it becomes part of a broader effort associated with recovery actions.

Status: In FY05, monitoring of 372 acres of occupied southwestern willow flycatcher habitat was initiated. This acreage is split into 11 different sites between Palo Verde Diversion Dam and Imperial Dam. Annual monitoring of soil moisture conditions at these sites is being performed to determine whether a change in soil moisture conditions has occurred due to water transfer actions. No change in soil moisture conditions attributable to water transfer actions was observed through 2008; therefore, no management actions have been required. Monitoring will continue under Work Task D3 for up to 5 years after implementation of all water transfer actions. A review of the current monitoring program, including methodology and results from the first 5 years, will be completed in FY10 and a determination will be made in FY11.

Conservation Measure 4, Tier 2

Establish baseline soil moisture conditions within 1 year of acceptance of the BO. Depending on the status of southwestern willow flycatcher population trends along the LCR, replace additional flycatcher habitat if management actions to prevent adverse changes to Tier 1 monitored habitat are no longer viable or will not be successful in maintaining baseline conditions.

Status: No change in baseline soil moisture was observed; therefore, no management actions were required. No additional southwestern willow flycatcher habitat replacement is necessary.

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 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 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 suckers in Lake Mead during the spawning season following this determination.*

The level of Lake Mead reached the 1,160 feet msl elevation during FY05. Reclamation, the Southern Nevada Water Authority (SNWA), and NDOW are cooperatively rearing razorback sucker larvae captured from Lake Mead for future repatriation into Lake Mead. Construction was initiated for additional rearing capacity at Lake Mead SFH and Overton Wildlife Management Area (B6 and B11).

California Endangered Species Act (CESA) Permit

In conjunction with Federal ESA coverage, California State law requires CESA permitting for the California activities. The California Partners applied for and received a CESA Incidental Take Permit pursuant to CDFG Code sections 2081(a) and 2081(b). The California Partners negotiated the terms of the CESA permit with CDFG 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 program requirements in FY10, CESA program requirements were also met for FY10. Listed below are the CESA requirements that are more detailed than the LCR MSCP HCP:

1. Requirements for various types of coordination with CDFG 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 CDFG including annual status reports and notifications.
3. Riparian, Marsh, and Backwater Replacement Plans are to be submitted to CDFG 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 CDFG for approval.
5. Locations of all habitat replaced or restored in the State of California under the LCR MSCP must be approved by the CDFG.
6. A minimum of 2,614 acres of the LCR MSCP riparian replacement habitat is to be located in 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 (CLRA) and 70 acres for California black rail (BLRA). 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 California will be protected in perpetuity.
10. An endowment fee of \$295.00 per acre (in 2005 dollars) will be provided to CDFG for each acre of habitat that is transferred to the Department in Fee Title at the time of transfer.
11. A total of 270,000 razorback suckers and 200,000 bonytails of at least 12 inches in length will be stocked into reaches 3-5.

Through FY10, 86,101 RASU and 33,952 BONY have been stocked into reaches 3, 4, and 5. Since the start of the LCR MSCP, 120,053 native fish have been stocked into the lower river in California.

Through FY10, 499 acres of cottonwood-willow land cover and 10 acres of mesquite land cover have been established at the Palo Verde Ecological Reserve (PVER). It is anticipated that an additional 446 acres of cottonwood-willow land cover will be established through FY12.

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OVERVIEW OF WORK TASKS

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Fish Augmentation, Monitoring, and Research

As described in the HCP, the LCR MSCP will implement 17 conservation measures for four native fish species: eight conservation measures for razorback sucker (RASU), five for bonytail (BONY), three for flannelmouth sucker (FLSU), and one conservation measure for humpback chub (HUCH). These conservation measures are being 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.

Fish Augmentation (Section B)

The target goal of the augmentation program is to provide a total of 660,000 RASU and 620,000 BONY for reintroduction into the Colorado River over a 50-year period. A Fish Augmentation Plan for the LCR MSCP has been developed and approved, and is available on the LCR MSCP website. Through the end of calendar year 2010, the program has stocked 174,351 native fish (Table 1-7).

To obtain sufficient numbers of young fish for grow-out, the LCR MSCP must maintain adult broodstock for each species. The adult RASU population in Lake Mohave is the most genetically diverse among RASU populations and is the primary broodstock for this species. The LCR MSCP currently captures offspring from this stock directly from the lake and rears them at Willow Beach NFH. The fish are then stocked into the Lower Colorado River. A second broodstock of RASU, developed by the USFWS from Lake Mohave offspring, is maintained at Dexter NFH. In 2007, the exotic quagga mussel was found in Lake Mead. To insure that quagga mussels do not gain access to Bubbling Ponds SFH, RASU larvae are being provided to Bubbling Ponds SFH from the Dexter NFH broodstock. Once methods to transport fish from Willow Beach NFH that are free from mussel larvae are tested and approved, wild RASU larvae will again be shipped to Bubbling Ponds SFH for rearing.

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

The LCR MSCP provides support to the following existing facilities that are currently rearing RASU or BONY:

1. Willow Beach NFH (USFWS)
2. Achii Hanyo Rearing Station (USFWS)
3. Dexter NFH (USFWS)
4. Bubbling Ponds SFH (AGFD)

5. Lake Mead SFH (NDOW)
6. Overton WMA (NDOW)

FY10 Accomplishments

The Fish Augmentation Plan has been updated and revised based on proposals following five years of rearing and stocking fish (2005-2009). New protocols were established for coordination of stocking events to be sure that all facility managers (hatcheries), land managers (refuges and wildlife areas), and fish resource managers (state and federal fishery biologists) were notified of stocking plans before the events occur. Fish survival research has shown some reaches to have such poor survival that continued stocking is essentially ineffective in accomplishing program goals (i.e., conservation of native fish). Fish production levels were to be ramped up to provide extra fish for species research in the years FY11-FY15, but prerequisite research needs have pushed these target dates into Phase 3 (FY16-FY25).

In September 2010 largemouth bass virus (LMBV) was confirmed at Dexter NFH. LMBV was isolated in one lot of bonytail, the 2008 year class, and in the refuge population of Gila topminnow. Immediately following the confirmation of the virus, the two LMBV positive lots were euthanized and removed from the facility. The euthanized lot of BONY was scheduled to be stocked into the lower Colorado River as part of the MSCP augmentation program, thus impacting the number of deliverable fish for the program.

Fish Augmentation work tasks are presented in Section B. Key accomplishments for FY10 include:

- successful capture of over 33,000 wild RASU larvae from Lake Mohave (B1)
- tagging and stocking of 6,595 RASU from Willow Beach NFH (B2)
- tagging and stocking of 3,093 BONY and 504 RASU from Achii Hanyo Rearing Station (B3)
- providing 30,000 larval RASU to Bubbling Ponds SFH, providing 2,609 fingerling BONY to Willow Beach NFH, and tagging and stocking 1,900 BONY from Dexter NFH (B4)
- tagging and stocking 14,950 RASU from Bubbling Ponds SFH (B5)
- rearing and transfer of RASU from Lake Mead SFH (B6) to Overton WMA (B11)
- tagging and stocking 861 large RASU from lake-side ponds (B7)

FY11 Activities

Fish augmentation actions currently underway in FY11 are similar to those conducted in FY10, with similar results expected. Dexter NFH is undergoing a series of fish health screenings in an effort to regain their fish health certification. It is anticipated that this will be accomplished in 2011 and all native fish stockings will resume accordingly. Infrastructure repairs to the water delivery and drainage system are currently underway at Bubbling Ponds SFH. Lake Mead SFH has incrementally increased their capabilities for rearing and conditioning RASU with expectations that this will continue into the future. The earthen dike that separates Yuma Cove backwater from Lake Mohave proper has

been reconstructed and other lake-side rearing ponds have undergone routing maintenance for vegetation and debris removal.

Proposed FY12 Activities

Similar to FY11, routine fish augmentation program plans for FY12 look to repeat the successful activities conducted over the first six years of the program and described in work tasks B1 through B11.

Stocking targets for FY12 are as follows:

- Reach 2 will receive a total of 6,000 RASU. These will be wild-caught larvae collected at Lake Mohave and reared at either Willow Beach Hatchery, Achii Hanyo Fish Rearing Facility (satellite of Willow Beach NFH) or in lake-side ponds. No BONY will go into Reach 2.
- Reach 3 will receive 8,000 RASU from Bubbling Ponds SFH, or Dexter NFH and 4,000 BONY from Dexter NFH.
- Reach 4 will receive 4,000 RASU from Bubbling Ponds SFH and 4,000 BONY from Achii Hanyo Fish Rearing.
- No fish are targeted for Reach 5 at this time.

Species Research (Section C)

Research is being conducted on covered fish species and their habitats to guide selection and application of conservation techniques, to document successful implementation of conservation measures, and to develop alternatives to conservation actions that prove ineffective. This strategy will allow researchers to quantify existing knowledge, identify data gaps, and design and implement species research to fill these data gaps.

FY10 Accomplishments

Fish research work tasks presented in Section C detail accomplishments for FY10. Some of the more significant findings from FY10 are:

- Five diets were evaluated for BONY with all performing equally well. BONY will continue to be reared on the RASU diet until further research is completed (C11).
- Remote PIT-tag monitoring contacted 389 RASU in Lake Mohave exceeding the number of RASU captured by traditional means during the March roundup and demonstrating that population estimates can be generated without having to physically handle native fish (C12).
- The presence of RASU in the Colorado River inflow area of Lake Mead was confirmed with the capture of three wild adult fish (C13).
- BONY and RASU survived, reproduced, and recruited at the Imperial Ponds Conservation Area (C25).

- Post-trial analysis showed that growth, food conversion efficiency, and swimming performance were highest among RASU that had been exposed to flowing conditions (C26).
- The concentration of peracetic acid necessary for killing quagga mussels is not suitable for transport of native fish (C30).
- Sonic tagged BONY had 95% survival at three months post-stocking (C39).
- pH levels should be maintained at or below a pH of 9 for successful RASU embryo development. The pH threshold observed for RASU larvae was slightly higher, with long-term exposure (20 days) to pH 10 resulting in 98% survival (C32).

FY11 Activities

Research remains focused on propagation and culturing, broodstock maintenance, post-stocking survival, habitat use and needs, genetics, and developing new/improved monitoring tools.

Proposed FY12 Activities

In addition to continuing previously initiated research, new investigations will be implemented to examine habitat cover preferences of BONY assess how BONY condition factor relates to post-stocking survival, and to evaluate habitat use of juvenile FLSU in Reach 3 (C53).

Accelerated Research

A major component of the conservation strategy for native fish, as laid out in the HCP and modified by Program Decision Document PDD 11-003 at the October 2010 Steering Committee meeting, is the stocking of large numbers of RASU and BONY each year for 10 consecutive years, and to then conduct intensive follow-up research. The HCP describes this research as follows:

“Monitoring and focused research will be a component of the adaptive management process. For example, the stocking of 4,000 subadult fish for 10 consecutive years below Parker Dam (conservation measure BONY3, sub measure 3) will be conducted as an adaptive management experiment, elements of which will include focusing augmentations in locations that currently support the species, followed by intensive monitoring and research for an estimated 7-8 years.” (HCP, BONY5, p. 5-44)

“Monitoring and focused research will be a component of the adaptive management process. In particular, the stocking of 12,000 subadult fish for 10 consecutive years (conservation measure RASU3, sub measure 1) will be conducted as an adaptive management experiment, elements of which will include focusing augmentations in locations that currently support large numbers of fish, followed by intensive monitoring and research for an estimated 7-8 years.” (HCP, RASU6, p. 5-49)

Three potential issues that may affect the fish augmentation program have been identified and will need to be investigated: 1) stocking levels for BONY are too low to initiate the accelerated research, 2) post-stocking survival of fish in Reach 4/5 is too poor to expect acceptable research results, and 3) invasion of the exotic quagga mussel is adversely impacting both production and research.

Annual stocking requirements during this accelerated research time frame are 12,000 RASU and 8,000 BONY per year for 10 years. Reclamation originally anticipated that production of RASU and BONY would reach the levels necessary to meet requirements for these research actions sometime in FY10/FY11. Issues over stocking fish from Uvalde NFH have however prevented the program from attaining production levels of 8,000 BONY, and the subsequent confirmation of LMBV at Dexter NFH may also affect the number of fish delivered to the Colorado River. Therefore, accelerated, focused, intensive research and monitoring for BONY cannot begin until these stocking issues are cleared up.

Post-stocking survival studies carried out under C8 documented that survival of stocked RASU and BONY is extremely poor in the main channel of Reach 4/5, especially downstream of Palo Verde Diversion Dam. A recommendation stemming from more than five years of intense research is that the LCR MSCP discontinues stocking these fish in the main river downstream of Palo Verde Diversion Dam. Hence, conducting accelerated research stockings into this area is not recommended at this time.

The invasive quagga mussel is limiting the number of locations available to rear RASU larvae from Lake Mohave. Neither Dexter NFH nor Bubbling Ponds SFH is willing to accept fish and/or water from Willow Beach NFH for fear of contaminating those facilities with the invasive mussels. Accelerating the stocking program at this time would increase the risk of inadvertently spreading these exotic aquatic pests.

The HCP specifically states:

“The number of fish that would be stocked in each reach would be based on the results of monitoring and research.” (HCP, p. 43 and p. 48)

“Stocking ... in any reach would cease, even if numbers described herein had not been stocked, if monitoring and research demonstrate: ... (3) there are factors in the reach that are not conducive to the survival of stocked fish to become adults or to be managed toward a self-sustaining population.” (HCP, p. 43 and p. 48)

Reclamation proposes that the accelerated stocking and research for RASU and BONY, which heretofore was projected to begin in FY11, be postponed until FY16 or until such time that it is both reasonable and prudent to do so. In the interim, Reclamation recommends that available RASU and BONY only be stocked into the main river or areas directly open to the main river in reaches 2 and 3, and into the upper section of Reach 4 (between Parker Dam and Palo Verde Diversion Dam). Off-channel areas in Reach 4/5 not directly connected to the river such as flood-plain ponds would still receive fish as needed.

In addition, selected experimental stockings of larger RASU will occur in two backwaters that are occasionally connected to the river through culverts. These fish will be monitored to determine survival rates.

Reclamation proposes the following stocking distribution for Phase 2 (FY11-FY15):

1. All RASU from Willow Beach NFH be repatriated back to Lake Mohave to increase that broodstock.
2. 4,000 RASU from Bubbling Ponds SFH be stocked into upper Reach 4 (Parker Dam to Palo Verde Diversion Dam).
3. All remaining RASU from Bubbling Ponds SFH be released into Reach 3 or into floodplain ponds.
4. 4,000 BONY be stocked into Reach 4 between Parker and Palo Verde dams.
5. No BONY be stocked into the main stem downstream of Palo Verde Dam.
6. Up to 8,000 BONY be stocked into Reach 3 in support of post-stocking survival studies.

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. The system monitoring for RASU and BONY is covered in D8. Monitoring data for FLSU are included in the research actions covered in C15. Reclamation annually presents this information by project reach in a status report to the LCR MSCP Steering Committee.

FY10 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 electro-fishing boats. In addition, helicopter surveys were completed from Lake Mead downstream to Palo Verde Diversion Dam.

Research studies conducted in each reach added additional fishery information. The RASU population in Reach 1 is estimated to be 500-700 adults, and larvae and juvenile fish were observed, along with active spawning in four separate areas. However, BONY are absent from this reach. Reach 2 had a population of roughly 1,400 repatriated RASU. Fewer than 25 wild RASU are estimated to still remain in the reservoir. Only repatriated BONY were present, but recapture numbers were too low to generate a population estimate. Reach 3 also had a strong RASU population, with an estimate of 4,376 adult fish. Active spawning was observed and larvae were occasionally found, but no juvenile fish were located.

This reach also had a healthy population of FLSU, estimated to comprise some 1,500 adults, but these fish were mostly found in the upper 10 miles of this reach. Researchers observed and captured juvenile FLSU in nets near the Big Bend boat ramp. Fingerling

size FLSU were captured along the river margin in late spring, and adults most often occupied main channel habitats.

BONY in Reach 3 were contacted in limited numbers. A single BONY was contacted during the annual Lake Havasu roundup, and several BONY were captured by fisherman near the Bill Williams Refuge.

Fish surveys in Reach 4/5 were limited. A winter sampling event focused from Parker Dam to Headgate Rock Dam located a small group of RASU in the main channel near River Island State Park. A survey below Palo Verde Dam resulted in no native fish being located. All fisheries surveys in Reach 5 were restricted to Imperial Ponds. These ponds are discussed under C25.

FY11 Activities

Monitoring will continue in all reaches, and surveys of the upper portion of Reach 4 will be initiated. Data will be gleaned from monitoring, from research actions, and from results supplied by partners. Results will be summarized by reach.

Proposed FY12 Activities

Reclamation will again participate in interagency surveys on reaches 1-3. Data will continue to be collected from ongoing research. Visual surveys by boat and helicopter will be conducted to search for spawning groups developed from stocked native fish.

Conservation Area Development (Section E)

Habitat creation for native fish is limited to backwater development. Implementation strategies range from making minor modifications in existing backwaters to major modifications such as the complete excavation of undeveloped land. Beal Lake Native Fish (E2), Imperial Ponds Conservation Area (E14), and Big Bend Conservation Area (E25) are existing work tasks with native fish habitat creation features. Future backwater development for native fish will be guided by the outcome of Backwater Site Selection (E15) and Conservation Area Site Selection (E16). This work is central to facilitating development of the remaining backwaters necessary under the LCR MSCP.

Post-Development Monitoring (Section F)

Post-development monitoring will be conducted at each conservation area following completion of habitat creation activities. This monitoring will evaluate both the maturation of the site as it develops into covered species habitat and the use of the habitat by the covered species. Post-Development Monitoring of Fish Restoration Sites (F5) provides funding to support post-development monitoring of Beal Lake and Imperial Ponds. Monitoring of the connected backwater at Big Bend Conservation Area began under C15, and will be continued under F5 in 2011.

Adaptive Management Program (Section G)

The LCR MSCP Adaptive Management Program (AMP) will address uncertainties encountered during implementation of the conservation measures outlined in the HCP. 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 current needs of the AMP are in the form of data collection and organization so that, when needed, the information can be readily accessed for use in the decision-making process. For native fishes, all stocking and tagging data developed by the LCR MSCP are maintained in an electronic database (G1).

Another aspect of the AMP that is needed early on is a tool box of evaluation techniques that can gauge the effectiveness of conservation measures as they are completed. Adaptive Management Research Projects (G3) will allow for the development of these tools. Funds allocated from G3 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 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, Glen Canyon Dam Adaptive Management Program) through participation in meetings and presentations to research and management groups, including local chapters of the American Fisheries Society, Colorado River Aquatic Biologists, Lake Mohave Native Fish Work Group, and the Lower Colorado River Native Fish Work Group.

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

The LCR MSCP utilizes a habitat-based approach to the conservation of covered species. In order to fully comply with the HCP, monitoring and research programs will be conducted throughout the LCR MSCP implementation period. Monitoring and research activities use standardized and scientifically accepted protocols for evaluating covered species and their habitats, guide selection and application of conservation techniques, document successful implementation of conservation measures, and develop alternatives to ineffective conservation actions. The HCP lists five general elements of the monitoring and research program:

1. Species Research (Section C)
2. System Monitoring (Section D)
3. Restoration Research (Incorporated into Section E)
4. Post-Development Monitoring (Section F)
5. Adaptive Management (Section G)

Although the HCP separates the monitoring and research program into five elements, connectivity and overlap exist throughout the monitoring and research program. Work tasks may have multiple goals or study results may directly lead to additional work tasks in other elements. This connectivity is spelled out in each work task under Connections with Other Work Tasks. A brief summary of the work planned for each target area is provided below.

Species Research (Section C)

Species research work tasks are designed to provide the necessary information required to create and manage habitats and populations for covered species. Work tasks identified in this section focus on life history and habitat requirements for covered species, and addressing information gaps in establishing and managing created habitats for these species. Information gained will be used to design and evaluate protocols for system-wide surveys in Section D, and to help design and manage habitat created in Section E.

Species research work tasks focus on key priorities set in the Five-year Monitoring and Research Priorities document. Two of the work tasks (C2 and C4) are specific to stand-alone conservation measures in which money is transferred to another entity to support ongoing programs for sticky buckwheat, threecorner milkvetch, and the relict leopard frog.

Habitats have been characterized for the MacNeill's sootywing (C7) and the results are being incorporated into new restoration sites. This work task is now finished and sootywing surveys will continue at restoration sites under F6.

Nest Predation on Avian Covered Species (C28) has been completed in FY10 and a final report with management recommendations will be received early in FY11. This study indicated that the main predators of neotropical migrant species, including the southwestern willow flycatcher, are other passerine species such as the yellow-breasted chat and the brown-headed cowbird.

In FY11, one new work task (C43) was added to determine the population demographics and habitat use of California leaf-nosed bats. This study will determine the distribution of genetic variation of California leaf-nosed bat roost sites and identify where individuals from different roosts are foraging. Current conservation areas such as CVCA and Cibola Unit #1 are being utilized by these bats for foraging, and this study will help determine how far away a roost can be from a conservation area and still be utilized.

In FY 12, two new work tasks will focus on two covered bird species that have been extremely difficult to locate during the system-wide bird monitoring conducted under C24 and D6. These work tasks will focus on the distribution and habitat requirements of the vermilion flycatcher and the gilded flicker. Species-specific survey protocols will be developed, and habitat requirements will be determined for incorporation into habitat creation areas.

System Monitoring (Section D)

System monitoring is being conducted to determine the ongoing status of covered species and their habitats in the LCR MSCP planning area. System monitoring programs that were established prior to LCR MSCP implementation were continued in FY10 and FY11. Two system monitoring work tasks, Southwestern Willow Flycatcher Presence/Absence Surveys (D2) and Southwestern Willow Flycatcher Habitat Monitoring (D3), continue existing monitoring for the SWFL and its habitat. Occupied SWFL habitat is monitored between Parker and Imperial dams under the 2001 BO requirements subsumed within the LCR MSCP (D3). The 2001 BO Reasonable and Prudent Measure 4 requires annual presence/absence surveys for up to five years after the implementation of all water transfers (D2), while Conservation Measure 4 requires habitat monitoring to be conducted annually for the same time period (D3). In FY10, a five-year review was conducted to assess the efficacy of the protocol and to review the results.

An additional investigation, Study of Interactions between the Tamarisk Leaf Beetle and Nesting Southwestern Willow Flycatcher, is being conducted under D2. This study will help determine potential effects that defoliation by the tamarisk leaf beetle may have on nesting habitat in the future along the LCR. The leaf beetle was released in St. George, Utah in 2006, and by 2008, populations had exploded and defoliated nesting habitat utilized by the SWFL. This beetle is spreading southward and has encompassed two SWFL sites monitored by the LCR MSCP including one site near Littlefield, Nevada and

one site in Mesquite, Nevada. The beetles are expected to reach the Mormon Mesa, Nevada SWFL life history sites in 2011. This study will show the potential effects of the leaf beetle on nesting habitat, determine potential effects on SWFL source populations along the Virgin River and LCR, and help prioritize new conservation area placement.

Multi-species protocols have been developed to monitor additional avian species covered under the LCR MSCP. Monitoring Avian Productivity and Survivorship (D5) collects intensive site-specific data on avian species utilizing two restoration sites. Data from this protocol also goes into a national database to track trends of bird species throughout the United States. System monitoring for riparian obligate avian covered species (D6) uses a multi-species protocol and sample plan developed by the U.S. Geological Survey (USGS) to document long-term population trends and habitat use of riparian bird species throughout the LCR MSCP area.

System monitoring for YBCU was initiated in FY06 and surveys continue under D7 utilizing a species-specific protocol to provide data on this late successional riparian obligate species. Data from these studies will be used to help design and manage created habitats in Section E. Presence/absence surveys continued in FY10 and YBCU has been found nesting at four LCR MSCP conservation areas including CVCA, PVER, Cibola NWR Unit #1, and Beal Lake Conservation Area.

System Monitoring and Research of Covered Bat Species (D9) continues using protocols developed in FY06. Acoustic surveys and capture techniques will provide information on bat distribution and habitat use. Data from these studies, along with Post-Development Monitoring of Covered Bat Species (F4), will be used to help design and manage created habitats in Section E.

In FY10, new system-wide surveys began for the lowland leopard frog and Colorado River toad. These surveys will determine the extant populations of the lowland leopard frog and Colorado River toad along the LCR, and help in understanding their habitat requirements.

Post-Development Monitoring (Section F)

Extensive monitoring of created habitats is necessary to evaluate implementation and effectiveness of designed 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 successful implementation and to record successional change within the restored areas.

In FY10, post-development monitoring for habitat characteristics and LCR MSCP covered species use was conducted at several riparian restoration demonstration sites and habitat creation sites (Table 1-9). Each proposed habitat creation project will be designed to provide habitat requirements for targeted covered species. To evaluate effectiveness in providing these habitat requirements, pre- and post-development monitoring will be

conducted for targeted covered species, including avian species (F2), small mammals (F3), bats (F4), and insects (F6). In FY11, a new work task (F7) was added for marsh bird post-development monitoring. Pre-development marsh bird monitoring was initially conducted under D1.

Table 1-9. LCR MSCP Covered Species Post-Development monitoring in FY10

Conservation Area	Vegetation	Avian	YBCU	SWFL	Small Mammals	Bats	Marsh Birds
Beal Lake	X	X	X	X	X	X	X
Big Bend							X
PVER	X	X	X	X	X	X	
CVCA	X	X	X	X	X	X	
Cibola NWR Unit #1	X	X	X	X	X	X	
Hart Mine Marsh							Under Const.
Imperial NWR		X			X	X	X

In FY10, post-development monitoring occurred for sites or phases where implementation has already occurred, including Beal Lake Riparian Restoration (E1), ‘Ahakhav Tribal Preserve (E3), Palo Verde Ecological Reserve (E4), Cibola Valley Conservation Area (E5), and Cibola NWR Unit #1 (E24). Post-development habitat monitoring is expected to continue through the life of the program at intervals determined by age and successional stages of each stand.

In FY11, pre-development monitoring will occur at Laguna Division Conservation Area. Surveys will include bats, small mammals, vegetation, avian use, SWFL, YBCU, and marsh birds. Monitoring results will be used to compare to habitat use after development.

Adaptive Management Program (Section G)

The AMP will address uncertainties encountered during program implementation by gauging the effectiveness of existing conservation measures, proposing alternative or modified conservation measures as needed, and addressing changed or unforeseen circumstances. The *Final Science Strategy* details the AMP process for the research and monitoring programs at the project and programmatic levels. A five-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 five-year planning cycle will allow for a review of past activities and the setting of priorities for the next five-year cycle. The *Final Five-Year Monitoring and Research Priorities for the Lower Colorado River Multi-Species Conservation Program: 2008-2012* was completed in FY08.

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 decision making process. Implementation of the data management system continued in FY10 with the restructuring of the LCR MSCP website and developing an outline for structure for the in-house database. In FY11 and FY12, the main database structure will be built and data modules will be constructed for fish, birds, mammals, land, hydrological features, GIS, adaptive management, project management, and administration.

Funding has been allocated under Adaptive Management Research Projects (G3) to begin priority research studies identified when applicable. Research projects associated with riparian species that began under G3 in FY10 include a study that was initiated to determine the population demographics and habitat use of the California leaf-nosed bat; this work will continue in FY11 under C43. Also, a habitat analysis and development of a population monitoring protocol for *Sigmodon* was designed and is being implemented under C27.

Conservation Area Development and Management

A major component of the LCR MSCP is the creation and management of habitat. 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 specific habitat. The term “created habitat” is typically used when an established land cover type has met or exceeded its species-specific performance standard. Land cover type is defined in the HCP as, “the dominant feature of the land surface discernible from aerial photographs defined by vegetation, or human uses.” This definition is used in conjunction with species-specific performance standards to evaluate the creation of habitat.

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 groundcover are typically planted or seeded to create the desired land cover type. For backwater land cover types, which include open water and associated emergent marsh, the habitat is defined by 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 conservation measures, habitat creation goals for the LCR MSCP include the establishment of:

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

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 floodplain. 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 website. 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 follow a different selection and evaluation process from those established primarily for native fish. Costs associated with development and implementation of the guidelines are captured in Backwater Site Selection (E15), and Conservation Area Site Selection (E16).

Conservation areas developed primarily for riparian and honey mesquite land cover types such as 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 are being developed as a part of the *Final Science Strategy*. The requirements are expected to include methods to cost effectively establish and manage planned land cover types while excluding growth of nonnative plant species. Completed terrestrial restoration research projects include Beal Lake Riparian Restoration (E1), ‘Ahakhav Tribal Preserve (E3), Cottonwood Genetics Study (E6), Mass Transplanting Demonstration (E7), and Seed Feasibility Study (E8).

Strategies for conservation areas that are being developed primarily as backwaters for native fish are likely to range from making modifications to existing backwaters with good water quality, to making improvements to backwaters with poor water quality, to the excavation and creation of backwaters on undeveloped land. Restoration research priorities for backwater development are being developed as part of the *Final Science Strategy*, and are expected to include researching the screening of water to exclude nonnative fish, maintaining water quality in isolated backwaters, and controlling nonnative fish species.

Creating and maintaining 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, three components of habitat creation have been developed: 1) site identification and selection, 2) research and demonstration, and 3) development and management. The following sections describe the distinctions between the components of habitat creation and how they are interconnected within the context of an adaptive 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. These variables can be 1) logistical: site accessibility, available infrastructure, availability of sufficient resources (water); 2) physical: depth to groundwater, soil texture and chemistry,

water quality, 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 outlined in E15 and E16. 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.

FY10 Accomplishments

Conservation Areas: Focus was on building partnerships with resource agencies, identifying properties for future development, and securing lands occupied by flat-tailed horned lizards to satisfy the FTHL conservation measure. The need to develop lands within the state of California has been identified and is a priority of the program.

Staff from the LCR MSCP continued to attend and contribute at numerous meetings held with other resources agencies and tribal entities. In particular, we regularly attended “Healthy Landscapes” meetings hosted by the BLM, Cocopah bi-national meetings hosted by the tribe, “Riparian Restoration Workshop” hosted by the Yuma Crossing National Heritage, as well as the Laguna Division Planning group which is hosted by the LCR MSCP. We also conduct quarterly meetings with FWS representatives from all 4 federal refuges on the lower Colorado River, both Complex Managers, and staff from both the Ecological Services and the Arizona Fisheries Research Office of the FWS.

With the passing by the Steering Committee of Program Decision Document 10-001: Land Approval in October 2009, Reclamation was directed to evaluate unprotected properties within the Salt Creek ACEC of the Dos Palmas Preserve for inclusion into the program for the protection of FTHL. Unfortunately, the costs associated with acquiring multiple small parcels outweigh the benefit to the species and the LCR MSCP at this time. Therefore, we revised decision document 10-001(r) to allow for acquisition in any of the four ACEC’s specifically managed for FTHL. Our intent is to secure all 230 acres within one ACEC; however, that may not be possible given the interest being generated by the search for renewable energy sources, specifically construction of solar plants in the desert southwest. Reclamation has been working with the Bureau of Land Management (BLM), El Centro Field Office to identify private lands occupied by FTHL within the Yuma Desert ACEC located within the greater El Centro Area. Using information from the Imperial County Assessor office, thirteen parcels, with acreages ranging from 70-319 acres have been identified and will be the first to receive letters of interest.

In January 2010 the LCR MSCP held a technical two-day workshop in Boulder City, Nevada to review the draft land cover type creation goals by reach and state presented at the October 2009 Steering Committee meeting in Laughlin. All LCR MSCP stakeholders were invited to attend and participate in the meeting, which helped refine the creation goals. As a result of the workshop, working with our partners the LCR MSCP will be actively talking with potential landowners to secure additional lands, primarily in California, to meet the goals of the program.

Backwater Site Selection: In response to technical challenges associated with creating and maintaining backwaters free from non-native species, as well as public comments associated with current isolated LCR MSCP backwaters, the decision has been made to postpone further conceptual planning for backwater habitat creation to provide additional time to perform further research on screening requirements for non-native fish, revising backwater habitat design criteria, and evaluating alternative water supply and filtration methods. A five-year backwater strategy has been drafted to address how the program will address backwater-related research and development issues.

FY11 Activities

Conservation Areas: Coordination with resource agencies and attendance at planning meetings is expected to be similar to those in FY10. In FY10 it was anticipated that at least one backwater, which would be created on existing ground at existing or potential conservation areas, may be identified and evaluated in California during this interim period. This effort is being initiated to bring a backwater, created from dry ground, to parity with existing backwaters identified under E15. However, those efforts are temporarily on hold in accordance with the discussion for E15.

Two development plans are currently being drafted and are expected to be sent to the California Department of Fish and Game for evaluation and approval. The first is the establishment of honey mesquite on lands adjacent to the Palo Verde Ecological Reserve and owned by the Palo Verde Irrigation District. The second is the development of over 500 acres located on Cibola National Wildlife Refuge into primarily honey mesquite. Both properties, if developed, would satisfy over one half of the program's honey mesquite goal for the state of California.

Figure 1.

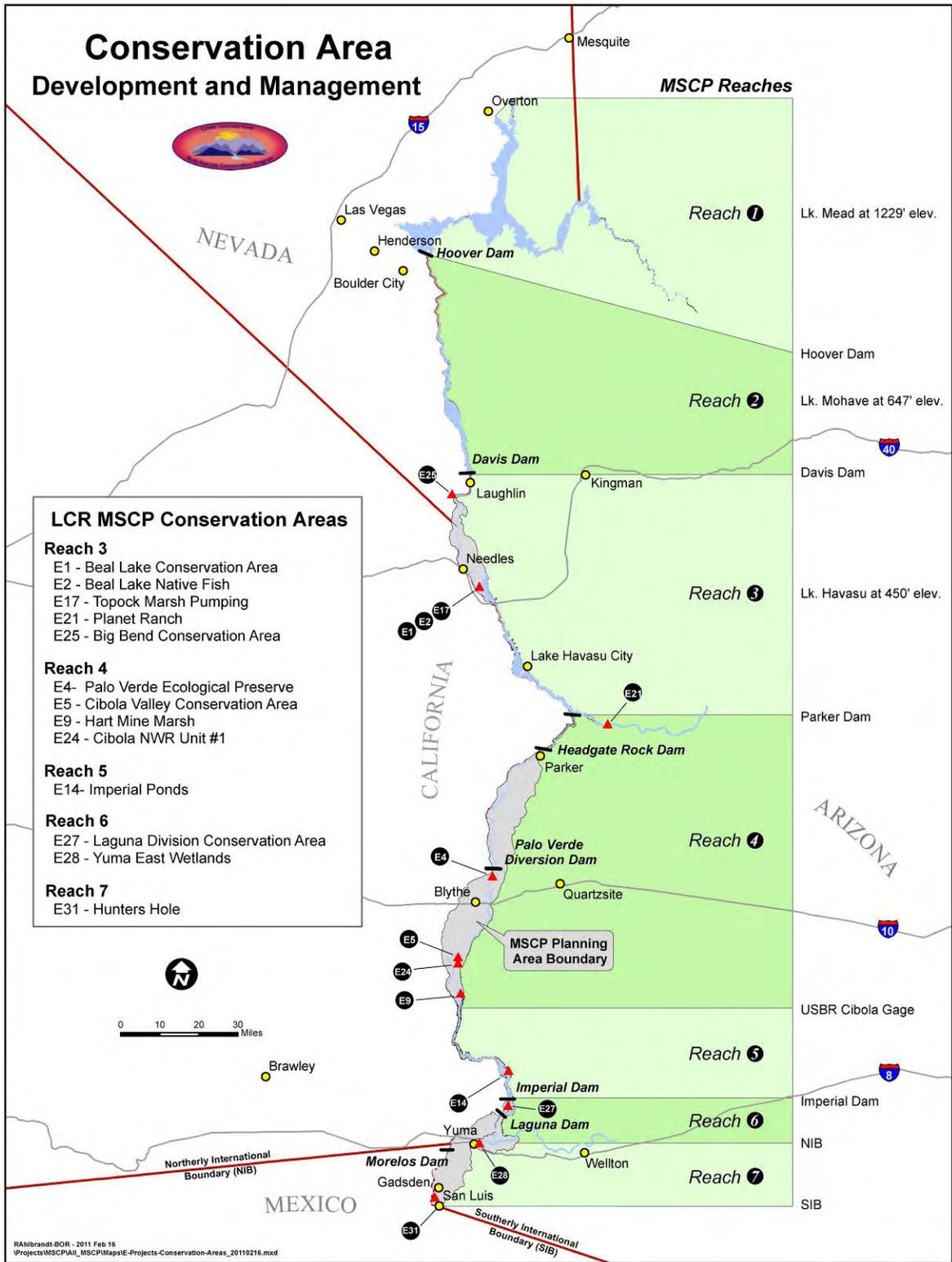


Figure 2.

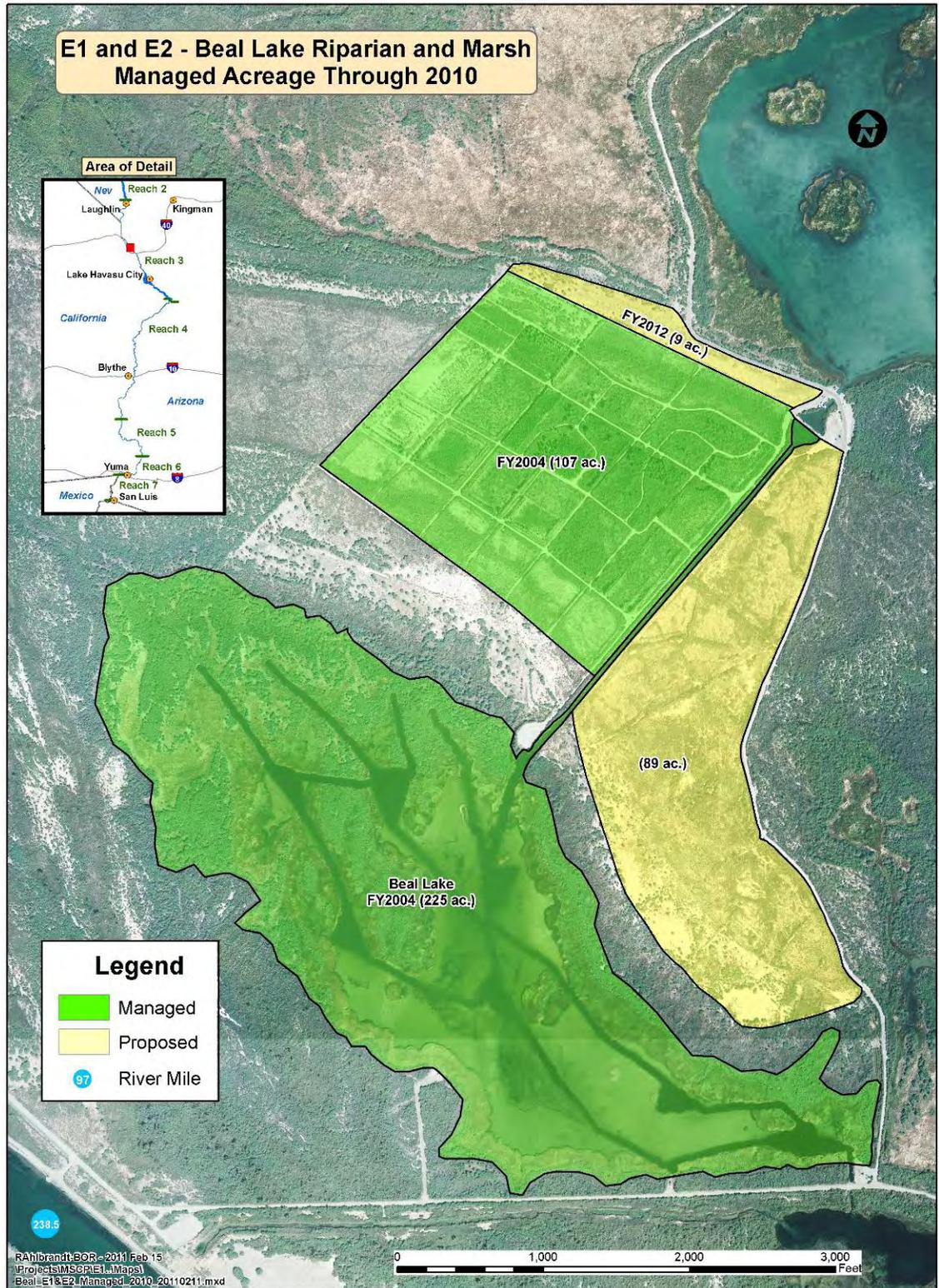


Figure 3.

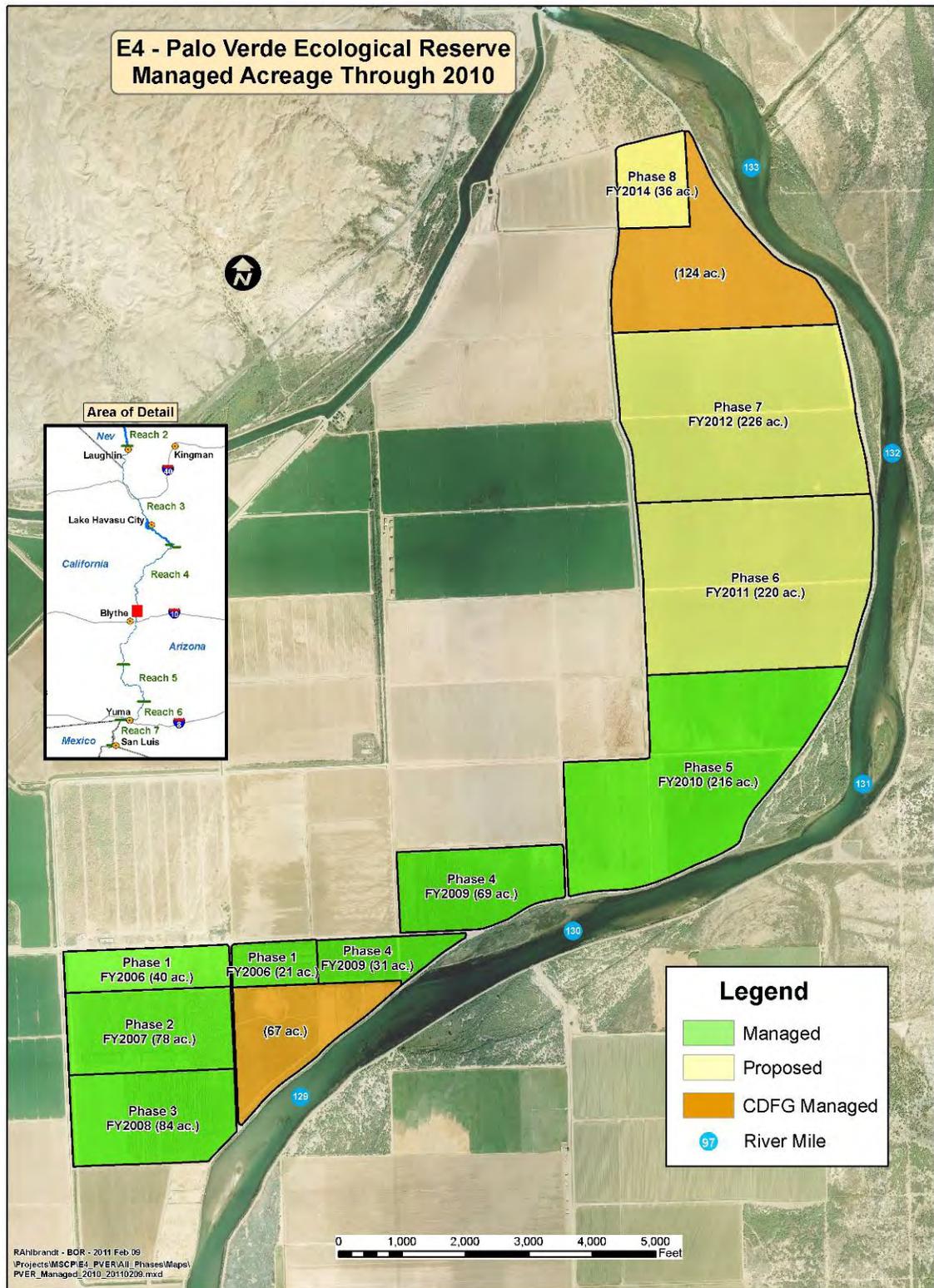


Figure 4.

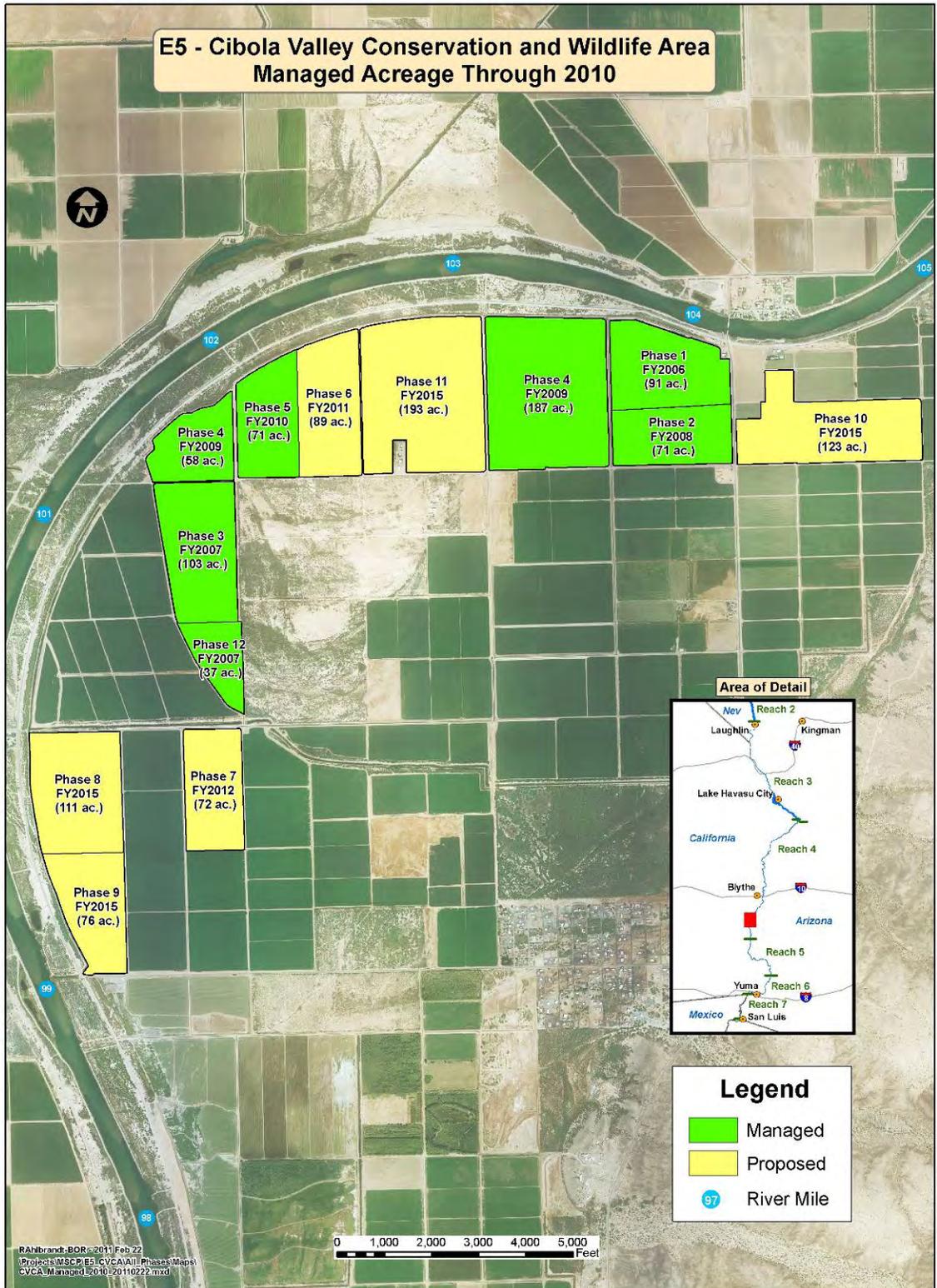


Figure 5.

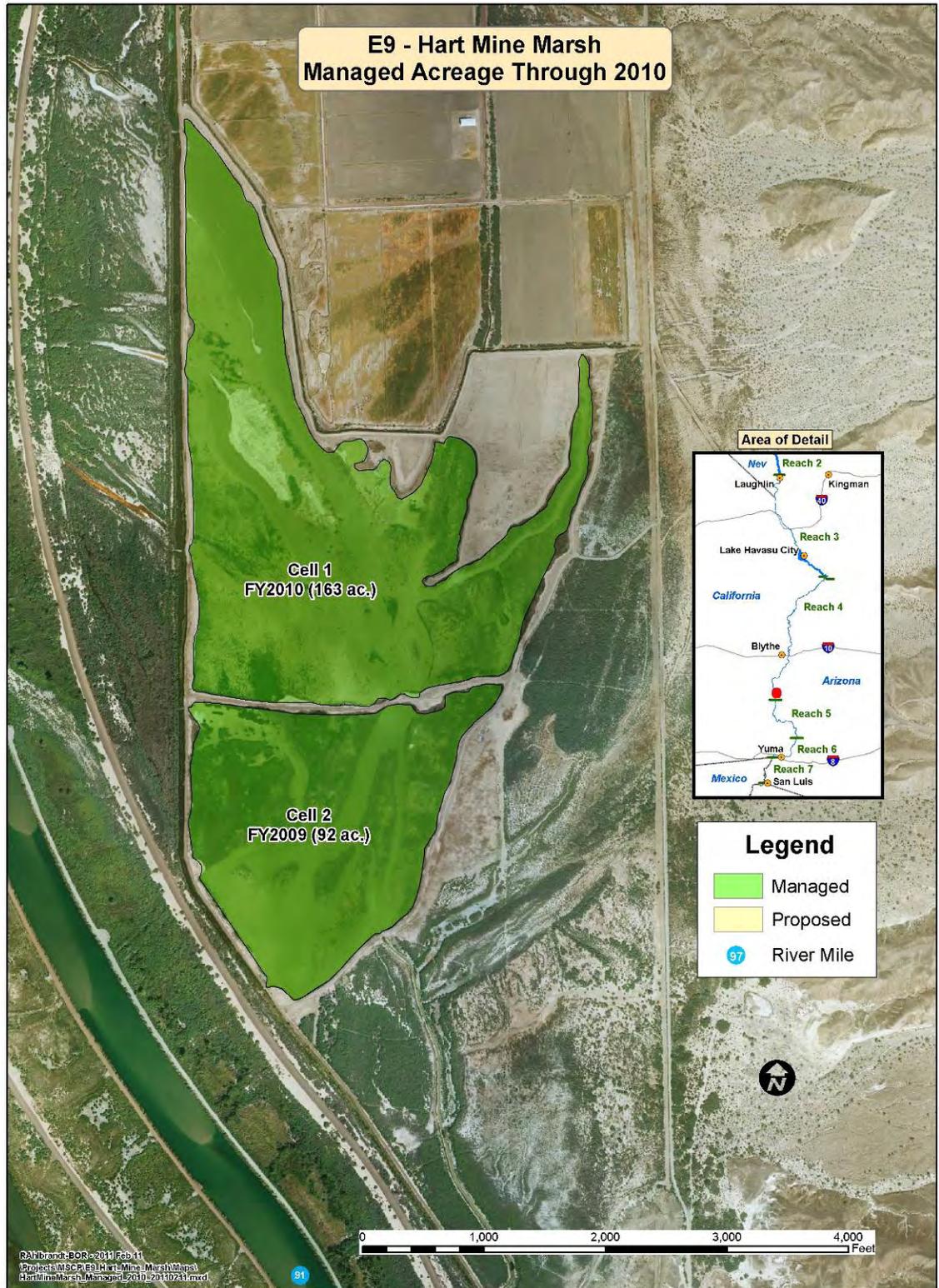


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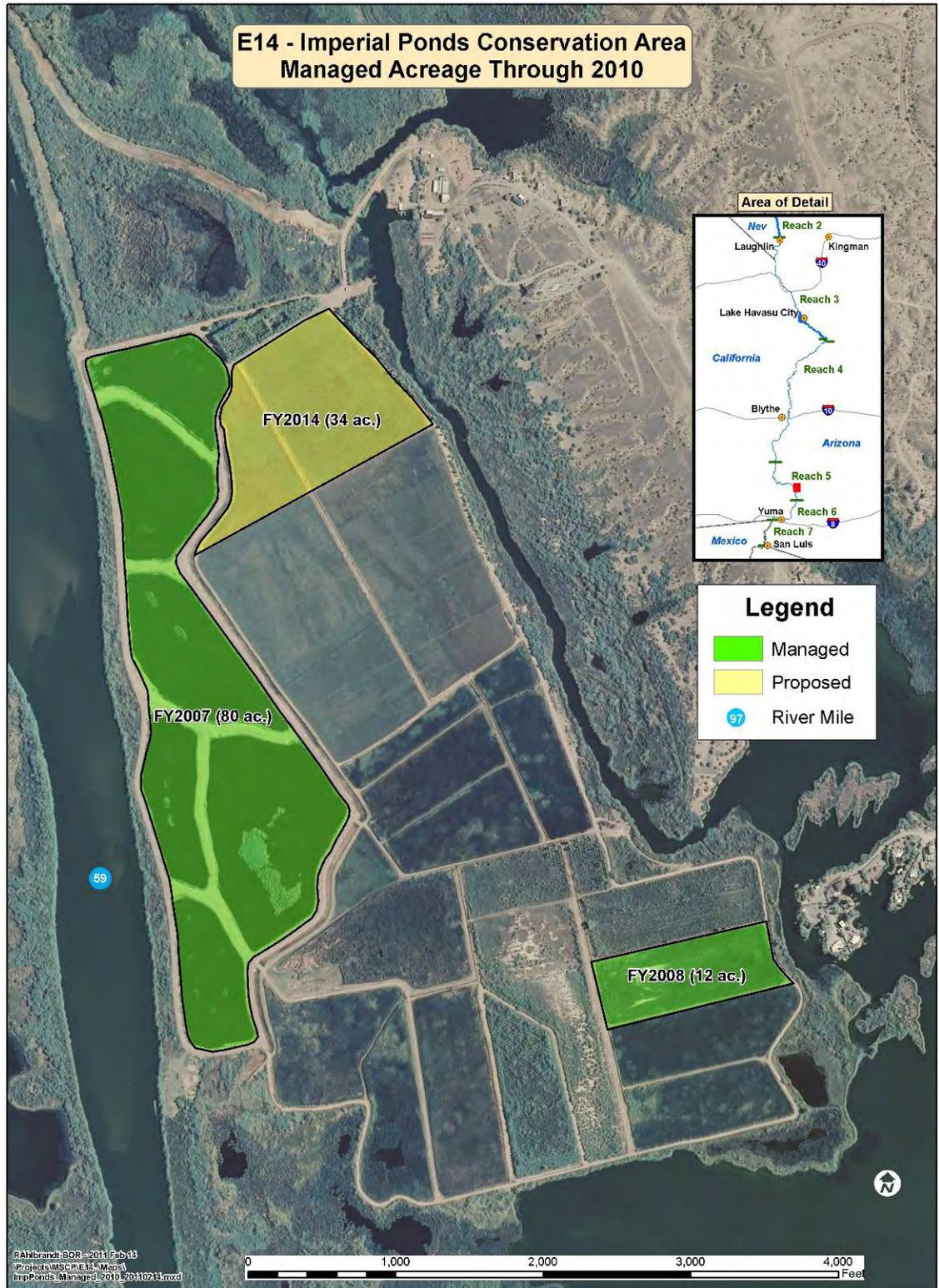


Figure 7.

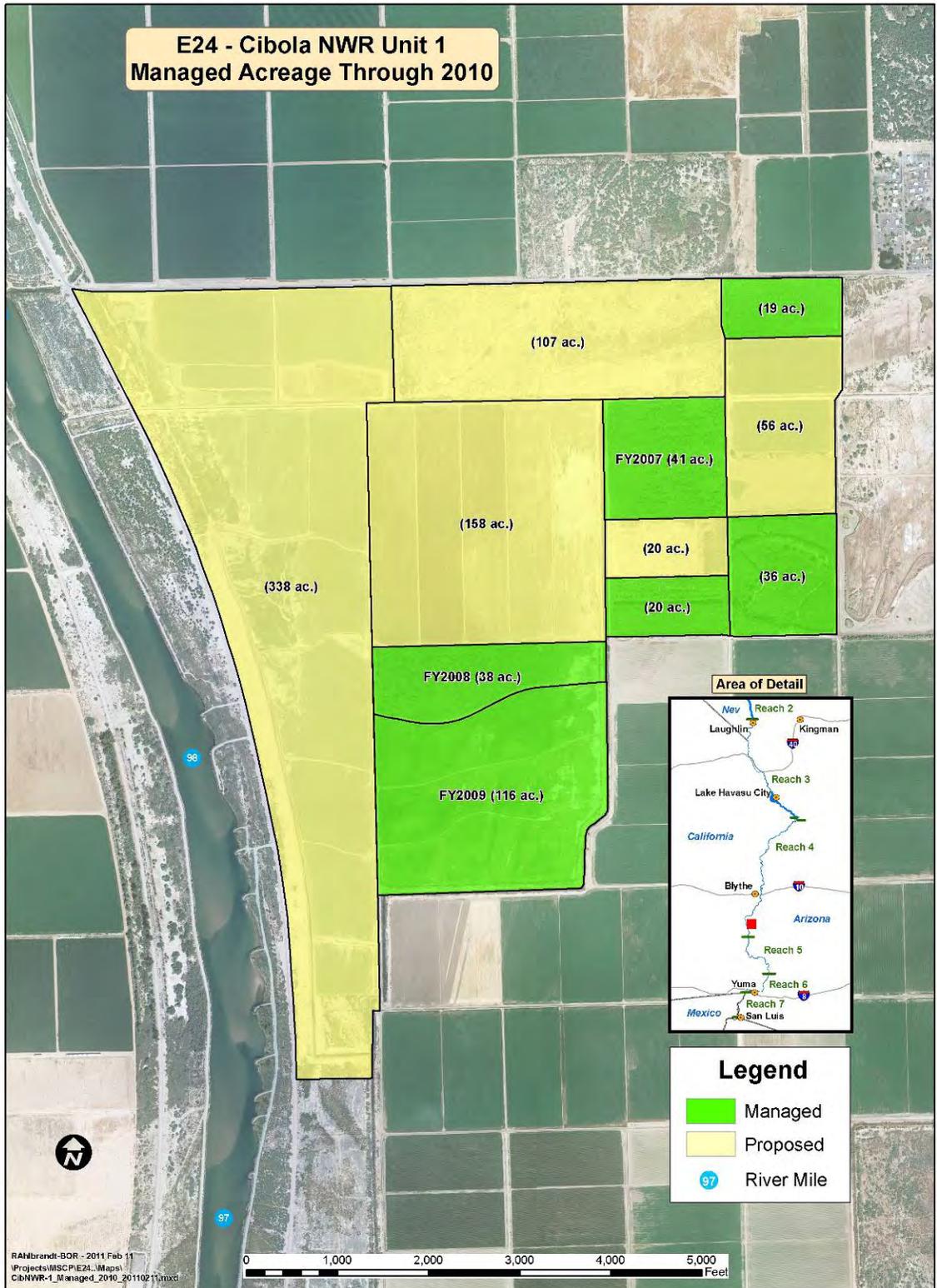


Figure 8.

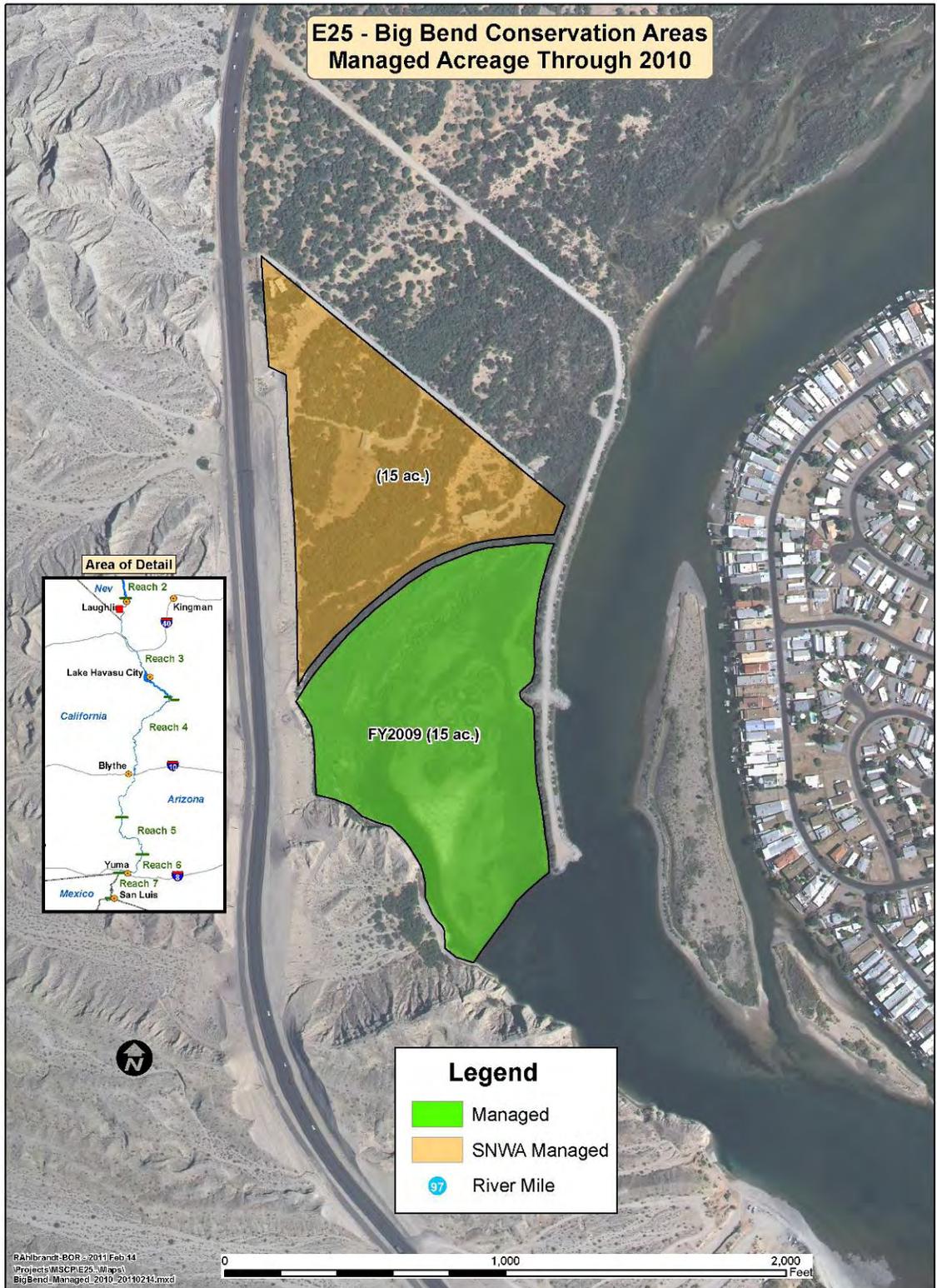


Figure 9.

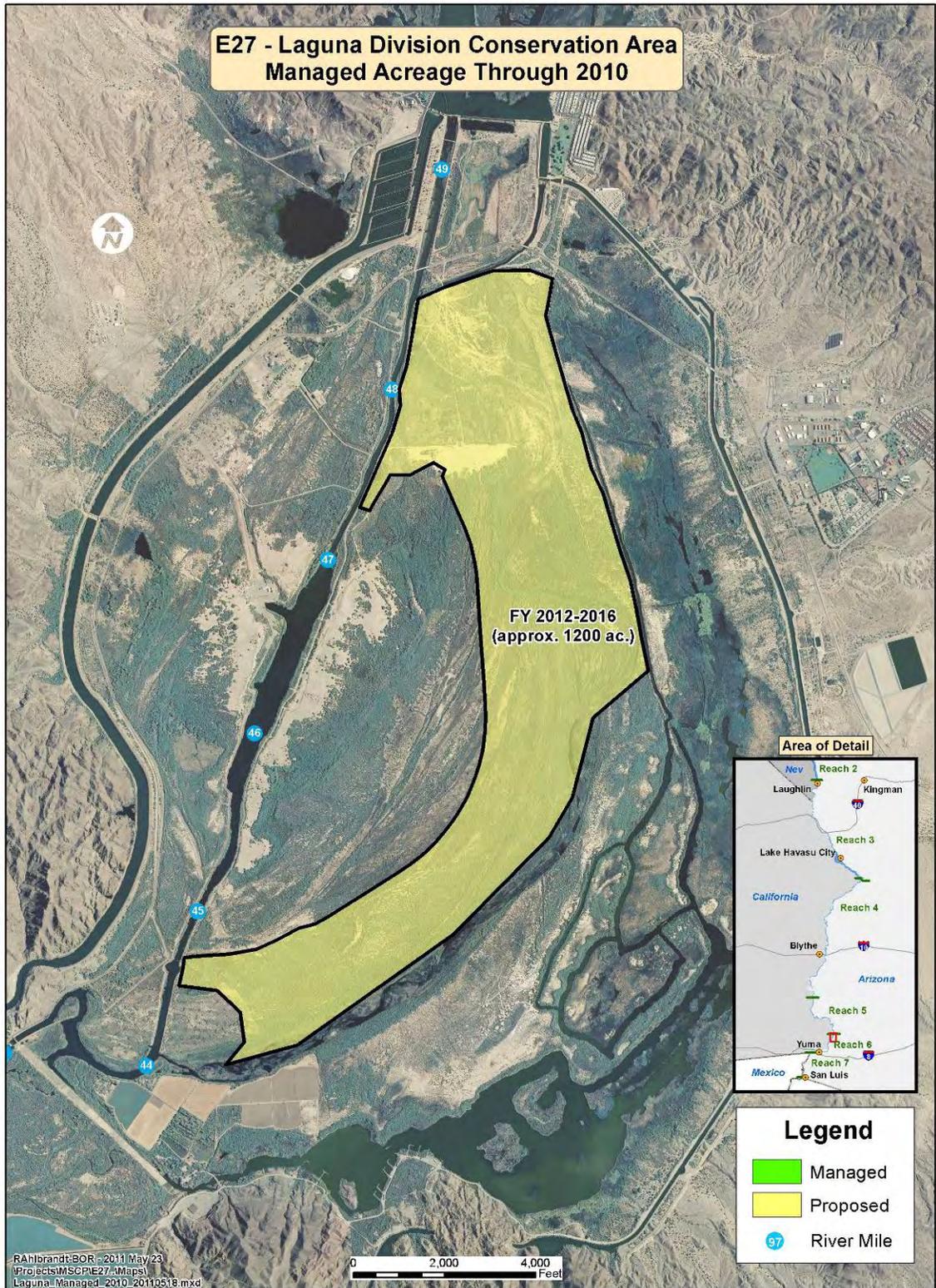


Figure 10.

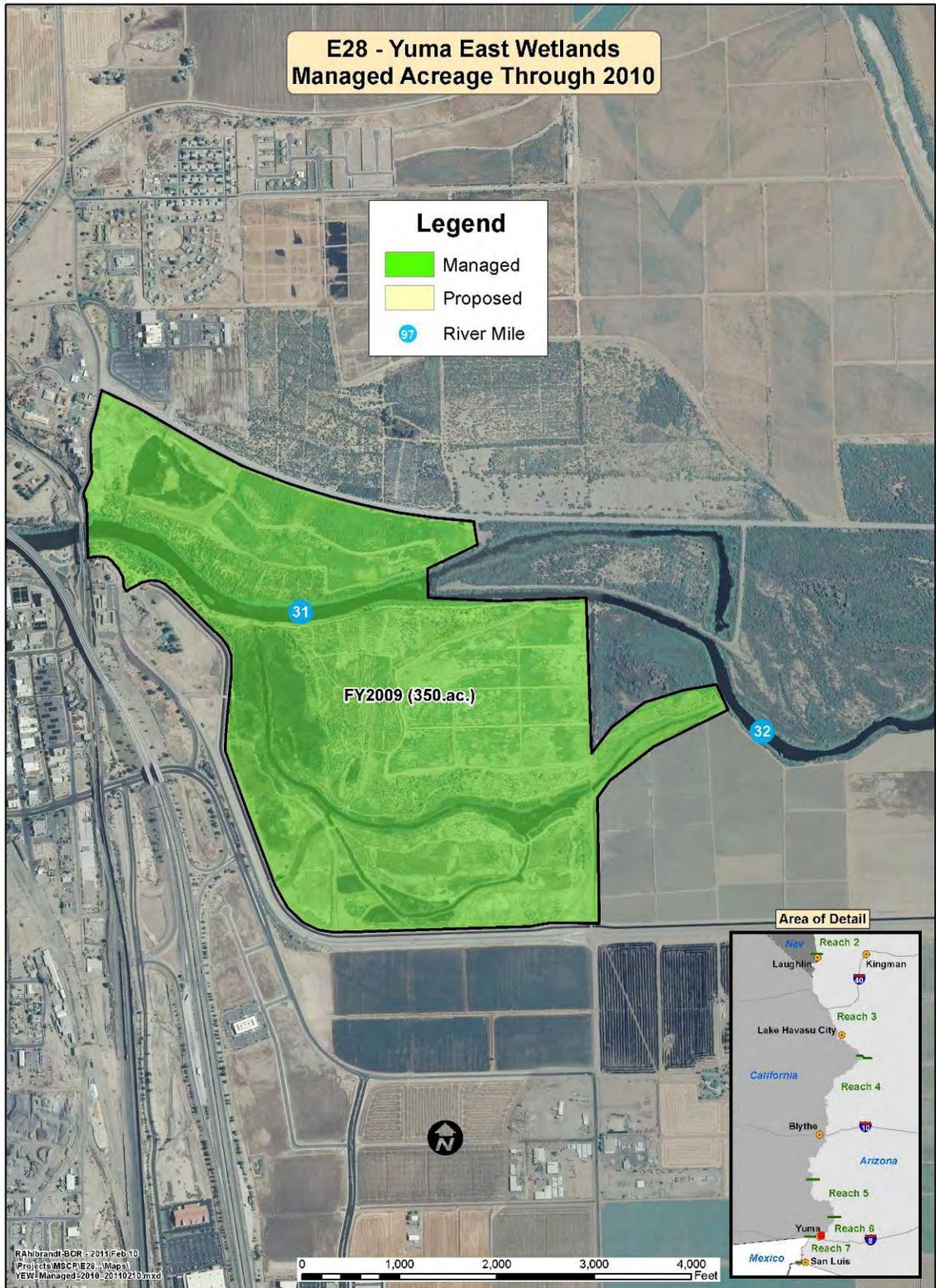
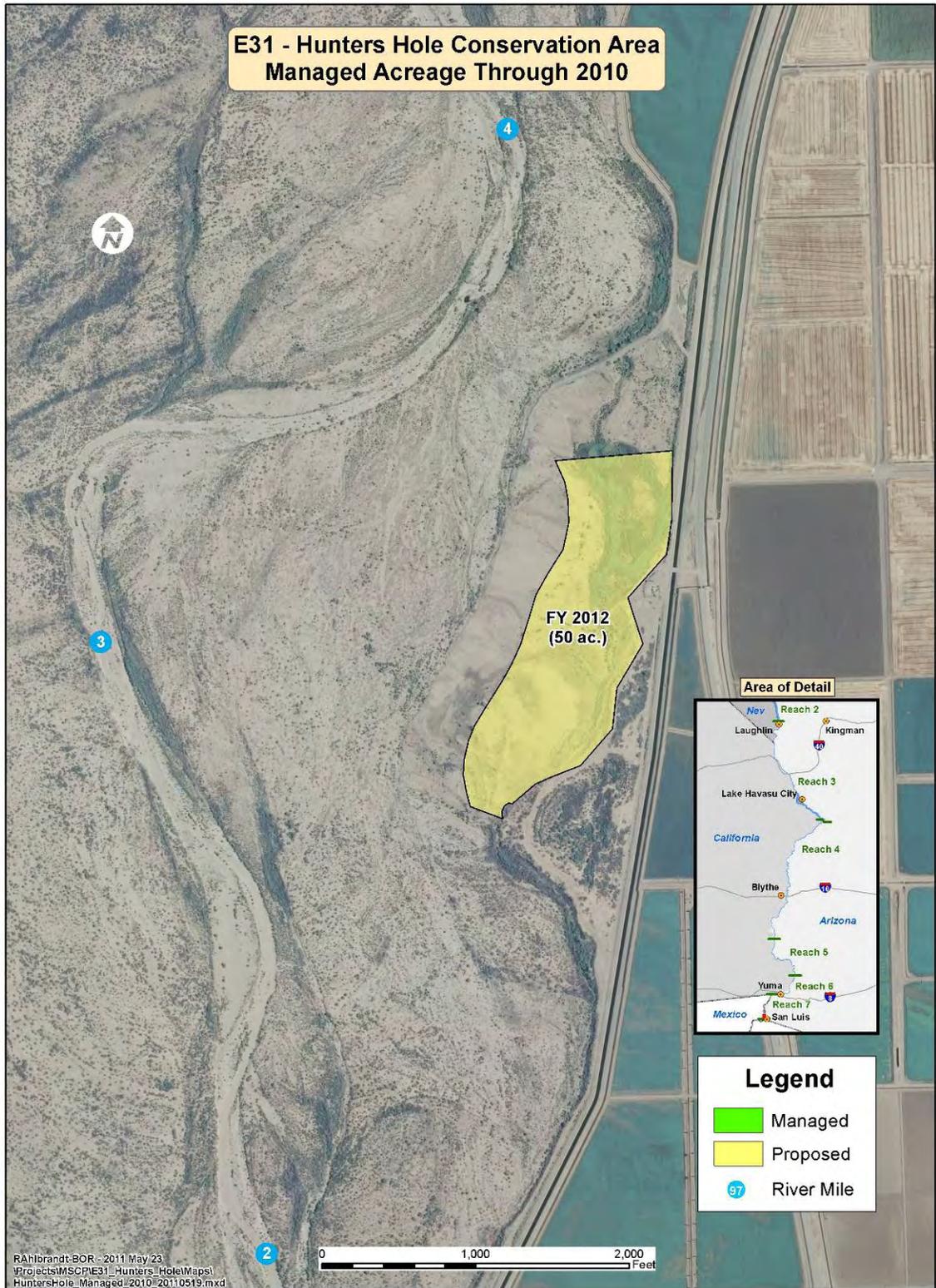


Figure 11.



Backwater Site Selection: Evaluating sand filters as a secondary filtration tool is scheduled for March to coincide with the presence of larval fishes. The summary of the findings of the testing is expected later in the year. Additional secondary treatment technologies, such as the use of microscreens, are also being evaluated through literature searches and potential by on-site visits at facilities currently using this technology. During this fiscal year, the distribution and comment on the five-year strategy is anticipated. Additional activities identified in the strategy which will help guide the selection process, such as determine salinity, oxygen, and temperatures limitations of native fish are on-going, but funded through other work tasks.

FY12 Proposed Activities

Conservation Areas: Coordination with resource agencies and attendance at planning meetings is expected to be similar to those in FY11. FY12 activities will focus on the identification and evaluation of potential conservation areas, primarily in California. Specific activities include completion of the site-selection process for sites identified under the 2008 RFP. Steps 2-6 of the *Draft Final Guidelines for the Screening and Evaluation of Potential Conservation Areas* will be conducted if the sites meet the goals identified in the workshop held in FY10.

Backwater Site Selection: Minimal activities are projected until the five-year backwater strategy is completed. At that time, backwater inventory and selection is anticipated to resume at increased funding levels and focus on backwaters within the state of California. However, the budgets may be revised in the future based on promising technologies and would follow the normal work plan process.

Research/Demonstration

Restoration research and demonstration projects are vital in supplying new information to make habitat creation projects more effective in terms of meeting species-specific habitat requirements, and more efficient in terms of overall costs to meet those requirements. In general, restoration research projects are those that have specific research questions and are supported by a robust, replicated study design where 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, determining habitat creation potential at identified sites based on current ecological functions, and evaluating technologies to assist in meeting specific habitat requirements.

Work tasks E2, E4, and E8 address specific research questions. In contrast, demonstration projects such as E1 and E3 assess a particular technique to determine whether the technique might be feasible and effective for use in a habitat creation project. Demonstration projects are designed to evaluate techniques, effectiveness, and cost efficiency. These activities may mature into a land cover type that meets the specific performance 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 and guide future selection and implementation of habitat creation projects.

FY10 Accomplishments

Irrigation and management of cottonwood-willow and honey mesquite at the Beal Lake Riparian Restoration continued. The restoration research being conducted at 'Ahakhav Tribal Preserve ended in FY10; therefore, work task E3 has been closed.

FY11 Activities

In April of 2010 with the passing of resolution 10-005, Beal Lake Conservation Area was adopted by the steering committee.

FY12 Proposed Activities

No specific research items are being proposed.

Development/Management

Habitat development and management are strongly connected. As described previously, in many cases 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 towards 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, to achieve the desired habitat under the LCR MSCP calls for establishing and managing for a snapshot in time and ecological succession. This may require actively creating disturbance 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 of that backwater 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 in better understanding these processes. This feedback, in turn, may serve to modify site selection or establishment approaches for future projects. The information can also reveal needs not previously anticipated. For example, during collections for the Mass Transplanting Demonstration (E7), 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 time and costs associated with collection. These nurseries were incorporated into the phased developments plans E4 and E5. 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.

FY10 Accomplishments

Planting of the Phase 5 cottonwood-willow land cover type was completed at the Palo Verde Ecological Reserve, which established an additional 216 acres of cottonwood-willow on the property owned by the California Department of Fish and Game. Planting of Phase 5 at the Cibola Valley Conservation Area was completed, which established another 71 acres of targeted land cover types on the property owned by the Arizona Game and Fish Department. The northern cell of Hart Mine Marsh was completed, which resulted in an additional 163 acres of marsh cover type being established at Cibola NWR. The total number of acres developed in FY10 was 450 acres. The total number of acres being managed by the program on established conservation areas is shown in Table 1-10.

Table 1-10. Managed Acres by Conservation Area Through FY10

Conservation Area	Managed Acreage
E1: Beal Lake Riparian Restoration	107
E4: Palo Verde Ecological Reserve	539
E5: Cibola Valley Conservation Area	618
E9: Hart Mine Marsh	255
E14: Imperial Ponds Conservation Area	92
E25: Big Bend	15
E24: Cibola NWR	270
Total	1,896

The total number of acres being managed by land cover type and by reach and state on established Conservation Areas is shown in Table 1-11.

Table 1-11. Managed Acres by Reach and State Through FY10

	Cottonwood -Willow	Honey Mesquite	Marsh	Backwaters	Upland- Buffer	TOTAL
ARIZONA						
Reaches 1-2	0	0	0	0	0	0
Reach 3	107	0	0	0	0	107
Reach 4	535	129	255	0	224	1,143
Reach 5	0	0	12	80	0	92
Reach 6	0	0	0	0	0	0
Reach 7	0	0	0	0	0	0
Total	642	129	267	80	224	1,342
CALIFORNIA						
Reaches 1-2	0	0	0	0	0	0
Reach 3	0	0	0	0	0	0
Reach 4	499	10	0	0	30	539
Reach 5	0	0	0	0	0	0
Reach 6	0	0	0	0	0	0
Reach 7	n/a	n/a	n/a	n/a	n/a	n/a
Total	499	10	0	0	30	539
NEVADA						
Reaches 1-2	0	0	0	0	0	0
Reach 3	0	0	0	15	0	15
Reach 4-7	n/a	n/a	n/a	n/a	n/a	n/a
Total	0	0	0	15	0	15
TOTAL	1,141	139	267	95	254	1,896

n/a = not applicable

Acres at conservation areas still in the planning phase or for which there are no signed land use agreements, such as Planet Ranch, Laguna Division Conservation Area, and Yuma East Wetlands, are not included in the tables at this time.

FY11 Activities

Planting of the Phase 6 cottonwood-willow land cover type is scheduled for FY11 at the Palo Verde Ecological Reserve, which would establish an additional 220 acres of targeted land cover types on the property owned by the California Department of Fish and Game. Planting of Phase 6 at the Cibola Valley Conservation Area is planned for FY11, which would establish another 89 acres of honey mesquite on the property owned by Arizona Game and Fish Department. The total number of acres to be developed in FY11 is 309 acres.

FY12 Proposed Activities

Planting of the Phase 7 cottonwood-willow land cover type is scheduled for FY12 at the Palo Verde Ecological Reserve, which would establish an additional 226 acres of targeted land cover types on the property owned by the California Department of Fish and Game. Hunters Hole is expected to be planted with 50 acres of cottonwood-willow in FY12. The total number of acres to be developed in FY12 is 276 acres.

WORK TASKS SECTION A

PROGRAM ADMINISTRATION

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Work Task A1: Program Administration

FY10 Estimate	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$1,313,220	\$1,296,959.74	\$5,947,832.95	\$1,212,438	\$1,231,780	\$1,231,780	\$1,231,780

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: This project provides senior staff and administration 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 the Lower Colorado Region of the Bureau of Reclamation in 2005. The Steering Committee was established in accordance with the Funding and Management Agreement (FMA), and the Bylaws for the Steering Committee were approved.

FY10 Accomplishments: Program Administration for FY10 continued the management of the LCR MSCP. Ongoing administrative activities include financial, human resources, and support for the program. Coordination with the Steering Committee continued with Steering Committee meetings held in October 2009 and April 2010. Technical Work Group meetings were held one month prior to these dates to review upcoming actions of the steering committee. A workshop reviewing habitat goals was held in January 2010. The *Final Implementation Report, Fiscal Year 2011 Work Plan and Budget, Fiscal Year 2009 Accomplishment Report* was prepared.

FY11 Activities: Program Administration for FY11 will continue the management of the LCR MSCP. Ongoing administrative activities include financial, human resources, and support for 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 2012 Work Plan and Budget, Fiscal Year 2010 Accomplishment Report* will be prepared. Financial tracking for the program will continue and the annual financial work group meeting will be held. Securing additional land and water for the program will be pursued. Processes for the program will continue to be developed including criteria for use of the Habitat Maintenance Fund, and in conjunction with the USFWS, habitat credit and performance standards will be developed.

Proposed FY12 Activities: Program Administration for FY12 will continue the management of the LCR MSCP. Ongoing administrative activities include financial, human resources, and support for 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 2012 Work Plan and Budget, Fiscal Year 2010 Accomplishment Report* will be prepared. Financial tracking for the program will continue and the annual financial work group meeting will be held. Securing additional land and water for the program will be pursued.

Pertinent Reports: The *Final Implementation Report, Fiscal Year 2011 Work Plan and Budget, Fiscal Year 2009 Accomplishments* is posted on the LCR MSCP website. The *Implementation Report, Fiscal Year 2012 Work Plan and Budget, Fiscal Year 2010 Accomplishment Report* (Draft and Final versions) will be posted to the website.

WORK TASKS SECTION B

FISH AUGMENTATION

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Work Task B1: Lake Mohave Razorback Sucker Larvae Collections

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$200,000	\$234,965.09	\$1,251,286.54	\$200,000	\$200,000	\$200,000	\$200,000

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: Develop the RASU broodstock in Lake Mohave, maintain the broodstock, and harvest offspring for rearing as needed to accomplish the LCR MSCP Fish Augmentation Program.

Connections with Other Work Tasks (past and future): Work tasks B2, B4, B5, B6, and B7 are related to this work task, as the RASU to be reared under these work tasks originate from Lake Mohave.

Project Description: The RASU broodstock in Lake Mohave provide a level of genetic diversity found nowhere else in the world. This project captures wild-born RASU larvae from Lake Mohave, and delivers them to Willow Beach NFH for initial rearing. Work includes helicopter surveys every two weeks to locate spawning groups, night-time larvae collection, and maintaining the boat fleet and field station at Cottonwood Cove. These larvae are captured one at a time, making this a labor-intensive program. Hence, most expenditures are for salary, travel, and fuel.

Previous Activities: This work is part of a program started by the Native fish Work Group (NFWG) in 1989 to rebuild the adult stock of RASU in Lake Mohave so that these fish could be used as brood fish for RASU recovery. A portion of the larvae collected are used to sustain broodstock and the remaining larvae are reared for release into reaches 3-5 to accomplish augmentation goals of the program.

FY10 Accomplishments: Thirty-three thousand eight hundred and eighty-nine (33,889) wild larvae were collected from four areas. The contribution of larvae from each zone of Lake Mohave by month of capture is presented in Table 1.

Table 1. Larval RASU Collected from Lake Mohave, 2010

	January	February	March	April	May	Total
Nine Mile	0	3,000	4,600	494	0	8,094
Tequila	0	2,850	5,250	3,970	0	12,070
Yuma	0	3,000	4,908	753	0	8,661
AOP	0	0	1,224	3,840	0	5,064
Total	0	8,850	15,982	9,057	0	33,889

Subsamples from each zone and for each month were preserved and provided to Arizona State University for genetic analyses. The sampling effort for the lowermost portion of Lake Mohave was not accomplished in FY10 because all efforts were focused on obtaining the annual goal. This sampling effort will be accomplished in FY 11. A status report was posted to the LCR MSCP website.

FY11 Activities: A target of 30,000 larvae has been established for 2011. Of the 30,000 larvae that will be delivered to Willow Beach NFH, up to 5000 of these will be transferred to NDOW's Lake Mead Hatchery. In addition to the four lake zones shown in Table 1, a survey will be conducted in the lowermost portion of Lake Mohave to search for additional new spawning sites. If spawning groups are located, attempts will be made to capture larvae from these areas.

Proposed FY12 Activities: RASU larval collections will continue. The target level for FY12 is 25,000 to 30,000 larvae.

Pertinent Reports: A status report titled, *Five-Year Summary of Razorback Sucker (Xyrauchen texanus) Larval Collections on Lake Mohave: 2005-2009*, will be posted on the LCR MSCP website.

Work Task B2: Willow Beach National Fish Hatchery

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$250,000	\$352,255.56	\$1,809,731.63	\$250,000	\$250,000	\$250,000	\$250,000

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: Annually contribute RASU and BONY to the LCR MSCP Fish Augmentation Program.

Connections with Other Work Tasks (past and future): Willow Beach NFH receives larval RASU from B1, and BONY from B4. Fish from Willow Beach are reared at Achii Hanyo (B3). Some fishery research actions described in Section C are ongoing at this facility, including Razorback Sucker Rearing Studies (C10), Bonytail Rearing Studies (C11), and Development and Evaluation of Measures to Reduce Transport of Quagga Mussel During Fish Transfer and Stocking Activities (C30).

Project Description: Willow Beach NFH is managed by the USFWS. The hatchery receives funding from the LCR MSCP for rearing of RASU and BONY for the Fish Augmentation Program. There are three primary tasks at the hatchery:

1. **Receive fish to be reared.** Annually receives wild RASU larvae collected from Lake Mohave and fingerling BONY (25-75 mm TL) from Dexter NFH.
2. **Provide fish to other hatcheries.** Initially, Willow Beach NFH was to provide fingerling RASU to Bubbling Ponds SFH to be further reared and ultimately stocked into reaches 3-5 of the lower Colorado River, provide fingerling RASU from wild-caught larvae to Dexter NFH for further rearing and eventual repatriation to Lake Mohave, and provide juvenile BONY to Achii Hanyo Rearing Station for further rearing and ultimately for stocking into reaches 3-5 of the Lower Colorado River. Due to the current infestation of quagga mussels, Willow Beach NFH is only delivering fish to Achii Hanyo.

3. **Annually rear RASU for release to Lower Colorado River.** Rear 6,000 subadult RASU to 300 mm TL for stocking into Reach 3; rear up to 5,000 RASU to 500 mm for repatriation to Lake Mohave.

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

During January 2007, the exotic quagga mussel was discovered in Lake Mead, and subsequently found at Willow Beach NFH. Larval RASU that were to be transferred to Bubbling Ponds SFH were not collected (B1) and no RASU of any size or year class were delivered to waters outside the lower Colorado River corridor. Quagga mussels have not severely impacted the maintenance or operation of the facility. However, quagga mussels continue to have an impact on delivery of fish. Fish transport protocols for the Lower Colorado River corridor are being tested (see C30).

FY10 Accomplishments: During 2010, 33,889 RASU larvae were received from Lake Mohave, 2,609 fingerling BONY were transferred to Achii Hanyo for further rearing, and 698 RASU juveniles (>300 mm TL) were stocked to lake-side rearing ponds (B7). A total of 6,195 RASU were repatriated into Lake Mohave (Reach 2) and a total of 400 RASU were stocked into Beal Lake (Reach 3). The majority of funds were for salary and consumable materials (fish feed, medicines, chemicals, etc.). Additional funds that became available in FY10 were used to fund planned work including acquiring gabions, aluminum screens, wire tags, wire tag readers, Jacuzzi pumps, PVC pipe, right angle gear drive, water filters, chemicals, and fish feed. The last two units of solar heating panels for warming water in the recirculating raceways were replaced during the year. Platforms used on recirculating raceways were replaced and improved to allow waste water to drain away from the raceways. Bird netting was replaced and gates were modified to exclude bird entry. Additionally, the feed room flooring was replaced.

FY11 Activities: Willow Beach NFH will receive RASU larvae from Lake Mohave, and continue to rear and distribute RASU and BONY that are currently on station. This includes 5,655 RASU of the 2007 year class, 7,946 RASU of the 2008 year class, 10,165 RASU of the 2009 year class, and 29,668 RASU of the 2010 year class. At the end of 2010 there were no BONY at the hatchery. BONY from Dexter NFH (B4) will be delivered directly to Achii Hanyo (B3). Investigations into methods for removing quagga mussel from transport tanks at Willow Beach NFH (C30) will continue.

Proposed FY12 Activities: The hatchery will continue to receive RASU larvae from Lake Mohave and will continue to rear and distribute RASU and BONY for the LCR MSCP Fish Augmentation Program.

Pertinent Reports: The *2005-2009 Fish Augmentation Summary* is in preparation and will be posted to the LCR MSCP website.

Work Task B3: Achii Hanyo Rearing Station

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$100,000	\$95,522.93	\$522,259.39	\$150,000	\$150,000	\$150,000	\$150,000

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

Start Date: FY04

Expected Duration: FY55

Long-term Goal: Maintain and operate fish-rearing facility as an integral part of the LCR MSCP Fish Augmentation Program.

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

Location: Reach 4, Colorado River Indian Tribes Reservation, Parker, Arizona.

Purpose: Support operation and maintenance of fish rearing facilities to annually contribute RASU and BONY to the LCR MSCP Fish Augmentation Program for stocking into reaches 3-5 of the LCR.

Connections with Other Work Tasks (past and future): This work task was previously included in the FY04 work tasks as Achii Hanyo National Fish Hatchery (A1). This work is related to B2 and B4, as fish from both Willow Beach NFH and Dexter NFH may be transferred to Achii Hanyo Rearing Station. Additionally, fish research for RASU and BONY may be accomplished at this facility.

Project Description: This project supports both the development and maintenance of Achii Hanyo Rearing Station as a grow-out site for RASU and BONY and the rearing of BONY for release into reaches 3-5 of the LCR. Funds allocated are used for staff salary, facility operation and maintenance, fish feed and chemicals, and fish distribution. This facility is located on the Colorado River Indian Tribes Reservation (CRIT), near Parker, Arizona. There are six earthen ponds that receive Colorado River water from an irrigation canal. A metal building was constructed to house four flow-through raceways and three circular tanks; in addition, 12 circular tanks are housed under an outside canopy, and there is one large, outside research tank.

Fish rearing is seasonal, producing one crop per year. BONY are brought in from Willow Beach NFH and/or Dexter NFH in the winter. Fish are fed through the spring and summer. In the fall, the ponds are drained, and fish are harvested, tagged, and released. Fish under target size (less than 300 mm TL) are returned to a pond for continued rearing.

New fish are then brought onto the station and the process is repeated. The annual production goal is 4,000 BONY for stocking into the LCR.

Previous Activities: The USFWS and Reclamation have cooperatively worked to upgrade this facility since FY04. Work completed includes the purchase and assembly of a metal building (tank house) and fiberglass fish tanks. An office, feed storage room, restrooms, and electrical upgrades have been completed. A backup generator and upgraded aeration systems for fish tanks in the tank house were completed.

FY10 Accomplishments: At the start of the year 14,000 BONY were on station. This number included 1,900 FY08 from Uvalde which averaged 258 mm, and 12,100 FY09 young-of-the-years ranging from 80-160 mm. At the beginning of the year 988 RASU were also on station. At the end of the year, 3,093 BONY and 504 RASU were harvested, tagged, and stocked into the LCR. A total of 504 RASU were stocked into Reach 2, 2132 BONY were stocked into Reach 3, and 961 BONY were stocked into Reach 4. A total of 5,983 BONY and 19 RASU were returned to ponds on station for further grow out. All fish on station in FY10 were part of research assessing RASU growth to 500 mm TL (C10) and polyculture of RASU and BONY (C11). Both research actions will be continued for two more years.

FY11 Activities: The BONY on station for the start of 2011 include 6,000 FY09 and 10,000 FY10 young-of-the-year fish. RASU on station are 19 with the addition of 1,300 planned for delivery from WBNFH for further grow-out. Delivery of approx 4,000 BONY from Dexter NFH is expected if Largemouth Bass Virus issues are resolved. Production goals will remain at 4,000 BONY greater than 300 mm TL. Four additional ponds have been designed and two ponds may be constructed this year. Levee roads will be reconstructed and disking/grading of two ponds is also planned.

Proposed FY12 Activities: BONY left on station from FY11 will be reared to target size, fingerling BONY will be delivered from either Dexter NFH or Willow Beach NFH. Two additional ponds are scheduled to be put into service to increase fish production and research.

Pertinent Reports: The *2005-2009 Fish Augmentation Summary* is in preparation and will be posted to the LCR MSCP website.

Work Task B4: Dexter National Fish Hatchery

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$180,000	\$269,833.73	\$1,007,044.80	\$180,000	\$200,000	\$220,000	\$220,000

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

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Maintain fish-rearing capability to provide RASU and BONY for the LCR MSCP Fish Augmentation Program.

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

Location: Off-river, Dexter, New Mexico.

Purpose: Support operation and maintenance at the facility, support maintenance of BONY broodstock, and annually provide RASU and BONY to the LCR MSCP Fish Augmentation Program.

Connections with Other Work Tasks (past and future): This work is related to work tasks B2, B3, and B10, as fish from Dexter NFH will be delivered to Willow Beach NFH, Achii Hanyo Rearing Station, and Uvalde NFH. In addition, fish-rearing research activities outlined in C10, C11, C14, and C30 may be conducted at Dexter NFH.

Project Description: Dexter NFH is managed and operated by the USFWS. The facility maintains the only broodstock for BONY in the world, and maintains a backup broodstock of RASU. Funds provided will be used to maintain extant broodstock, produce fingerling BONY annually for distribution to other hatcheries, rear RASU to 500 mm TL for repatriation to the LCR for broodstock replacement, and annually rear BONY to 300 mm TL for distribution within reaches 3 and 4.

Previous Activities: Reclamation and the USFWS have past and ongoing interagency agreements to support rearing and research for RASU and BONY at Dexter NFH. Since the inception of the LCR MSCP through 2009, a total of 2,724 RASU have been repatriated to Reach 2, a total of 794 RASU have been stocked into Reach 3, a total of 6,869 BONY have been stocked into Reach 3, and a total of 535 BONY have been stocked into Reach 4.

FY10 Accomplishments: In September 2010, largemouth bass virus (LMBV) was confirmed at Dexter NFH. LMBV was isolated in one lot of 2008 year class bonytail, and in the refuge population of Gila topminnow. Immediately following the confirmation of the virus, the two LMBV positive lots were euthanized and removed from the facility. The euthanized lot of BONY was scheduled to be stocked into the lower Colorado River as part of the MSCP augmentation program, thus impacting the number of deliverable fish for the program. Additional funds made available in 2010 were used to purchase the following: PVC pipe and fittings, photovoltaic panels and hardware, fiberglass tanks, bird netting, metal shelving system, gooseneck trailer, metal I-beams, electrical hoist, trolleys, wire, cable, and a tissue homogenizer.

BONY: Dexter NFH staff maintained 2,000 adult BONY broodstock. The stock comprises six year classes of Lake Mohave origin fish. A total of 31,000 BONY were maintained on station for future stocking into the lower Colorado River; 3,000 (07 year class), and 28,000 (09 year class). Staff from the USFWS hormonally induced and hand-stripped eggs and sperm from 44 adult BONY, producing 250,000 eggs. A total of 4,500 BONY were transferred to Achii Hanyo Rearing Station; 2,500 (09 year class produced at Dexter) and 2,000 (08 year class produced at Uvalde). No larvae were transferred to Willow Beach NFH or Uvalde NFH during 2010. USFWS staff wire-tagged, hauled, and stocked a total of 1,900 subadult BONY (300+ mm TL) into Lake Havasu proper at Bill Williams NWR (Reach 3).

RASU: Dexter staff maintained a refuge stock of 1,250 adult RASU. The broodstock comprises nine year classes of Lake Mohave origin fish. USFWS staff hormonally induced and hand-stripped eggs and sperm from 20 adult RASU, producing 300,000 eggs. Of these, 30,000 larvae were transferred to Bubbling Ponds SFH for rearing. Approximately 25,000 RASU are currently on station at Dexter for grow out. No RASU were transferred to Dexter NFH from Willow Beach NFH due to ongoing quagga mussel issues. No RASU from Dexter NFH were stocked into the lower Colorado River in 2010.

FY11 Activities: The BONY broodstock will be maintained, and the hatchery will produce between 150,000 and 300,000 fingerling BONY for distribution depending upon various agency requests (including Willow Beach NFH, Achii Hanyo Rearing Station, and Bubbling Ponds SFH); up to 1,000 RASU will be reared to 500 mm TL for stocking into the LCR. A total of 4,000 BONY will be reared to 300 mm TL for distribution within Reach 3. The hatchery is in the process of regaining certification for delivery of fish to avoid contamination of LMBV-free areas. Fish on station are scheduled to be tested twice over a six months period for the presence of LMBV. If both tests come back negative these fish could then be stocked into the LCR.

Due to an invasion of exotic quagga mussels to the Colorado River, Dexter NFH may provide up to 50,000 RASU larvae to Bubbling Ponds SFH from hand-spawned broodstock held on station. Any RASU supplied by Dexter to other facilities will be contingent upon resolution of LMBV issue.

Proposed FY12 Activities: The BONY broodstock will be maintained. Up to 75,000 fingerling BONY will be produced for distribution to Willow Beach NFH and Achii

Hanyo Rearing Station, and 4,000 BONY will be reared to 300 mm TL for distribution within reaches 3-5.

Pertinent Reports: The *2005-2009 Fish Augmentation Summary* is in preparation and will be posted to the LCR MSCP website.

Work Task B5: Bubbling Ponds Fish Hatchery

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$250,000	\$351,957.84	\$1,430,085.53	\$250,000	\$250,000	\$250,000	\$250,000

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

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Maintain fish-rearing capability and provide RASU for the LCR MSCP Fish Augmentation Program.

Conservation Measures: RASU3 and RASU4.

Location: Off-river, Cornville, Arizona.

Purpose: Operate and maintain the fish-rearing facility and annually contribute RASU to the LCR MSCP Fish Augmentation Program.

Connections with Other Work Tasks (past and future): Activities at Bubbling Ponds SFH are related to B2 and B4, as Bubbling Ponds SFH receives RASU from Willow Beach NFH and Dexter NFH. Some of the fish-rearing research activities outlined in C10 are conducted at Bubbling Ponds SFH.

Project Description: Bubbling Ponds SFH is managed and operated by AGFD. This is a warmwater rearing facility supplied by a continuous, year-round, 10 cfs spring flow of 68°F water. The facility has 10 acres of production ponds, a work shop, a storage shed, a small laboratory, and sufficient fish distribution equipment to meet the delivery requirements for the LCR MSCP. Program funds provide for salary, fish feed and supplies, facility operation and maintenance, and delivery of fish. Production goals are 12,000 RASU of 300 mm TL for release to reaches 3-5 of the lower Colorado River.

Previous Activities: Prior to the LCR MSCP, 70,000 RASU were successfully reared at this facility and delivered to the lower Colorado River as required by two biological opinions (1997 and 2001). Both commitments have now been met. Between the start of the LCR MSCP and the end of 2009, Bubbling Ponds SFH has reared and stocked 54,764 RASU.

FY10 Accomplishments: A total of 30,000 fry were received from Dexter NFH in April for rearing, and should reach target size in 2011 and 2012. During 2010 a total of 14,950 RASU were harvested, PIT/wire-tagged, and stocked: 2,077 were repatriated into Lake

Mohave, 6,780 were stocked into Lake Havasu (Reach 3), and 6,093 were stocked at River Island State Park below Parker Dam (Reach 4).

During 2010 funds were expended for salaries and associated costs for fish rearing activities. Additional funds made available in 2010 were used to fund planned work, which included the purchase of the following: tractor/backhoe, new pipe for water distribution throughout hatchery, perimeter fence to restrict otter access, materials for construction of a new feed storage facility and bunk house. The tractor was used to install some of the new pipes around the facility. Fencing has been installed to restrict otter access, and the new feed storage and bunk house have been constructed.

FY11 Activities: Bubbling Ponds SFH began 2011 with approximately 91,000 RASU on station. These fish are from Dexter NFH and are expected to reach target size in 2011 and 2012. Plans are underway to replace existing deteriorated water supply pipes throughout the hatchery. This will require diversion of the incoming water supply. Delivery of RASU larvae from Dexter NFH in 2011 is contingent upon Dexter's RASU being certified free of largemouth bass virus (see B4).

The state of Arizona is evaluating redesigning the entire facility at Bubbling Ponds SFH. Future plans could include smaller ponds, buildings for water treatment, propagation, rearing, quarantine, and a wetland for outflow water treatment. Development of a new artesian well is also being considered. Construction of these new features is contingent upon funding.

Proposed FY12 Activities: RASU larvae will be received from Dexter NFH; RASU from the 2010 and 2011 year classes will continue to be reared; 12,000 RASU (300 mm TL) will be sorted, tagged, and delivered to the lower Colorado River, and annual progress reports will be produced. Construction of production design features will continue. As features are completed, normal fish culture activities will be dovetailed into the new systems.

Pertinent Reports: The *2005-2009 Fish Augmentation Summary* is in preparation and will be posted to the LCR MSCP website. The scope of work is available upon request.

Work Task B6: Lake Mead Fish Hatchery

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$50,000	\$41,521.10	\$275,848.45	\$50,000	\$50,000	\$50,000	\$50,000

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

Start Date: FY05

Expected Duration: FY16

Long-term Goal: Operate and maintain fish-rearing facility to provide RASU for the LCR MSCP Fish Augmentation Program.

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

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

Purpose: Support Lake Mead RASU studies and contribute RASU to the LCR MSCP Fish Augmentation Program.

Connections with Other Work Tasks (past and future): Activities at Lake Mead SFH are related to the Overton Wildlife Management Area (B11), the Lake Mead Razorback Study (C13), and the Evaluation of Raceway Rearing of Razorback Sucker at Lake Mead Fish Hatchery (C26). Razorback sucker larvae are captured from Lake Mead as part of the Lake Mead Razorback Study (C13) and reared at Lake Mead SFH. Once fish reach subadult size, they are transferred to grow-out ponds at Overton Wildlife Management Area (B11) to complete the rearing process. Portions of the subadult fish are also utilized for Evaluation of Raceway Rearing of Razorback Sucker at Lake Mead Fish Hatchery (C26).

Project Description: Lake Mead SFH is managed and operated by NDOW. Renovation of Lake Mead SFH allowed development and inclusion of dedicated facilities for rearing RASU and other natives. Reclamation, SNWA, and NDOW are cooperatively rearing RASU larvae captured from Lake Mead for future repatriation back to the lake. Funds from this work task provide staff, equipment, feed, and chemicals to rear these fish and to complete SIA BO requirements.

In addition, space may be available as a contingency to rear RASU for the LCR MSCP Fish Augmentation Program. This additional rearing capacity is needed in 2016, when the number of RASU needed annually for stocking into reaches 3-5 is expected to increase.

Previous Activities: Reclamation, SNWA, and NDOW have cooperatively been rearing RASU from Lake Mead in temporary outside tanks at the hatchery. In 2005, Reclamation assisted with the installation of a single 500-gallon fiberglass tank for the purpose of rearing RASU 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 RASU have been brought into the facility and reared in these tanks.

FY10 Accomplishments: Eight hundred and forty-five larval RASU (194 from Las Vegas Bay, 635 from Echo Bay, and 16 from the Overton Arm) were collected from Lake Mead during the course of the spawning season and taken to Lake Mead SFH for grow-out. In addition to these wild-caught Lake Mead larvae, 6,739 larval RASU from Lake Mohave Razorback Sucker Larvae Collections (B1) were also taken to the hatchery for grow-out. To make room for incoming larvae NDOW delivered and stocked 1,350 juvenile RASU into Center Pond at the Overton Wildlife Management Area (B11). An additional 936 subadult RASU were also moved out of the native fish room to provide space for incoming larvae. These subadult fish will remain on station for of Raceway Rearing of Razorback Sucker at Lake Mead Fish Hatchery (C26).

FY11 Activities: The NDOW will continue to operate Lake Mead SFH for RASU production. Operations will include capture and rearing of wild-caught larvae from Lake Mead and grow-out of subadult fish from the 2009 and 2010 year classes. If needed, supplemental larvae will be captured from Lake Mohave to ensure adequate hatchery stock. The 2009 RASU remaining on station and a portion of the 2010 year class will be stocked at the Overton Wildlife Management Area. The NDOW is also evaluating additional ponds that may be used as future rearing sites.

Proposed FY12 Activities: Continued rearing of RASU captured during previous years will occur, and hatchery stock will be augmented with 2012 year-class RASU larvae. Adult and subadult RASU from the 2010 year class will be delivered to the Overton Wildlife Management Area and potentially to additional grow-out sites. The possibility of developing additional rearing capacity for native fish at Lake Mead SFH will be discussed.

Pertinent Reports: The *2009 Nevada Department of Wildlife Lake Mead Razorback Sucker Augmentation Project Activities Report* will be posted to the LCR MSCP website. The 2010 Activities Report is in development and will be posted to the website upon completion.

Work Task B7: Lake-Side Rearing Ponds

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$150,000	\$165,056.32	\$1,095,885.82	\$250,000	\$175,000	\$175,000	\$175,000

Contact: Bonnie Contreras, (702) 293-8315, bcontreras@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Maintain fish-rearing capability, provide RASU and BONY for 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: Operate and maintain fish grow-out areas along the Lake Mohave shoreline to contribute to RASU broodstock development.

Connections with Other Work Tasks (past and future): Activities are related to B2, B4, and B5, as fish for grow-out ponds may come from Willow Beach NFH, Dexter NFH, and/or Bubbling Ponds SFH. In addition, some of the fish-rearing research activities outlined in C10, C11, C34, C40, and C44 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 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 RASU and BONY. The ponds are stocked with juvenile fish as the reservoir fills in the spring (typically stocked in March). Reclamation staff monitor the fish and manage the ponds throughout the growing season. This work includes periodic fertilization with alfalfa pellets and ammonium nitrates to sustain algae blooms and plankton production, removal of weeds and debris, installing and maintaining floating windmills or solar well pumps to mix the water and provide sufficient oxygen levels, 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 RASU and BONY conservation through the life of the program (FY55).

Previous Activities: These ponds have been in use since 1993 and more than 30,000 RASU have been reared and repatriated to Lake Mohave. In an effort to expedite development of RASU 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, RASU in excess of 300 mm TL are stocked into the ponds and then harvested in the fall. Any in situ production from volunteer spawning is usually transferred to Yuma Cove pond or Davis Cove pond. These two ponds contain water throughout the year and support multiple year classes of fish and are operated separately from the other ephemeral ponds. They also serve as reservoirs for fish that have not yet met a minimum stocking size of 300 mm.

In 2009 Nevada Egg's earthen berm had breached, and it was invaded by non-native fish. South Sidewinder has not been successful the past few years due to poor water quality, neither of these ponds will be used in the foreseeable future.

FY10 Accomplishments: Five backwaters were stocked at the beginning of the year with juvenile razorbacks that were originally collected from Lake Mohave as larvae and then reared at Willow Beach National Fish Hatchery. The first backwaters stocked in February were AJ and Dandy; the remaining backwaters were stocked in March, this included North Chemehuevi, Nevada Larvae, and Willow. Each backwater received 199, 200, 200, 50, and 49 razorbacks respectively for a total of 698 fish, with a mean TL of 377 mm and a range of 305 mm to 450 mm.

In May, North Nine Mile backwater received 1,723 larvae with an average TL of 20 mm. These fish originated from hand spawned Lake Mohave adult razorbacks. They were reared in Boulder City, Nevada at the USBR Fish Laboratory and used in a research project associated with work task C32. All fish were PIT tagged at the time of initial stocking into the backwaters except for the experimental fish stocked into North Nine Mile. Fish were re-scanned at the time of harvest and a new tag was inserted if the original PIT tag was not detected.

Table 1. 2010 RASU Repatriated to Lake Mohave

Ponds RASU	# Stocked	Mean Length at Stocking	# Harvested	Mean Length at Harvest	% Harvested
Yuma*	0	NA	310	470	NA
Willow	49	376	34	476	69
Dandy	200	378	151	444	76
Arizona Juvenile	199	378	127	432	64
Nevada Larvae	50	376	0	0	0
N. Chemehuevi	200	376	122	460	61
Davis*	0	NA	117	480	NA
Total	698	377	861	460	62%*

*Yuma Cove and Davis Cove ponds sustain fish year round and have multiple year class fish; these fish were not included in the percent harvest.

FY11 Activities: Lake-side ponds are again being used for RASU broodstock maintenance and development. An additional \$100,000 had been requested to rebuild the earthen berm at Yuma Cove and has been completed. Research investigations have been initiated to look at ways to better manage natural food resources in these ponds (C44: Management of Fish Food Resources in Off-Channel Native Fish Habitats).

Proposed FY12 Activities: Lake-side ponds along the shoreline of Lake Mohave will be operated and maintained for native fish. The ponds will be harvested in fall as the lake elevation declines, and fish reared in these ponds will be released back into Lake Mohave for development and maintenance of RASU broodstock.

Pertinent Reports: The *2005-2009 Fish Augmentation Summary* is in preparation and will be posted to the LCR MSCP website.

Work Task B8: Fish Tagging Equipment

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$75,000	\$78,710.75	\$460,065.58	\$85,000	\$90,000	\$100,000	\$100,000

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

Start Date: FY04

Expected Duration: FY55

Long-term Goal: Acquire and maintain 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: Fish released into the LCR by the LCR MSCP will be marked for identification purposes to assess survival and distribution.

Connections with Other Work Tasks (past and future): This work was previously listed in FY04 work tasks as PIT Tag (A2). Activities are related to all work tasks that result in fish stocking for augmentation, fish research, and fish monitoring.

Project Description: The LCR MSCP will rear and stock more than 1.2 million native fish into the LCR. Fish will be marked to assess distribution and survival and for effective research and decision making. 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 (FY55).

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 spaghetti tags (or Floy tags) have been used for short-term survival studies in some rearing and grow-out ponds.

A decision was made in 2006 to begin using the newest PIT-tag technology, 134.2-kHz frequency tags. These new tags have a greater detection range than the previously used tags (12 inches versus 2 inches away from fish) and will allow for testing and deployment

of remote listening stations within spawning areas. Purchase of the new PIT tags, tag readers, and antennae began in 2006. A total of 19,433 RASU and 5,136 BONY were PIT-tagged and/or wire-tagged and released into the LCR during 2008 and 24,299 RASU and 6,579 BONY were PIT-tagged and/or wire-tagged and released into the LCR during 2009.

FY10 Accomplishments: PIT tags, tagging equipment, and tag readers were purchased as needed to mark fish for monitoring and research. A total of 22,476 RASU and 4,993 BONY were PIT-tagged and/or wire tagged and released into the LCR during 2010.

FY 11 Activities: PIT tags, tagging equipment, and tag readers will be purchased as needed to mark fish for monitoring and research. A slight increase in funding is requested in anticipation of replacing tag-reading devices older than five years.

Proposed FY 12 Activities: PIT tags, tagging equipment, and tag readers will be purchased as needed to mark fish for monitoring and research.

Pertinent Reports: N/A

Work Task B10: Uvalde National Fish Hatchery

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$85,000	\$70,053.15	\$551,323.68	\$0	\$0	\$0	\$0

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

Start Date: FY06

Expected Duration: Closed in FY10

Long-term Goal: Maintain fish-rearing capability to provide RASU and BONY for the LCR MSCP Fish Augmentation Program.

Conservation Measures: RASU 3, RASU4, BONY3, and BONY4.

Location: Uvalde, Texas.

Purpose: Provide backup source and rearing capacity for RASU and BONY as needed for the Fish Augmentation Program, and provide a facility where species research can occur.

Connections with Other Work Tasks (past and future): This work task was added in April 2006 following approval by the Steering Committee, with concurrence from the USFWS. Funds were allocated to this work task from B5. This work is related to B4, as RASU and BONY for Uvalde NFH will be supplied by Dexter NFH. The work is also related to B1 and B2, as Uvalde NFH may also rear RASU for repatriation to Lake Mohave. Finally, the work is related to C10 and C11, as species research relative to rearing and growth of BONY and RASU may be conducted at this facility.

Project Description: Uvalde NFH is a large warmwater fish culture facility established in southwest Texas in 1934. The facility has 47 ponds totaling more than 50 surface acres for fish production. Water is supplied by two deep wells, which provide 72°F water year-round. A third well was developed to secure the long-term water supply for rearing ponds. The facility was shut down for renovation in 2001 following a major flood event and has since been returned to production.

The LCR MSCP and the San Juan River Basin Recovery Implementation Program are sharing costs for upgrading water supply systems and for rearing native fishes. The LCR MSCP will utilize the facility to assess rearing capacity for BONY, rear RASU for broodstock development at Lake Mohave, and conduct research on fish hauling and transportation.

The LCR MSCP has a requirement to stock 12,000 BONY each year for five consecutive years. This is beyond the current capacity of the LCR MSCP Fish Augmentation Program, primarily because of the target size being 300 mm TL. Bonytail tend to be sexually mature by the time they reach 150 mm TL. During pond culture, these fish typically spawn and increase the number of fish in the pond. This in turn results in slow growth of the original fish. Initial actions at Uvalde NFH will focus on capability and techniques to grow BONY to target size in one growing season.

Previous Activities: During both 2006 and 2007, fingerling BONY were brought on station from Dexter NFH to assess growth rate and rearing capacity. The fingerling fish averaged 172 mm TL and were stocked into 1-acre ponds at densities of 500, 1,000, and 1,500 fish per acre. In October, these fish were harvested and hauled by tank truck to Dexter NFH. Growth and survival were remarkable, with 92% surviving and 88% of the survivors reaching target size in one season.

During routine fish health inspections in July 2007, Guadalupe largemouth bass on station tested positive for Largemouth Bass Virus, a restricted pathogen in both Arizona and California. BONY were also tested and came up negative; however, the states of Arizona and California have asked that no fish from this facility be stocked into the Colorado River until the hatchery receives a Class A rating. As a result, no BONY were stocked from Uvalde NFH into the LCR during 2007. The fish were held at Uvalde NFH for future research.

BONY growth studies were repeated in 2008 using similar densities to those used in 2007. There was 72% survival with most fish attaining target size during the study period. In July 2008 the hatchery was tested for Largemouth Bass Virus and was clean.

BONY growth studies continued in 2009 using densities of 1,500 and 2,000 fingerlings per acre in four lined ponds. Fish stocked at 1,500 fish per acre attained a survival rate of 96%, and fish stocked at 2,000 fish per acre attained a survival rate of 94%, with 99.7% of all fish in the study reaching or exceeding target size. In July 2009, the hatchery received its second annual consecutive clean fish health report, thereby returning the facility to Class A status.

FY10 Accomplishments: Most of the funds were used for salaries and contract administration. Funds scheduled for Uvalde NFH were to be shifted to Achii Hanyo (B3) in FY11. These actions were completed ahead of schedule; therefore, not all funds were spent completing goals within this work task as originally agreed to.

FY11 Activities: Closed in FY10.

Proposed FY12 Activities: N/A

Pertinent Reports: N/A

Work Task B11: Overton Wildlife Management Area

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$50,000	\$53,930.37	\$296,963.88	\$50,000	\$75,000	\$75,000	\$75,000

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

Start Date: FY06

Expected Duration: FY16

Long-term Goal: Develop and maintain off-site rearing capability to augment production at state and Federal hatcheries.

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

Location: Reach 1, Overton, Nevada.

Purpose: Provide additional rearing capacity for RASU.

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 is closely related to the Lake Mead Fish Hatchery (B6) and the Lake Mead Razorback Sucker Study (C13). Once developed, the rearing ponds may receive fish from Willow Beach National Fish Hatchery (B2).

Project Description: Overton Wildlife Management Area (WMA) is located in Clark County, Nevada, at the upper end of Lake Mead, 65 miles northeast of Las Vegas. The wildlife area is managed by NDOW 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 RASU originally captured from Lake Mead and initially reared at Lake Mead SFH, and growing them out to target size (300+ mm) for eventual repatriation to Lake Mead. Overton WMA may also provide opportunities to conduct species research under the LCR MSCP AMP.

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 carried out in 2007, and to curtail

aquatic vegetation and maintain ponds with sufficient open water areas, a fourteen foot aluminum boat with chemical spray unit was purchased in 2008.

FY10 Accomplishments: A total of 1,350 juvenile RASU reared at Lake Mead SFH were delivered and stocked into Center pond during FY10. Associated field work was performed and included periodic monitoring of pond water quality as well as multiple sampling events to assess RASU pond stock. A single sampling event to remove adult RASU from Center pond was completed and resulted in the capture of seventy-three RASU. These fish were transported to Mulberry pond at Floyd Lamb City Park to support future research efforts associated with the Lake Mead Razorback Sucker Study (C13). Infrastructure improvements for water delivery were completed, and a new boat ramp was installed to improve access to Center pond.

FY11 Activities: RASU reared at Lake Mead SFH will be transferred to Overton WMA ponds for further rearing. Sampling and monitoring of fish and ponds will be conducted periodically throughout FY11, and pond stock may be transferred to additional grow-out sites and made available for research purposes. Site improvements will be made as needed.

Proposed FY12 Activities: Razorback sucker from Lake Mead SFH will be stocked for grow-out and future repatriation to Lake Mead. Overton WMA ponds, principally Center pond, will continue to be monitored through sampling efforts. Improvements to existing ponds and infrastructure will continue as needed. An increase in funding is requested to begin evaluating additional on-site ponds that may provide opportunities to conduct species research. These ponds would also be available for rearing additional Lake Mead RASU.

Pertinent Reports: The scope of work for this agreement is available upon request.

WORK TASKS SECTION C

SPECIES RESEARCH

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Work Task C2: Sticky Buckwheat and Threecorner Milkvetch Conservation

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$11,000	\$10,000.00	\$50,000.00	\$11,000	\$11,000	\$11,000	\$11,000

Contact: Dianne Bangle, (702) 293-8220, dbangle@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: 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 described in the 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: In FY09, \$10,000 was provided to the NPS via a 5-year agreement between Reclamation and the NPS. Monitoring of select populations implemented in 2008 continued in 2009. Data were summarized and a report written summarizing results of two years monitoring sticky buckwheat and threecorner milkvetch.

FY10 Accomplishments: In FY10, \$10,000 was provided to the NPS via a 5-year agreement between Reclamation and the NPS. Data were summarized and a final report will be posted to the website.

Proposed FY11 Activities: A minor modification to the conservation measures for both plants was written and approved 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”.

Funds in the amount of \$10,000 will be transferred to an ongoing conservation program to implement conservation activities for these two plant species. An annual report will be provided to Reclamation summarizing achievements towards conservation goals for threecorner milkvetch and sticky buckwheat.

Proposed FY12 Activities: Funds in the amount of \$10,000 will be transferred to an ongoing conservation program to implement conservation activities for these two plant species. An annual report will be provided to Reclamation summarizing achievements towards conservation goals for threecorner milkvetch and sticky buckwheat.

Pertinent Reports: Annual reports summarizing monitoring efforts for sticky buckwheat and threecorner milkvetch will be posted on the LCR MSCP website.

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

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$15,000	\$13,285.36	\$273,610.40	\$15,000	\$15,000	\$15,000	\$15,000

Contact: Theresa Olson, (702) 293-8127, tolson@usbr.gov

Start Date: FY05

Expected Duration: FY55

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, LEB1, BLRA1, BLRA2, YBCU1, YBCU2, ELOW1, GIFL1, GIWO1, VEFL1, BEV1, YWAR1, SUTA1, FTHL1, FTHL2, FLSU1, MNSW1, MNSW2, CLNB1, CLNB2, PTBB1, PTBB2, CRTO1, CRTO2, CRTO3, LLFR1, LLFR2, and LLFR3.

Location: System-wide.

Purpose: Assess existing knowledge for 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 E15 and E16.

Project Description: To successfully create habitat for LCR MSCP covered species, species accounts have been developed. Extensive literature searches were conducted to accumulate existing knowledge on each covered species. Species accounts were written for both covered and evaluation species, including known habitat requirements and management concerns. Data gaps were identified to direct covered species research priorities.

Previous Activities: FY05 activities were designed to provide information for the development of backwater rating criteria for LCR MSCP covered species. These data and models were used to prioritize backwater restoration projects.

Species accounts for the 25 covered species and 5 evaluation species listed in the HCP that utilize terrestrial, marsh, and riparian habitats were completed in 2008. A species account was not developed for humpback chub as there is neither critical habitat nor occupied habitat for this species within the LCR MSCP program area.

These species accounts were based on extensive literature searches for each species and include the most recent scientific information. These accounts include current knowledge about each species' legal status, life history, distribution, habitat requirements, behavior, and LCR MSCP conservation measures as it relates to the creation and management of the species' habitats.

Reclamation will use these species accounts to identify information needed for the creation and management of covered species habitats, enabling the successful completion of conservation measures. The 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 five-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, that are outside of the scope and purpose of the LCR MSCP have also been listed.

FY10 Accomplishments: New information was incorporated and updated internally into the species accounts. Information collected by Reclamation and others was utilized in the preparation of the draft habitat credit process. Literature searches, literature acquisition, and data compilation were conducted to update species accounts as needed. A complete updated species accounts report will be completed in 2013.

FY11 Activities: Information will be gathered from recent literature and will be incorporated into the species accounts on a five-year cycle.

Proposed FY12 Activities: Information will be gathered from recent literature and will be incorporated into the species accounts on a five-year cycle.

Pertinent Reports: *Species Accounts for the Lower Colorado River Multi-Species Conservation Program Covered Species* is posted on the LCR MSCP website.

Work Task C4: Relict Leopard Frog

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$11,000	\$11,532.14	\$65,665.66	\$11,000	\$11,000	\$11,000	\$11,000

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: 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.

Project Description: The LCR MSCP will assist and contribute to existing relict leopard frog research and conservation efforts initiated by the Relict Leopard Frog Conservation Team. Ten thousand dollars per year, for a period of 10 years, will be contributed to the Relict Leopard Frog Conservation Team to implement planned, but unfunded, conservation measures. Funding may be advanced for up to five years, depending on availability, to keep administrative costs at a minimum.

Previous Activities: In FY06, FY07, FY08 and FY09 funds in the amount of \$10,000 annually were transferred to the NPS through a five-year agreement.

FY10 Accomplishments: Funds in the amount of \$10,000 were transferred to the NPS through the fifth year of a five-year agreement. In 2010, a report was generated to document 2010 activities. Major relict leopard frog conservation activities supported by these funds were completed at 14 sites within southeastern Nevada and included:

1. 1,785 tadpoles and 847 juvenile frogs were released at three translocation sites.
2. Diurnal and nocturnal surveys were conducted year-round at established and experimental sites; egg masses were seen at 10 of 14 sites.
3. Perkins Pond was added as a translocation site, and tadpoles and frogs have been released.

FY11 Activities: Funds in the amount of \$10,000 will be transferred to the NPS through the first year of a new five-year agreement. A report will be provided to Reclamation summarizing calendar year 2011 monitoring of experimental and natural populations of relict leopard frogs, and frog rearing and relocation activities.

Proposed FY12 Activities: Funds in the amount of \$10,000 will be transferred to the NPS through the second year of a five-year agreement. A report will be provided to Reclamation summarizing calendar year 2012 monitoring of experimental and natural populations of relict leopard frogs, and frog rearing and relocation activities.

Pertinent Reports: The scope of work is available upon request. *Annual 2010 Relict Leopard Frog Monitoring and Management* will be posted on the LCR MSCP website.

Work Task C5: Effects of Abiotic Factors on Insect Populations in Riparian Restoration Sites

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$90,000	\$97,189.14	\$319,599.06	\$90,000	\$90,000	\$90,000	\$90,000

Contact: Bill Wiesenborn, (702) 293-8699, wwiesenborn@usbr.gov

Start Date: FY06

Expected Duration: FY14

Long-term Goal: Species research.

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

Location: Cibola NWR Unit #1 (Reach 4, Cibola NWR, Arizona, 1/2 mile east of River Mile 97), Cibola Valley Conservation Area (Reach 4, Mohave County, Arizona, south of River Mile 103), and Beal Riparian and Marsh (Reach 3, Havasu NWR, Arizona, river miles 238-239).

Purpose: The purpose of this work task is to determine how two abiotic factors, plant water content and plant nutrient content, influence abundances of plant-feeding insects that are the prey base for many LCR MSCP species.

Connections with Other Work Tasks (past and future): Information obtained in these studies will be used in the design and implementation of future habitat creation projects detailed in Section E.

Project Description: Eight species of birds and four species of bats included in the LCR MSCP eat insects. Creating and maintaining habitat for these species requires providing an adequate supply of insects for food. This work task was extended to allow for greater studies determining insect response to water and other abiotic factors that may be needed for future management of restoration sites.

Plant-feeding insects respond to water and nutrient concentrations of their plant hosts. Plants with higher water concentrations produce more insects. This increase in phytophagous insects also increases densities of predaceous insects and spiders. Plant nitrogen concentrations similarly affect insect populations. Nutrient concentrations in spiders and insects also may affect foraging by insectivorous birds. Nutrients that vary among spiders and insects include nitrogen, sulfur, and phosphorous. This project will examine the following at MSCP restoration sites:

1. The influence of increased plant-nitrogen content on spider and insect densities.
2. Variation in nitrogen, sulfur, and phosphorus among spiders and insects.
3. The influence of plant water content on spider and insect densities.

Previous Activities: Effects of plant water and nitrogen contents on arthropod abundance and mass was examined at the Palo Verde Ecological Reserve during 2008. Fertilizer application increased branch water content and leaf nitrogen content. Abundances of insects in Homoptera (leafhoppers and aphids) were higher on branches on fertilized trees. Fertilizing trees with nitrogen had a small positive effect on insect abundance.

In 2009, nitrogen was examined as a nutrient in spiders and insects that are prey of insectivorous birds. Arthropods were collected from various plant species at the Beal Lake restoration site during April-August. Nitrogen concentrations were measured in collected arthropods. Most variation in nitrogen concentration was due to body size, with larger arthropods containing more nitrogen. Nitrogen concentrations also differed among arthropod orders, with herbivorous flies containing low nitrogen concentrations and spiders containing high nitrogen concentrations. Overall, arthropod herbivores and predators contained similar nitrogen concentrations.

FY10 Accomplishments: We examined the association between the amount of resilin, a digestible protein, and nitrogen-content of riparian insects collected at Beal Lake. Resilin and other digestible proteins may be important sources of nitrogen for insectivorous wildlife, especially birds. The amount of external resilin on insects was determined by its fluorescence in ultraviolet light. Amounts of resilin and nitrogen-contents were positively associated in beetles, flies, lacewings, true-bugs, dragonflies, and grasshoppers. Amounts of resilin and nitrogen-contents were not associated in bees and wasps.

FY11 Activities: We will expand our investigations of nutrients in spiders and insects eaten by birds by including the element sulfur. Sulfur is found in methionine and cysteine, two of the amino acids that are the building-blocks of proteins. Sulfur in methionine and cysteine has been implicated as an important nutrient in spiders and insects eaten by insectivorous birds. Spiders have especially high concentrations of sulfur and may be eaten selectively. In FY11, we will measure sulfur concentrations in a variety of riparian spiders and insects collected from one or more of the MSCP habitat restoration sites.

A second study will examine insect abundance and composition as a function of distance to surface water. Determining this relationship will help us design and locate future MSCP restoration projects. The composition of flying insects, aquatic and riparian will be sampled at different distances from water. This work would likely be performed at the Bill Williams National Wildlife Refuge as there is a gradient of habitats that could be sampled at various distances to water. As a comparison, a similar study would be set up at a restoration site such as PVER or CVCA.

Proposed FY12 Activities: The abundance/composition study as a function of distance to surface water will continue. The study determining the importance of sulfur as a

nutrient for insectivorous wildlife may be examined further in FY12. Alternatively we will examine the importance of phosphorus, needed by arthropods and birds primarily in energy metabolism and in some structural compounds. Similar to nitrogen, phosphorus is a limiting nutrient in plants, and plant phosphorus concentration may influence arthropod abundances.

Pertinent Reports: The 2010 Annual Report will be posted to the LCR MSCP website.

Wiesenborn, W.D. 2011. Nitrogen content in riparian arthropods is most dependent on allometry and order. *Florida Entomologist*. *In print*.

Wiesenborn, W.D. 2011. Biomasses of arthropod taxa differentially increase on nitrogen-fertilized willows and cottonwoods. *Restoration Ecology*. *Available online and in print*.

Work Task C7: Survey and Habitat Characterization for MacNeill's Sootywing

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$80,000	\$58,380.22	\$546,963.96	\$0	\$0	\$0	\$0

Contact: Bill Wiesenborn, (702) 293-8229, wwiesenborn@usbr.gov

Start Date: FY06

Expected Duration: Closed in FY10

Long-term Goal: Species research.

Conservation Measures: MNSW1 and MNSW2.

Location: Floodplain of entire lower Colorado River, dependent on permission by landowners.

Purpose: The purpose of this work task is to survey MacNeill's sootywing distribution along the lower Colorado River and determine habitat requirements for the species. Results from MNSW1 will be used to accomplish MNSW2, which creates habitat for the species.

Connections with Other Work Tasks (past and future): Results of this study will be used in future work tasks to create habitat for MacNeill's sootywing under work tasks in Section E. This work task will be phased out and replaced by F6 during FY09-10. Work task F6 monitors sootywing populations in restoration sites.

Project Description: The butterfly and its host plant, quail brush (*Atriplex lentiformis*), will be surveyed within the LCR MSCP boundaries. Annual surveys will cover one third of the flood plain. Surveys will record GPS coordinates of stands of quail brush. Species will be detected as eggs, larvae, pupae, or adults on host plants and as adults on nearby nectar sources. Surveys will be conducted during April to October when adults are intermittently present (2-3 generations occur per season).

The species habitat requirements will be determined concurrent with surveys by measuring site factors affecting sootywing presence or absence and density. Possible site factors are:

1. Plant water and nitrogen content.
2. Plant species used as nectar sources.
3. Availability of nearby nectar sources (distances, amounts).

4. Area of *A. lentiformis* stands.

Previous Activities: Sites were surveyed between Parker Dam and Imperial Dam during 2006 and between Imperial Dam and the Southerly International Boundary with Mexico during 2007. The number of adults and their behaviors (nectaring, oviposition, etc.) were counted on eight dates monthly from April to October at Cibola NWR during 2007. One flight of adults was observed, peaking at the end of June. The most common behavior observed was flying within quail brush plants. Adults were found feeding at flowers of six plant species: heliotrope, sea purslane, tamarisk, honey mesquite, alkali-mallow, and arrowweed. Heliotrope was the most frequent nectar source during spring, and tamarisk was the most frequent nectar source during summer. A seventh plant species used for nectar, the weedy succulent *Portulaca oleracea*, was identified south of Yuma.

A study was completed of host-plant selection by ovipositing sootywings that began in 2006 at Cibola NWR. The effects of plant size (canopy radius), plant water content, and leaf water content on host acceptance were tested. Percentages of plant water and leaf nitrogen were positively correlated. Acceptance of plants was influenced most by plant size and leaf nitrogen content acting simultaneously. All plants that exceeded 1.6 m in canopy radius, 64% in water content, and 3.2% in leaf nitrogen received eggs. Preliminary recommendations for restoring sootywing habitat based on our survey and study results were presented in the FY07 annual report.

Surveys were completed for sootywings and their host plants by surveying between the Muddy River inflow into Lake Mead and Parker Dam during 2008. In total, 102 localities were identified as supporting stands of host plants. GPS coordinates for these sites were entered into the Geographic Information System. Sootywings were found at 54 of the host plant localities.

A comparison of nectaring frequencies was also completed for potted *Heliotropium curassavicum* (heliotrope) and *Sesuvium verrucosum* (sea purslane) plants. Nectarings per plant did not differ between plant species, but flowers were more often visited in sunlight. Nectarings per flower were greater on *S. verrucosum*, the species with fewer flowers per plant. Amounts of nectar remaining in heliotrope flowers after landings by adults were also measured. Compared with males, female sootywings landed on plants supporting inflorescences with more nectar. Amounts of nectar in flowers decreased after landings by females but not after landings by males.

Two studies were performed examining the habitat requirements for MacNeill's sootywing. In the first study, oviposition and larval survival were compared on *Atriplex lentiformis*, the sootywing's known host plant, and *Atriplex canescens*, a related species also found along the lower Colorado River. The numbers of ovipositions on six potted plants of each species were compared at Cibola NWR. Sootywings only oviposited on *A. lentiformis*. Larval survival was compared on the two plant species by transferring 15 first-instar larvae to three potted plants of each species. Larvae only survived on *A. lentiformis*. Oviposition and survival only on *A. lentiformis* confirms the species as the sootywing's primary host plant.

FY10 Accomplishments: We examined attraction of sootywings to *H. curassavicum* inflorescences at CVCA Phase 4 (west). Flowers on *H. curassavicum* are white with yellow centers that turn purple as flowers age. Flowers also absorb ultraviolet light. Skippers were most attracted to purple followed by yellow, then white, models. Attraction of sootywings to yellow and purple did not correspond with amounts of nectar in yellow- and purple-centered models. Blocking ultraviolet light from yellow and purple models greatly increased frequencies of responses, especially landings on models that also displayed white. Adding *H. curassavicum* inflorescences to multiple-color models did not influence attraction, suggesting that sootywings are not attracted to scent. Sootywings are attracted specifically to colors produced by heliotrope, suggesting the plant is a significant nectar-source for the butterfly.

FY11 Activities: N/A

Proposed FY12 Activities: N/A

Pertinent Reports: The 2010 Annual Report for Monitoring MacNeill's Sootywing in Habitat Creation Sites will be posted to the LCR MSCP website.

Wiesenborn, W.D. 2010. Attraction of *Hesperopsis graciellae* (Lepidoptera: Hesperidae) skippers to *Heliotropium curassavicum* inflorescence models. Journal of the Kansas Entomological Society.

Wiesenborn, W.D., and G.F. Pratt. 2010. Visitation of heliotrope and western purslane flowers by *Hesperopsis graciellae* (Lepidoptera: Hesperidae). Florida Entomologist 93: 260-264.

Work Task C10: Razorback Sucker Rearing Studies

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$125,000	\$127,882.41	\$589,689.23	\$125,000	\$125,000	\$125,000	\$125,000

Contact: Andrea Montony, (702) 293-8203, amontony@usbr.gov

Start Date: FY06

Expected Duration: FY15

Long-term Goal: Seek measures to improve quantity, quality, and cost effectiveness of RASU reared for the Fish Augmentation Program.

Conservation Measures: RASU3, RASU4, and RASU6.

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

Purpose: Evaluate factors affecting rearing of subadult RASU to maximize quantity and quality of RASU produced for the LCR MSCP.

Connections with Other Work Tasks (past and future): This work is similar to actions in Bonytail Rearing Studies (C11) and shares some activities (concurrent studies at same locations). Also, a workshop for fish culturists was held in FY07 that focused on culture needs for both Razorback Sucker Rearing Studies (C10) and Bonytail Rearing Studies (C11).

Project Description: Provides funding for investigations into rearing and culture of RASU. The goal is to investigate ways to accelerate growth of RASU through manipulation of physical, chemical, and biological attributes of the rearing environment (e.g., manipulate feed, fish density, water temperature, water hardness, turbidity, lighting, presence/absence of cover). Current hatchery practices rear 250-300 mm TL fish in roughly three years. However, numerous observations during recent rearing and culture of RASU show a wide range in growth rates for this species, and it is possible to have 100-, 200-, and 300-mm TL fish from the same year class on station at the same time. In general, 25% of a RASU year class exhibit accelerated growth, 50% show moderate growth, and 25% demonstrate slow growth.

The species is a rare fish for which only limited life history data exist, and data that exist are mostly for adults, not young life stages such as those being reared in hatcheries. As more fish are reared, released, and followed, more life history data are being collected. Much of this information may be important to fish culturists. For example, the fact that

young RASU are nocturnal was determined in 1992 by observations of biologists from the Lake Mohave Native Fish Work Group. Even so, hatchery managers are only now testing night-time feeding regimes. Active culture of RASU is a young science; many of the techniques initially used for rearing this species originated in the culture of rainbow trout, a species actively cultured for more than 50 years. Only during the past decade was it conclusively determined that a high protein trout diet results in spinal deformities in fingerling RASU. For example, it was not recognized until the 1980s that adult RASU can feed successfully in open water areas on zooplankton. Much of the existing literature up to that time was for the riverine population, and assumed that the adult RASU were only bottom feeders. This information may be vital in determining where feed should be introduced within the water column during the culturing process (sinking, floating, or suspension). These types of observations need to be recognized, then hypotheses developed, and finally tests of the hypotheses designed and conducted.

This work task was originally expected to end in FY12. However, this project has consistently benefited RASU culture. Many of the studies require multiple years of observation to assess their effectiveness. As this work generally has added to the conservation of RASU, it is proposed that this project continue through FY15.

Previous Activities: Literature reviews were conducted to compile information on rearing these fish. These reviews also included site visits to facilities that are actively culturing RASU to document successes and failures. Inquiries were made to field biologists and technicians to document behavior of fish in the wild (i.e., daily activities such as feeding, resting, and use of cover in wild habitat). Ideas and hypotheses are being formulated into numerous small experiments, testing one variable at a time.

Survival of three native Colorado River fish species including razorback sucker were documented post-netting. Fish captured in trammel nets experienced higher mortality than fish captured using a seine net. Fish captured in water temperatures exceeding 20°C had elevated blood cortisol levels as compared to fish captured with the same methods below 15°C.

During calendar year 2009 several batches of PIT-tagged RASU were placed into the same pond. No significant differences in growth rate were observed among fish that had been in the pond only during the winter period compared to fish that had been in the pond the entire year, indicating that water temperatures at Bubbling Ponds are high enough to allow fish to feed and grow year-round.

RASU were reared in recirculating raceways units at Willow Beach NFH to determine how large they would grow in four years time. RASU grew on average 110 mm and doubled their weight during eight months of growth.

Polyculture of RASU and BONY took place at Achii Hanyo Rearing Station in four ponds. In December all four ponds were harvested and 54% of BONY grew to the stockable size of 300+ mm TL. RASU growth was variable in all four ponds with best growth from lower density ponds.

FY10 Accomplishments: The USFWS conducted the second year of polyculture for RASU and BONY stocked in the same ponds at Achii Hanyo Rearing Station. Polyculture of BONY and RASU is not detrimental to either species provided densities don't exceed carrying capacity.

The USFWS continued the RASU growth studies at Willow Beach NFH to determine density levels and feeding rates for rearing RASU from 300 mm up to 500 mm TL to accelerate broodstock development in Lake Mohave.

AGFD completed the fourth year of research to identify ways to improve growth rates and maximize the size of RASU at time of release. This year focused on 3 growth experiments. The first investigated growth in the absence of the parasite *Ichthyophthirius*, which were significantly greater than previously recorded rates at the hatchery over the last few years. Fish tagged at 300 mm or greater total length have reduced growth rates as expected. Sorting smaller fish from larger fish after the first year appears to improve growth rates of the smaller growing fish, with growth of the smaller fish equal to that of the larger fish. A research proposal was completed for Physiological Responses in Bonytail and Razorback Sucker to Transport Stress (C46) the scope of work is available upon request.

FY11 Activities: USFWS will continue the RASU growth studies focusing investigations on bottom surface area comparison to see if the spatial requirements of RASU are related to bottom surface area available rather than density of the entire water column. A second workshop is to be organized and held locally to review status of culturing native Colorado River Fishes.

Proposed FY12 Activities: Research investigations on RASU growth will continue to be implemented through research projects with cooperating hatcheries. Findings from the culturing native Colorado River Fishes workshop will be used to develop further research.

Pertinent Reports: Scopes of work and project reports are available upon request. *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 website.

Work Task C11: Bonytail Rearing Studies

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$165,000	\$160,883.55	\$663,023.50	\$150,000	\$150,000	\$150,000	\$150,000

Contact: Andrea Montony, (702) 293-8203, amontony@usbr.gov

Start Date: FY06

Expected Duration: FY15

Long-term Goal: Improve quantity, quality, and cost-effectiveness of fish reared for the Fish Augmentation Program.

Conservation Measures: BONY3, BONY4, and BONY5.

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

Purpose: Evaluate factors affecting growth of subadult BONY to maximize total length at release and reduce rearing time in hatchery.

Connections with Other Work Tasks (past and future): This work task is a companion study to Razorback Sucker Rearing Studies (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 Section B.

Project Description: Provides funding for investigations into rearing and culture of BONY. The species is a rare fish for which only limited life-history data exist, and data that exist are mostly for adults, not young life stages such as those being reared in hatcheries. The goal is to investigate ways to accelerate growth of BONY through manipulation of physical, chemical, and biological attributes of the rearing environment (e.g., manipulate feed, fish density, water temperature, water hardness, turbidity, lighting, presence/absence of cover). Current hatchery practices rear 250-300 mm TL fish in roughly 3-4 years. However, BONY over 150 mm are generally sexually mature and often times spawn in rearing ponds therefore increasing number of mouths to feed and general biomass in the ponds. Overcrowding reduces growth and increases risk of disease. Funds are expended over numerous studies to fill life history gaps.

Previous Activities: Investigations and evaluations of current culture practices for BONY were performed through literature reviews, survey questionnaires, site visits to culture facilities, and interviews with fish culturists. A workshop was held in August 2007 for fish culturists to review survey findings and prioritize research actions. Research

hypotheses were formulated for study designs and investigations are being carried out. Findings and results will be documented and reported. Dexter NFH developed and initiated an alternative rearing strategy to assist with BONY restoration in Lake Mohave. Hatchery staff investigated the potential for increased growth and resource conservation by rearing larval BONY within the same pond as adult broodstock and determined the effect individual size variation has on growth within an intensive culture environment. In addition, in 2008 researchers began investigating how to improve growth performance of BONY through diet optimization, temperature and rearing density the second year of the study has been completed.

Arizona State University conducted a comprehensive review of available published and gray literature, compiled an annotated bibliography, and submitted a report titled, *BONY Rearing Studies: Literature Review*, 2008.

Investigations into handling stressors in BONY at Achii Hanyo were completed and a report titled, *Passive Integrated Transponders in Gila elegans: Location, Retention, Stress, and Mortality*, 2008 is available on the LCR MSCP website. Recommendations were that fish tagging should be done at temperatures below 16°C.

A site visit to Achii Hanyo National Fish Hatchery during the annual harvest was conducted. Observations were made on the culturing, handling, tagging and transporting procedures at Achii Hanyo. It is recommended to assess tolerances of BONY to hatchery and stocking stressors by evaluating the stress responses at the biochemical, organismal, population, community, and ecological levels to alleviate observed handling stressors. A report titled, *Stress Inducing Factors of BONY Hatchery and Stocking Practices*, 2009 is available on the LCR MSCP website.

FY10 Accomplishments: Dexter NFH with assistance from USGS-New Mexico Cooperative Fish and Wildlife Research, USDA- ARS Hagerman Fish Culture Experiment Station, and the USFWS, Bozeman FTC completed the final year of research associated with the development of a formulated species-specific diet for BONY. All five diets evaluated performed equally well on the following variables measured at the end of the study: % body weight gain, specific growth rate, feed conversion ratio, condition factor, and survival. It is recommended that BONY remain on the RASU diet until further research dictates otherwise.

Research proposals were completed for Physiological Responses in Bonytail and Razorback Sucker to transport stress (C46) and Genetic Monitoring and Management of Recruitment on Bonytail Rearing ponds (C47). Study designs are available upon request.

FY11 Activities: FY11 activities have been limited due to the detection of Large Mouth Bass Virus (LMBV) at Dexter NFH&TC. Dexter maintains the only broodstock of BONY and are currently unable to transport BONY off station. This limits the availability of BONY for research purposes.

Develop a study plan to investigate condition factors of BONY at different stages of development, create standards based on condition factor, and evaluate standards with

regards to predator avoidance. Site visits will be conducted to facilities culturing BONY to evaluate operations, identify research needs, and develop study plans.

Proposed FY12 Activities: Collect previous length and weight data for BONY and determine condition factors for fish dependent upon age, sex, and season. Evaluate hatchery reared BONY versus wild BONY. Use information gathered from BONY culturing facilities to implement research needs from FY11 site visits.

Pertinent Reports: *Passive Integrated Transponders in Gila elegans: Location, Retention, Stress, and Mortality*, and *Bonytail Chub Rearing Studies: Literature Review Final Report* are available on the LCR MSCP website.

Work Task C12: Demographics and Post-Stocking Survival of Repatriated Razorback Suckers in Lake Mohave

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$200,000	\$216,432.73	\$934,265.66	\$200,000	\$0	\$0	\$0

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

Start Date: FY06

Expected Duration: FY11

Long-term Goal: Species research.

Conservation Measures: RASU5.

Location: Reach 2, Lake Mohave, Arizona/Nevada.

Purpose: Assess population for repatriated RASU, and develop a demographic model for predicting survival and replacement rates to maintain broodstock for the LCR MSCP.

Connections with Other Work Tasks (past and future): Data collected under this work task, and previously under Evaluation of Remote Sensing Techniques for PIT-Tagged Fish (C23, closed in FY09), are managed under Data Management (G1).

Project Description: This activity will support ongoing RASU conservation efforts at Lake Mohave to develop and maintain a population of adult RASU as a genetic refuge. More than 120,000 fish have been reared and repatriated to date, yet broodstock population estimates remain below 2,000 fish. The study will assess causes for poor survival of stocked RASU and make recommendations for corrective actions.

Previous Activities: Rearing, stocking, and recapture data for Lake Mohave were collated and reviewed. Field investigations were implemented during spawning and post-spawning seasons. Telemetry work was initiated to examine post-stocking dispersal, habitat selection, and short-term mortality, and to verify existing population models. A population model was refined to estimate abundance and to describe critical, dynamic life table features such as mortality rates. Data were acquired to assess fish predators as a mortality factor for stocked RASU.

Extensive radio and sonic tracking of fish were used to assess distribution and survival. Demographic modeling was used to assess population structure. The sonic telemetry study was designed as a multi-year iterative process, with each study year being considered a separate independent study. Observations and conclusions from previous

year activities provided direction for work in subsequent years. Initial findings during the 2007 study year showed that the 300-mm TL RASU that were released were being eaten by predators immediately after stocking, with less than 20% surviving the first 90 days. This prompted a need to evaluate stocking of adult size RASU (500 mm TL). Rearing of these larger fish took longer than expected. Only a few hundred fish were available for research subjects during 2007.

The second, six-month interval of sonic telemetry was completed during 2008. This work compared post-stocking survival of subadult (avg. TL 380 mm) and adult (avg. TL 500 mm) RASU repatriates. At the conclusion of the study year, 1 of 15 (7%) tagged subadult fish and 5 of 14 (36%) tagged adult fish remained active. For subadult fish in the telemetry study, first-week survivorship was estimated at 82%. For adult fish in the telemetry study, first-week survivorship was estimated at 95%. Mortality was likely due to predation by nonnative striped bass.

The third, six month sonic telemetry study was completed in FY09 and again evaluated the post-stocking survival of adult and subadult RASU. Twenty adult and 10 subadult razorback sucker were implanted with sonic transmitters and released at Fortune Cove (RM 17) on November 6, 2008. One fish was removed from analysis because it was contacted only once immediately after release. At the conclusion of the study year, 6 of 9 (67%) subadult and 16 of 20 (80%) adult razorback suckers remained active. Five transmitters were recovered from the bottom of the lake by a SCUBA diver. No fish remains were observed near any recovered transmitters.

Annual monitoring for repatriated and wild RASU continued. Capture data continued to show a decline of the original wild population that had existed prior to the repatriation program. The repatriate population maintained a low abundance but was stable despite only a small number of RASU repatriates (<1,000 individuals) being stocked during FY08.

Based on monitoring data from 2008 and 2009, the wild razorback sucker population in Lake Mohave was estimated at 70 fish. The repatriated razorback sucker population was estimated to number 1,502 with a 1% estimated survival of all repatriates released as of March 2008.

FY10 Accomplishments: The fourth, six-month interval of the sonic telemetry portion of this task was completed. This work compared post-stocking survival of Bubbling Ponds reared adult (avg. TL 530 mm) RASU repatriates stocked into Lake Mohave at the Willow Beach boat ramp and adult (avg. TL 610 mm) RASU captured and released near Hoover Dam. All study fish from both groups that survived the stocking and were contacted post-release remained active during the entire six-month period (100% survival). Approximately 60% of individuals from both groups of fish remained exclusively in the zone above Willow Beach where the highest concentration of contacts occurred. The four sonic telemetry studies completed under this work task have implicated predation as a major cause of post-stocking mortality, and have provided additional evidence that RASU size at release is strongly associated with post-stocking mortality. However, the studies have shown high annual variation in post-stocking

mortality which may be linked to the abundance of large (greater than 800 mm) striped bass.

Annual monitoring for repatriated and wild RASU continued with sampling trips in March and November 2010. Capture data as well as mark-recapture estimates of population size continued to show a decline in wild abundance. The repatriate population maintained a low abundance but remained relatively stable. Based on monitoring data from 2009 and 2010, the current wild razorback sucker population in Lake Mohave is estimated at 24 fish. The repatriated razorback sucker population is estimated to number 1439 with a 1% estimated survival of all repatriates released as of March 2009. The current total population estimate for razorback sucker in Lake Mohave is 1,463.

Remote sensing data obtained through Evaluation of Remote Sensing Techniques for PIT-Tagged Fish (C23-Closed FY09) was analyzed and compared to netting data. A total of 12,278 scanning contacts and 711 unique individuals were reported since remote sensing began in Lake Mohave in 2008; 1,733 from 2008, 3,083 from 2009 and 7,462 from 2010. In 2010 the number of unique remote scanning contacts with RASU exceeded the total RASU catch during the March roundup in 2010 (389 scans compared to 286 captured), but most fish were contacted only at one location; 5 of 18 fish were contacted in both Half Way Wash and Tequila sampling sites for RASU released prior to March 1, 2010 and 9 of 39 fish released after March 1, 2010. In addition, one fish released prior to March 1, 2010 and six fish released after March 1, 2010 were contacted at Half Way Wash and Yuma Cove.

FY11 Activities: Activities during FY11 will focus on remote PIT scanner deployments in the riverine portions of Lake Mohave downstream of Hoover Dam. This work will be coordinated with remote PIT scanning conducted by Reclamation personnel in the basin area of the lake. In addition, a website will be created to compile striped bass capture data from sport fishermen including stomach contents of large striped bass. These data will be used to determine the potential impact striped bass have on razorback sucker and bonytail stocking. Modeling of RASU population and demographics will continue as new data are made available.

Proposed FY12 Activities: Closed in FY11. Monitoring activities identified through this research will be implemented under Razorback Sucker and Bonytail Stock Assessment (D8).

Pertinent Reports: An annual report titled, *Demographics and Post-stocking Survival of Repatriated Razorback Sucker in Lake Mohave 2010 Final Report*, will be posted to the LCR MSCP website. The study plan is available upon request.

Work Task C13: Lake Mead Razorback Sucker Study

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$300,000	\$341,670.90	\$1,305,050.53	\$125,000	\$125,000	\$125,000	\$125,000

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

Start Date: FY05

Expected Duration: FY15

Long-term Goal: Determine conditions that allow for natural recruitment of RASU.

Conservation Measures: RASU7.

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

Purpose: Assess RASU 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 Lake Mead Razorback Study (D7). Larvae collected during this effort are to be reared at Lake Mead Hatchery (B6) and Overton WMA (B11).

Project Description: The LCR MSCP will continue to fund and support the ongoing studies of RASU in Lake Mead that were implemented under the SIA BO. The focus areas of these studies are to:

1. Locate populations of RASU in Lake Mead.
2. Document use and availability of spawning areas at various water elevations.
3. Monitor potential nursery areas.
4. Continue aging of captured RASU.
5. Confirm recruitment events that may be tied to physical conditions in the lake.

These studies began in 1995 and were anticipated to be completed within a 5-10 year period. However, under Conservation Measure RASU7, these studies may be followed by further research and monitoring within the adaptive management program of the LCR MSCP.

Previous Activities: The SNWA began a monitoring program for RASU in Lake Mead in 1995, partnering with NDOW and Reclamation. Between 1995 and 2004, some 200 adult and 30 juvenile RASU were captured. Aging data showed that a low level of recruitment has occurred in at least 22 of the past 30 years. This remarkable 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 to the LCR MSCP website.

FY10 Accomplishments: Trammel netting surveys during the spawning season resulted in the capture of 58 RASU, 13 from Echo Bay, 20 from Las Vegas Bay, and 25 from the Muddy River/Virgin River inflow area. Six of the RASU collected were subadult fish, and 12 were recaptures. Aging information was obtained from 48 RASU during the 2010 study year, and evaluation of fin-ray sections removed from captured fish suggests continued, recent recruitment in Lake Mead. Growth information was also obtained from a subset of recaptured fish, and mean growth rates of Lake Mead RASU continue to be substantially higher than those recorded from other populations. This elevated rate of growth and the continued presence of subadult fish suggest that the Lake Mead RASU populations are able to maintain a fairly strong cohort of young, fast growing fish. Seven hundred and sixty-two larval RASU were also captured during the 2010 spawning season. Larvae were present in all three of the main study areas with 601 captured from Echo Bay, 145 from Las Vegas Bay, and 16 from the Muddy River/Virgin River inflow area. All larvae were subsequently delivered to the Lake Mead SFH for grow-out (B6). Monitoring of sonic-tagged fish continued to gather information on habitat use and movement patterns of RASU. Data obtained from monitoring sonic-tagged fish provided valuable information including the general location of the RASU population, the location of spawning sites, and the movement patterns of RASU within and between spawning areas. An additional point of interest from the 2010 study season was the capture of 6 flannelmouth sucker from the Muddy River/Virgin River inflow area. All flannelmouth were marked with PIT tags, and fin-ray sections were removed for aging purposes. This is the first year flannelmouth have been documented through these monitoring efforts.

A cooperative research study was initiated by Reclamation and the Glen Canyon Adaptive Management Program to evaluate razorback sucker use of the Colorado River inflow (CRI) area of Lake Mead. Based on research conducted during the long-term Lake Mead monitoring study, 8 pond-reared razorback suckers were sonic tagged and released into Gregg Basin and the CRI. Sonic tagged fish were tracked to determine potential spawning locations in this area of the lake, and trammel netting and larval sampling were used when suspected spawning sites had been identified. Trammel netting surveys conducted during the spawning season resulted in the capture of three wild, adult RASU, and larval sampling resulted in the capture of seven larvae. Additional efforts will be performed in subsequent years to gather more information on the use of the CRI area by native fish.

FY11 Activities: Monitoring of RASU ecology in Lake Mead will continue. However this work has been separated from the research task and has been reassigned to an existing work task under the System Monitoring portion of the LCR MSCP (D8).

All RASU research actions initiated in the CRI area of Lake Mead are expected to continue. These actions will include larval sampling, adult trammel netting, monitoring of sonic-tagged fish, evaluating growth rates of recaptured fish, and fin-ray sectioning for

aging subadult and adult RASU. In light of the results from the FY10 study year, sampling efforts will be doubled to increase the opportunity of contacting various life stages of RASU in the area. Data obtained through these actions will help identify the size, age structure, habitat use, spawning areas, and recruitment patterns of the RASU aggregate located in the CRI.

Proposed FY12 Activities: Investigations will continue in the Colorado River inflow area of Lake Mead. Additional changes to the study design will be made as necessary based on the results from the first two study years. An additional group of smaller size class RASU may also be implanted with sonic tags to begin evaluating movement patterns and habitat use of subadult fish.

Pertinent Reports: *Razorback Sucker Studies on Lake Mead, Nevada and Arizona 2009-2010 Final Annual Report*, and *Razorback Sucker Investigations at the Colorado River Inflow Area Lake Mead, Nevada and Arizona 2010 Final Annual Report* will be posted to the LCR MSCP website. The 10-year comprehensive report, *Razorback Sucker Studies on Lake Mead, Nevada and Arizona 1996-2007*, is available on the LCR MSCP website.

Work Task C14: Humpback Chub Program Support

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$70,000	\$67,997.50	\$171,430.81	\$75,000	\$11,000	\$11,000	\$11,000

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

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Support HUCH conservation.

Conservation Measures: HUCH1.

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

Purpose: Provide support to the Glen Canyon Dam AMP for conservation of HUCH.

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

Project Description: The LCR MSCP will provide a total of \$500,000 over the life of the program (50 years) to the Glen Canyon Dam AMP, or other entities approved by USFWS, to support implementation of planned, but unfunded HUCH conservation measures.

Previous Activities: As recommended by the Glen Canyon Dam AMP, funds were provided to USFWS at Willow Beach NFH in FY06 to support care of HUCH from the Little Colorado River that were held on station. To reduce administrative costs, funds were provided for a three-year period (FY06-08) at \$10,000 per year. During calendar year 2008, the LCR MSCP agreed to provide additional funds for the development of a refugia broodstock for HUCH. The agreement will be in place for FY09-FY11. Young-of-year fish were transferred from the Little Colorado River to Arizona Game and Fish's Bubbling Ponds Hatchery. The fish were treated for parasites and held in quarantine for 30 days, then transferred to Dexter NFH. All the fish were PIT-tagged, and in June 2009, 300 fish were provided for translocation to Shinumo Creek in Grand Canyon National Park. The remaining 287 fish were used to begin establishing the (500-1000) refuge population at Dexter. Dexter staff completed the draft USFWS *Genetic Management Plan for Captive and Translocated Endangered Humpback Chub* in the Lower Colorado River Basin.

FY10 Accomplishments: This marks the second year of a three-year agreement to develop a refuge population/captive broodstock of Grand Canyon HUCH at the Dexter National Fish Hatchery and Technology Center, in Dexter, New Mexico. Dexter received 178 young of the year HUCH collected from the Little Colorado River, Grand Canyon. Following a quarantine period, 175 fish were added to the captive broodstock. In 2010 Dexter successfully maintained 657 HUCH; 277 (2008 year class), 205 (2009 year class), and 175 (2010 year class). Dexter staff successfully translocated 300 HUCH into Shimuno Creek in Grand Canyon National Park. This was the second stocking of fish for the Shinumo Creek translocation project.

FY11 Activities: Development of the refuge population/captive broodstock for HUCH at Dexter NFH will continue. Dexter will receive 200 HUCH for grow out, tagging, and incorporation into the captive stock. The captive management plan will be finalized and posted to the LCR MSCP website.

Dexter staff will also evaluate and refine fish culture, marking, and transport methodologies for wild-caught HUCH. In addition, researchers will conduct acute toxicity tests on HUCH larvae and juveniles (90-160 mm) to determine median lethal concentration (LC50) of potassium chloride.

Proposed FY12 Activities: Continue support for HUCH conservation in coordination with USFWS and Glen Canyon AMP. Dexter will receive an additional 200 HUCH for grow out, tagging, and incorporation into the captive stock. The goal is to achieve 1,000 individuals in the refuge population at Dexter.

Pertinent Reports: N/A

Work Task C15: Flannelmouth Sucker Habitat Use, Preference and Recruitment Downstream of Davis Dam

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$80,000	\$96,551.48	\$502,245.23	\$25,000	\$0	\$0	\$0

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

Start Date: FY05

Expected Duration: FY11

Long-term Goal: Support flannelmouth sucker (FLSU) conservation.

Conservation Measures: FLSU2 and FLSU3.

Location: Reach 3, Arizona/Nevada/California.

Purpose: Support existing FLSU conservation and research below Davis Dam, and develop a management needs strategy for this species.

Connections with Other Work Tasks (past and future): Work conducted under this task is related to C29, C31, and D8 as all FLSU and RASU captured are providing tissues for aging and for genetic analyses, and the capture data are covered in the System Monitoring program.

Project Description: Flannelmouth sucker were reintroduced into the Colorado River below Davis Dam by 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 of Davis Dam.

Under conservation measures FLSU2 and FLSU3, the LCR MSCP is conducting research in Reach 3 below Davis Dam to determine habitat use, habitat preferences, and recruitment, and to support decisions on habitat management activities for river channel and backwater habitats. Studies will continue through FY11. Once completed, research results will be used through the adaptive management process to assess main channel and backwater management needs and to develop management strategies to benefit the FLSU.

Previous Activities: Spring field sampling was conducted in FY05; this work was combined with monitoring activities for RASU. Results of this work are included in a report covering a three-year period from 2003 to 2005, which is posted to the LCR MSCP website. Field sampling in FY06 resulted in the contacting of all life stages of FLSU.

This produced a population estimate of 2,437 adults. Fifteen adult male FLSU were surgically implanted with 14-month sonic tags. These fish were tracked throughout the year and were instrumental in locating additional spawning sites, as well as providing data on dispersal and habitat use.

Field sampling in FY07 focused primarily on FLSU spawning aggregations and the young fish that resulted. We captured a total of 104 adults, which generated a population estimate of 2,471 adult FLSU, similar to the 2006 estimate. Additionally, 7 juveniles and 19 larvae were collected. Numerous schools of juvenile fish (25-60 mm) were visually identified; these fish numbered in the hundreds. An additional 20 adult FLSU were surgically implanted with 36-month sonic tags: 10 were females and 10 were males. One hundred and twenty-seven detections from manual tracking added additional information to our habitat use database. In FY08, telemetry work continued with tracking of about 15 active transmitters. We also conducted sampling for all life stages of FLSU with an emphasis on early life stages. These sampling trips focused on the locations and habitats used by aggregations of young-of-year (YOY) FLSU. Twenty-eight adult flannelmouth suckers were fin clipped for aging purposes and averaged 15 years of age (range 7-26).

In FY09, telemetry work continued with tracking of about seven active transmitters. An additional 122 fin clips were taken from adult flannelmouth for aging and these sampled fish averaged 14 years old (range 2-24). We also conducted sampling for all life stages of FLSU with an emphasis on early life stages. These sampling trips focused on the downstream distribution, locations, and habitats used by aggregations of young-of-year FLSU. Sampling methods consisted of small mesh trammel nets, boat electrofishing, beach seining, larval lights, and dip nets. This effort resulted in the capture of 123 adults, two juveniles (148 mm and 200 mm), and hundreds of young-of-year (14-62 mm). More than a dozen rearing areas for larvae and early juveniles were located in backwaters and slack water habitats from river mile 272 (near Laughlin) to river mile 251 (near Needles). Habitat mapping was completed from Davis Dam to the California state line; this base map will be used to show relative distribution of various life stages throughout this reach.

FY10 Accomplishments: We conducted sampling for all life stages of FLSU. Collection efforts utilizing seines for YOY relative abundance were extended from river mile 251 to river mile 232 in Topock Gorge, with collection of YOY found as far South as Mohave Wash (RM 232). Two juvenile flannelmouth suckers (166 and 285 mm) were collected in trammel nets at the Big Bend Conservation Area. These juveniles represent the 8th and 9th juveniles collected by us since 2006. We collected 228 adults with trammel nets and boat electrofishing. The population is estimated to be at 1,476 adults. Telemetry work continued on a limited basis consisting mostly of submersible ultrasonic receiver detections for the few fish that still had active tags.

FY11 Activities: A final report assimilating the data for the five-year study will be prepared, along with a management needs strategy that assesses main channel and backwater habitats for the benefit of FLSU.

Proposed FY12 Activities: Closed in FY11.

Pertinent Reports: The 2009 annual report, *Investigations of Flannelmouth Sucker Habitat Use, Preference and Recruitment Downstream of Davis Dam*, will be posted on the LCR MSCP website.

Work Task C24: Avian Species Habitat Requirements

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$200,000	\$165,079.12	\$629,212.50	\$175,000	\$200,000	\$200,000	\$200,000

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

Start Date: FY08

Expected Duration: FY16

Long-term Goal: Develop habitat suitability index models for covered avian species.

Conservation Measures: MRM1 (CLRA, LEBI, BLRA, WIFL, YBCU, ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, SUTA).

Location: LCR MSCP project area.

Purpose: Determine habitat requirements for covered marsh and riparian bird species, including Yuma clapper rail (CLRA), least bittern (LEBI), California black rail (BLRA), southwestern willow flycatcher (SWFL), yellow-billed cuckoo (YBCU), elf owl (ELOW), gilded flicker (GIFL), Gila woodpecker (GIWO), vermilion flycatcher (VEFL), Arizona Bell's vireo (BEVI), Sonoran yellow warbler (YWAR), and summer tanager (SUTA).

Connections with Other Work Tasks (past and future): Information gained from this work task will be used to design, create, and maintain marsh and cottonwood-willow habitat described in Section E that targets covered bird species. Information will also be used to maintain existing habitat as described in H1. Data collected in work tasks D2, D3, D5, D6, D7, and F2 will be used to help define habitat requirements.

Project Description: The HCP requires 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 CLRA and LEBI, while 130 acres will provide habitat for BLRA. Studies will be conducted to determine habitat requirements for marsh bird surveys. Created habitats in turn will be designed in a mosaic to provide the characteristics required by each species. In addition, potential limiting factors such as water fluctuation, percent cover by plant species, minimum patch size, and selenium bio-accumulation may be determined.

The HCP also 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. Habitat requirements for these covered species are not fully understood. A study will be conducted to determine habitat requirements for riparian obligate species. Results

from this study may be utilized in created habitats. Riparian obligate LCR MSCP covered birds included in this study are the Sonoran yellow warbler, Arizona Bell's vireo, summer tanager, Gila woodpecker, vermilion flycatcher, and the gilded flicker. Habitat associations for the southwestern willow flycatcher (D2) and the western yellow-billed cuckoo (D7) are covered under other work tasks.

Previous Activities:

Restoration of managed marsh units to benefit black rail and other marsh birds:

Vegetation surveys were conducted in 2009 and water depth data were downloaded from all monitoring wells. Bi-weekly marsh bird surveys were conducted at Imperial NWR in fields 16 and 18 throughout the breeding season in 2009. The locations of all black rails, clapper rail, and least bitterns were mapped in both fields. Black rails were first detected in fields 16 and 18 in April and July of 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.

Yellow-billed cuckoo habitat modeling: Two preliminary multivariate models of yellow-billed cuckoo breeding habitat were developed in 2009. This GIS-based model for quantifying occupied yellow-billed cuckoo breeding habitat may help in determining essential factors for landscape level habitat development.

Habitat associations for riparian obligate species: The habitat sampling methods used for this study were developed under System Monitoring for Riparian Obligate Avian Species (D6). Location of each territory and general bird surveys were conducted under D6, but all habitat research and data collection for each territory was conducted under this work task.

Territories per covered species were paired up with non-use sites from the same geographic and habitat type. In 2008, habitat data was gathered at 46 sites. In 2009, habitat data was gathered at an additional 145 sites, for a total of 191 use and non-use sites for the two-year period (2008-2009). Habitat assessments were not conducted for the gilded flicker due to lack of gilded flickers detected in the bird surveys. A combination of landscape variable assessment, basic characterization of the vegetation cover types, and a microhabitat description with a point intercept method were used to assess habitat.

FY10 Accomplishments:

Habitat associations for riparian obligate species: In 2010, habitat data was gathered at additional locations for the summer tanager, Gila woodpecker, and vermilion flycatcher. Overall, habitat association data were collected for the Arizona Bell's vireo, Sonoran yellow warbler, Gila woodpecker, vermilion flycatcher, and summer tanager. A preliminary habitat suitability model was created for these species from the three years of data (2008-2010).

Gila woodpeckers were associated with large trees and snags. Vermilion flycatchers were associated with high canopy cover and areas devoid of upland habitat and saltcedar. Arizona Bell's vireo were associated with high canopy cover and large trees particularly cottonwood, and shrub-sized mesquite, but avoided large patches of upland habitat. Sonoran yellow warblers were associated with overall dense woodland covers, particularly cottonwood and willow, but largely avoided mesquite and patches of upland habitat. Summer tanagers were associated with high canopy cover and large cottonwood and willow trees. Gilded flickers were not detected in the LCR MSCP planning area during the last three years; therefore, no habitat assessments for this species were possible.

Yellow-billed cuckoo habitat modeling: A final report summarizing the results of the GIS habitat model has been submitted for review. The GIS models examined the effects of landscape-scale habitat variables on cuckoo distribution and identified features that constituted high quality cuckoo habitat within the LCR MSCP planning boundaries. Existing data on cuckoo distribution and abundance within the planning area and in both the Verde River and San Pedro River watersheds were used to develop and test the model. A probability map depicting the likelihood of cuckoo habitat was created and tested with a set of known cuckoo locations from 2007. The model was then extrapolated to reaches of the Verde and San Pedro rivers and tested with additional known cuckoo locations. A vegetation type model showed a negative correlation with saltcedar, and a positive correlation with cottonwood-willow vegetation types.

FY11 Activities:

Habitat associations for riparian obligate species: More detailed habitat models for the Sonoran yellow warbler, Gila woodpecker, Arizona Bell's vireo, and summer tanager will be created during this five-year period. These models will add to the preliminary models developed from 2008 to 2010. The methodology of the habitat assessments from 2011 to 2015 will be more detailed than the ones conducted from 2008 to 2010 by including additional vegetation parameters and microclimate data. Fifty use and non-use sites will be conducted per species over the five-year period (10 per year).

FY12 Proposed Activities:

Habitat associations for riparian obligate species: Habitat assessments for the new detailed models (2011-2015) will be continued to be conducted in 2012. Vegetation and microclimate data will continue to be collected for the Sonoran yellow warbler, Gila woodpecker, Arizona Bell's vireo, and summer tanager.

Marsh bird habitat studies: A detailed habitat study will be designed and conducted for the three marsh birds. This study will focus on vegetation and habitat needs for each species and how to incorporate those additional habitat needs into created LCR MSCP marsh habitat.

Pertinent Reports: The *Summary Report on the Lower Colorado River Riparian Bird Surveys, 2008-2010* will be posted on the LCR MSCP website. Final reports for Marsh Bird Habitat Monitoring and Yellow-billed Cuckoo Modeling will be posted when available.

Work Task C25: Imperial Ponds Native Fish Research

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$235,000	\$213,756.65	\$653,010.34	\$235,000	\$250,000	\$250,000	\$250,000

Contact: Andrea Montony, (702) 293-8203, amontony@usbr.gov

Start Date: FY08

Expected Duration: FY18

Long-term Goal: Species research, backwater restoration.

Conservation Measures: RASU2, BONY2.

Location: Reach 5, Imperial National Wildlife Refuge, Arizona.

Purpose: Evaluate six ponds created as backwater habitats at Imperial NWR to assess the efficacy of the ponds for native fish species, specifically BONY and RASU.

Connections with Other Work Tasks (past and future): BONY and RASU to be stocked into the ponds are provided through: Lake Mohave Razorback Sucker Larvae Collection (B1), Willow Beach National Fish Hatchery (B2), Achii Hanyo Rearing Station (B3), Dexter National Fish Hatchery (B4), and Bubbling Ponds Fish Hatchery (B5). Ponds were developed under Imperial Ponds Conservation Area (E14), and additional monitoring support will be provided through Post-Development Monitoring of Fish Restoration Sites (F5). Data are maintained in part under Data Management (G1).

Project Description: This activity will monitor and evaluate the development of native fish refugia in six constructed ponds on Imperial NWR. Pond construction incorporated design features such as riprap, spawning gravels, hummocks, and increased depth, all thought to provide suitable habitat for life cycle completion by BONY and RASU. The experimental design of this research program will evaluate the role and importance of each of these features toward developing self-sustaining native fish populations. The design includes an initial fish stocking strategy for the ponds, and a monitoring program for selected features of the habitat and fish.

Water quality is being monitored at fixed water quality stations within each pond. The monitoring of pond temperature, conductivity, pH, and dissolved oxygen will occur on a monthly basis from October to May, and twice a month from May through September.

Previous Activities: A total of 1,601 BONY and 834 RASU have been stocked in five of the six ponds. BONY were stocked in the winter of 2007, RASU were stocked in the

winter of 2007, 2008, and 2009. Pond 2 received both BONY and RASU. All fish were PIT tagged prior to release.

Several fish monitoring techniques were assessed. Imaging sonar was determined to provide inconsistent data and was discarded as a viable monitoring technique. Swimming transects was marginally successful when water clarity was greater than 3 meters. Hoop netting in autumn was effective in capturing young-of-year BONY, but adult BONY were rare. Adult RASU were effectively captured only by using entanglement nets during autumn sampling.

Remote PIT-tag scanning units were developed and tested. These units provided multiple mark-recapture population estimates for each pond prior to autumn sampling, and declines in abundance of native species in four ponds were documented. Renovation of pond 1 to eliminate nonnative fish species through dewatering was unsuccessful as western mosquitofish (*Gambusia affinis*) are still present. Mapping software and aerial photography were used to map discrete habitats in each pond and habitat use data was acquired using remote PIT-tag scanning units.

FY10 Accomplishments: Monitoring of RASU and BONY populations continued using remote sensing, snorkeling, and netting. Autumn sampling was conducted in October 2009 and resulted in the capture of 17, 18, and 10 adult RASU in ponds 2, 4, and 6 respectively. No adult BONY were captured in FY10 although they are known to persist in Pond 2. One BONY larva and 11 RASU larvae were collected in Pond 2. Remote sensing was used in FY10 not only for adult population monitoring but also for the collection of habitat use data. Deployments were standardized and random deployment locations were stratified by habitats.

Habitat use for RASU shifted across seasons, but habitat preference in any given season was different for RASU populations in each pond. In addition, radio telemetry conducted in ponds 2 and 4 during the summer months provided additional support to the hypothesis that razorback sucker spend their days during summer in deep open water locations. Renovations continued on pond 3, with a chemical treatment applied while the ponds water elevations were at full pool, 186'. The renovation of pond 3 was successful; no fish have been detected to date.

FY11 Activities: Remote sensing of BONY and RASU populations in Imperial Ponds will continue. All BONY and RASU currently in ponds 2, 4, and 6 will be captured during autumn sampling and released into Pond 1 to increase the likelihood of successful recruitment. A sonic telemetry study will be conducted in Pond 1 to continue monitoring RASU behavior in the pond during summer. A five-year research priorities plan will be developed.

Proposed FY12 Activities: Research will continue based on the priorities developed under the five-year plan with an emphasis on factors influencing post stocking mortality.

Pertinent Reports: The scopes of work are available upon request. Annual reports will be posted to the LCR MSCP website.

Work Task C26: Evaluation of Raceway Rearing of Razorback Sucker at Lake Mead Fish Hatchery

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$70,000	\$82,395.92	\$157,726.77	\$70,000	\$0	\$0	\$0

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

Start Date: FY08

Expected Duration: FY11

Long-term Goal: Rear RASU of sufficient quantity and quality to accomplish the LCR MSCP Fish Augmentation and Species Research programs.

Conservation Measures: RASU3, RASU4, and RASU8.

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

Purpose: Evaluate raceway rearing of RASU to improve physical conditioning prior to stocking.

Connections with Other Work Tasks (past and future): This research is complementary to work conducted under Razorback Sucker Rearing Studies (C10). If successful (i.e., shows benefit to fish and is cost effective), this action may be included in the Fish Augmentation Program (Section B) in the future. Other rearing of RASU is being conducted at this facility, Lake Mead Fish Hatchery (B6).

Project Description: This project will investigate and evaluate rearing of RASU in flowing raceways at Lake Mead SFH. The study will investigate ways to deliver food, efficiency of food conversion, feeding rate, growth of RASU, and physical condition of fish. End-of-year results will be compared with similar parameters for RASU being reared for the LCR MSCP in non-flow facilities (Willow Beach NFH and Bubbling Ponds SFH).

This research is designed to take advantage of a unique opportunity at Lake Mead SFH. Research underway at Achii Hanyo by the USGS and USFWS is showing that RASU acclimated to flow have improved swimming performance. This may improve post-stocking survival for fish released by the LCR MSCP. Currently, there are no facilities rearing fish for the LCR MSCP using flowing raceways. Due to current water elevations of Lake Mead, intake water temperatures at Lake Mead SFH are too warm for rearing rainbow trout (summer water temperatures in 2006 exceeded 75°F). The NDOW is waiting to acquire water from deeper, cooler areas of Lake Mead. In the meantime, all or

parts of the Lake Mead SFH will be idle. This work proposes to use RASU from lakes Mead and Mohave to examine and evaluate the practicality and cost effectiveness of feeding and growing RASU in flowing raceways at Lake Mead SFH.

Previous Activities: Reclamation, SNWA, and NDOW have been cooperatively rearing Lake Mead RASU at the Lake Mead Fish Hatchery (B6) to support ongoing studies in Lake Mead. During FY09 the design for the flowing raceway test apparatus was finalized, and four large fiberglass raceways along with parts and equipment for construction of the inflow manifold were purchased. A portion of the subadult RASU reared under Lake Mead Fish Hatchery (B6) were PIT tagged and kept on station for use as research subjects.

FY10 Accomplishments: Construction of the inflow manifold was completed and the flowing raceway apparatus was tested and approved in early 2010. Rearing trials began in late May and concluded in the end of July while hatchery water temperatures were still favorable. Approximately 1,200 subadult RASU were weighed, measured for total length, individually marked with PIT tags, divided and released into the three test raceways, and exposed to flow velocities of 0, 23, or 36 centimeters per second (cm/s). A subset of the 1,200 unexercised RASU were also evaluated individually in a swim chamber to establish their pre-trial mean failure velocity (velocity at which fish could not maintain their position in the water column) for post-trial comparison.

Post-trial analysis showed that growth, food conversion efficiency, and swimming performance were highest among fish that had been exposed to flowing water conditions. Furthermore, fish exposed to the highest average flow velocity (36 cm/s) performed better in each category tested while unexercised control fish (0 cm/s treatment) exhibited the worst growth, food conversion efficiency, and conditioning. Additional trials planned for the next study year will help to validate these findings and direct future research in this area.

FY11 Activities: Rearing trials are expected to begin in May when hatchery water temperatures become favorable. Minor modifications to the study design, including flow acclimation periods and increased trial durations, are anticipated based on observations made during the FY10 study year. Relative cost, fish growth, and food conversion data from other facilities rearing RASU under non-flowing conditions will be obtained and compared to study results.

Proposed FY12 Activities: Closed in FY11.

Pertinent Reports: The final report for the FY10 study year titled, *Evaluation of Rearing Razorback Sucker (*Xyrauchen texanus*) in Flowing Raceways at Lake Mead Fish Hatchery*, will be posted on the LCR MSCP website.

Work Task C27: Small Mammal Population Studies

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$35,000	\$57,914.14	\$261,179.50	\$70,000	\$50,000	\$0	\$0

Contact: Chris Dodge, (702) 293-8115, cdodge@usbr.gov

Start Date: FY08

Expected Duration: FY12

Long-term Goal: Determine distribution, genetics, habitat requirements, and establish monitoring protocol of covered small mammal species.

Conservation Measures: CRCR1, YHCR1.

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

Purpose: Implement distribution, habitat, and genetics studies for system monitoring of LCR MSCP covered small mammal species. These studies are being conducted to determine geographic range limits of the Yuma hispid cotton rat and the Colorado River cotton rat, and to determine habitat requirements for these species. Data will be used through the adaptive management process to coordinate surveys of habitat creation sites and design habitat for covered mammal species.

Connections with Other Work Tasks (past and future): Data collected as part of Small Mammal Colonization (F3) will also be analyzed as part of the effort to determine species distribution of the two cotton rat species found along the LCR. Previous presence/absence surveys on small mammal populations were conducted under D10. This research will aide in developing a long term population monitoring protocol for small mammals and develop a habitat model for the two cotton rat species that can be used in restoration efforts (Section E) and adaptive management (Section G).

Project Description: Studies will be designed to determine the habitat usage, population status, genetic differentiation, and distributional range of two covered small mammal species: the Colorado River cotton rat and Yuma hispid cotton rat. Small mammals will be trapped in various habitat types along the LCR to collect genetic samples. 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 compare and contrast specific subspecies and determine the distributional range of each species of cotton rat within the LCR watershed. Habitat use and population demographic analyses are currently being

estimated with mark-recapture analyses. A habitat model and population demography study will be implemented to determine habitat usage and establish a protocol for population monitoring at conservation areas. Population monitoring protocol development and habitat model development research was designed and began in FY10 under G3. These studies were moved to C27 in FY11.

Previous Activities: *Sigmodon* have been captured at seven localities along the LCR, including sites near Yuma, Arizona, Imperial NWR, Cibola NWR, PVER, and Pintail Slough on Havasu NWR. A study was initiated at the end of FY07 to determine genetic differentiation between covered small mammal species, distributional range for each species, and habitat usage along the LCR. In FY08, 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.

FY10 Accomplishments: Population monitoring and habitat model development research began in FY10. Trapping grids have been established at 3 sites including Cibola NWR Unit #1 Nature Trail, PVER, and Pintail Slough on the Havasu NWR. A mark-recapture study designed to quantify structural components of habitat use and survival of the three populations is underway. Data are being collected in spring and fall. Preliminary analyses suggest two sites have high population survival while one has low survival. Habitat characteristics differ between the three sites and are likely correlated to survival probability of the local population. Preliminary habitat models indicate there are several structural components that may be important to predicting *Sigmodon* use of an area. These include depth of litter and vertical density measurements. A population monitoring protocol for *Sigmodon* is being developed with the demographic and capture data generated here and under D10 and F3.

FY11 Activities: Continue collecting population, vegetation, and habitat data from permanent sites for mark-recapture analysis and habitat modeling. Findings will be presented at scientific meetings.

Proposed FY12 Activities: Continue population monitoring design and habitat analysis research. Long term datasets are necessary for this species because of drastic population cycles which may have short-term local effects on the population. Final analyses and a final report will be drafted.

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

Work Task C28: Nest Predation Effects on Riparian Bird Species

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$25,000	\$26,392.77	\$157,132.04	\$0	\$0	\$0	\$0

Contact: Chris Dodge, (702) 293-8115, cdodge@usbr.gov

Start Date: FY09

Expected Duration: Closed in FY10

Long-term Goal: To determine the effects of nest predation on susceptible bird species, such as the southwestern willow flycatcher, yellow warbler, and Arizona Bell's vireo, and develop potential management actions to lessen these effects.

Conservation Measures: MRM1, MRM2 (WIFL, YBCU, VEFL, BEVI, YWAR, SUTI).

Location: LCR SWFL life history study sites (D2), including: Topock Marsh, Arizona; Mesquite, Nevada; Pahrangat NWR, Nevada; and areas where larger populations of open cup nesters currently exist, such as Bill Williams River NWR, Arizona.

Purpose: Predation on open-cup nesting passerines is one of the main reasons for nest failure. The purpose of this study is to verify identity of nest predators of open cup passerines (such as the SWFL, BEVI, and YWAR), determine habitat and nest microclimate variables that are related to nest predation, and determine how nest microclimate influences nest predation in order to develop tools for managing restoration areas that would deter predators and create nest sites necessary for maintaining productive LCR MSCP covered bird populations.

Connections with Other Work Tasks (past and future): The first year of this work task was completed under G3.

Project Description: This study will gather information pertaining to relative nest predation pressures and predator communities by determining identity of nest predators at real and artificial nests, determining interaction between patch size, surrounding landscape matrix, and potential for nest predation, linking female behavior and nest microclimate with nest predation, and evaluating the potential for nest predation to be offset if nest microclimate can be manipulated to reduce predation pressure. Nest predator communities will be assessed by documenting predator visits to real nests of species such as the SWFL, BEVI, and YWAR by utilizing nest cameras. In addition, artificial nests with cameras will be placed at sites differing in size and landscape

characteristics. An additional set of artificial nests with plasticine (clay eggs) and quail eggs, but without cameras, will be used to determine whether relative nest predation rate differs among areas that differ in size and broader habitat context. Utilizing both real and artificial nests will not only be able to economically cover more areas, but will also test the validity of utilizing artificial nest technique. Nest cameras will record both nest predation events as well as female behavior associated with nesting (such as time incubating, time off nest). Nest microclimate will be measured utilizing temperature/humidity data loggers once the nests have been vacated. Three habitat types will be compared for predator pressure.

Previous Activities: Video cameras were installed at natural and artificial nests to determine predator composition of nests of LCR open cup nesting passerines. Cameras were camouflaged to reduce visual impact, and utilized infrared to detect night predators. Artificial nests contained plasticine eggs to retain distinctive tooth or beak marks that allowed identity of potential nest predators. Nests were monitored in several areas of the three habitat types. Microclimate was measured at each nest utilizing temperature/humidity data loggers directly below the nest once it has been vacated, either due to predation, abandonment, or successful fledging. Cameras were also utilized to determine female behavior at nest. Results indicate nests placed in mesquite trees had higher rates of nest predation by rodents than those placed in tamarisk, cottonwood or willow. Brown-headed Cowbirds and yellow-breasted chats were the two most common species recorded at artificial nests, followed by Bewick's wrens and Bullock's orioles. The overlap in nest predators recorded at artificial and real nests indicates that artificial nests may be an effective rapid-assessment technique that could be used to assess potential nest predators at sites of management interest.

FY10 Accomplishments: This project was originally scheduled to be closed by the beginning of FY10 but was extended for a third summer, and the final report is due in 2011. In conversations with the USFWS, it was determined that a third year of recordings of nest predation events would benefit both Reclamation and the USFWS. The USFWS contributed to the third year.

Cameras were placed at 17 nests in Pahrnagat National Wildlife Refuge, at 14 nests in Key-Pittman Wildlife Area, and at 15 nests in Mesquite, Nevada. At Pahrnagat, cameras were placed on 11 willow flycatcher nests, 2 song sparrow nests, 2 yellow-breasted chat nests, 1 yellow warbler nest, and 1 Bell's vireo nest; there were 8 nest predation events recorded. At Key-Pittman, cameras were placed on 13 willow flycatcher nests and 1 yellow warbler nest; there were 3 nest predation events recorded. At Mesquite, cameras were placed on 5 willow flycatcher nests, 1 yellow-breasted chat nest, 1 song sparrow nest, and 8 yellow warbler nests; there was 1 predation event recorded involving a king snake.

FY11 Activities: Due to the efficiency of the study, this work will continue for one more summer using FY10 funds. No additional funding is needed in FY11. A final report will be completed at the end of FY11.

Proposed FY12 Activities: Closed in FY10.

Pertinent Reports: The annual report summarizing the first two years of the nest predation study, *Real and Artificial Nest Predation along the Colorado River*, and the final report will be posted on the LCR MSCP website when available. The study plan is available upon request.

Work Task C29: Age Characterization of Reach 3 Razorback Sucker Population

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$125,000	\$126,061.29	\$206,526.28	\$0	\$0	\$0	\$0

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

Start Date: FY09

Expected Duration: Closed in FY10

Long-term Goal: Assess effectiveness of the fish augmentation program.

Conservation Measures: RASU6.

Location: Colorado River in vicinity of Needles, California, and Laughlin, Nevada, and other sections of LCR MSCP Reach 3 where spawning RASU are encountered.

Purpose: To characterize the age structure of the RASU spawning population and identify successful stocking measures leading to the majority of fish residing in Reach 3.

Connections with Other Work Tasks (past and future): This work is related to B2, B3, B4, and B5 as fish from these facilities may be encountered and data collected will help assess potential survival and population structure resulting from RASU stockings. This study began under G3 to evaluate the aging technique developed for RASU on Lake Mead under C13.

Project Description: This study will characterize the age structure of the spawning RASU in Reach 3 of the Colorado River. Under the Lake Havasu Fishery Improvement Project, more than 31,000 RASU were stocked into this reach over a 10-year period (1993 to 2002). In 2005, researchers located concentrations of spawning RASU just upstream of Needles, California. This group of RASU is believed to have resulted from the earlier augmentation stockings by the Lake Havasu Fishery Improvement Project. Unfortunately, few if any of those fish were PIT-tagged prior to release.

This study will aggressively capture adult RASU from Reach 3 during the spring 2009 and spring 2010 spawning periods and remove fin-ray sections in the field. The fin-ray sections will be analyzed in the laboratory, and researchers will build an age structure of the spawning stock. These data will then be compared with stocking records for the Lake Havasu Fishery Improvement Project. Attempts will be made to isolate individual stocking events and to assess differential successes or failures. The final report will

summarize these data and provide recommendations and guidance to the LCR MSCP Fish Augmentation Program.

Previous Activities: In FY08 more than 50 fin ray samples were collected and analyzed as part of G3. The purpose of this work was to assess the ability to age fish from tailwaters; due to the success of this research, the work was expanded and incorporated into a separate work task. In FY09, specimens were collected from field activities in Reach 3, and upwards of 300 RASU fin ray samples for aging were obtained. Fin ray sections were analyzed and fish ages were determined. Aging data along with past stocking information were used to determine disparate stocking successes and identify the age structure/hatchery origins of the RASU population between Davis Dam and the Lake Havasu delta in Reach 3.

FY10 Accomplishments: Results suggest that while fish can accurately be aged, this information could not be correlated to stocking records. The RASU ranged in age from 3 to 22 years, with an average age of 9. Through investigation into past stocking records, it was determined that differentiation of wire tag locations was inconsistent and it was difficult to determine any differences. While originally expected to continue into FY11, the project was completed in FY10.

FY11 Activities: Closed in FY10.

Proposed FY12 Activities: Closed in FY10.

Pertinent Reports: A report titled *Razorback Sucker Aging and Stocking Population Assessment* is completed and will be posted to the LCR MSCP website.

Work Task C30: Development and Evaluation of Measures to Reduce Transport of Quagga Mussel During Fish Transfer and Stocking Activities

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$70,000	\$77,335.50	\$171,889.89	\$150,000	\$150,000	\$150,000	\$0

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

Start Date: FY09

Expected Duration: FY13

Long-term Goal: Maintain effectiveness of the fish augmentation program.

Conservation Measures: BONY2, BONY3, BONY4, BONY5, RASU2, RASU3, RASU4, RASU5, RASU6, and RASU8.

Location: Various state and federal hatcheries and laboratories in Boulder City, Nevada; Willow Beach, Arizona; Cornville, Arizona.

Purpose: To develop and test measures to assure non-transmittal of quagga mussel larvae and adult quagga mussels during the fish transport and stocking activities of the LCR MSCP Fish Augmentation Program.

Connections with Other Work Tasks (past and future): This work is related to all fish facilities in B2, B3, B4, B5, B6, B7, B10, and B11 as RASU and/or BONY are moved between these sites and the lower Colorado River. Work began as a literature investigation under G3.

Project Description: This study will develop and test means to assure that quagga mussel larvae and adult mussels are not being transported throughout the Colorado River system as a result of the Fish Augmentation Program. The original Fish Augmentation Plan called for capture of wild RASU larvae from Lake Mohave, which are provided to Willow Beach NFH (B2), Dexter NFH (B4), and Bubbling Ponds SFH (B5). In addition, RASU larvae and juveniles are transported from Willow Beach NFH to Lake Mead SFH (B6) and to lake-side rearing ponds (B7). BONY are transferred from Dexter NFH to Willow Beach NFH and to Achii Hanyo Rearing Station (B3), and directly to the river system. This is an acceptable pathway because quagga mussels are already present at the Willow Beach and Achii Hanyo facilities; therefore, no quagga-free facility is exposed to quagga infestation as the result of this strategy. Transfers of fish from quagga-infested facilities to non-infested facilities have been halted until such time that assurances can be

made that quagga mussels are not being carried along with these fish. This study will attempt to develop measures to allow such certification.

Previous Activities: During January 2007, the exotic quagga mussel was discovered in Lake Mead, and subsequently found in both Lake Mead SFH (B6) and Willow Beach NFH (B2). Larval RASU that were to be transferred to Bubbling Ponds SFH (B5) were not collected (B1) and no RASU of any size or year class were delivered to waters outside the Lower Colorado River corridor. Quagga mussels have not severely impacted the maintenance or operation of the facility. However, quagga mussels continue to have an impact on delivery of fish. Preventing further movement or transfer of quagga mussels is a priority for state and federal agencies. Fish transport protocols for the lower Colorado River corridor have been developed and are under review by cooperating resource agencies. Studies conducted by the USFWS determined that concentrations of potassium chloride (KCl) and formalin, which had been recommended for killing quagga mussel larvae in transport water, were not effective in killing quagga larvae under the water conditions at Willow Beach NFH and the levels of KCl/formalin tested may be toxic to native fish species.

FY10 Accomplishments: Cutrine-Ultra (copper), Peraclean (peracetic acid), and Spectrus CT1300 (quaternary ammonium compound) were selected from a list of molluscicides in the Zebra Mussel Chemical Control Guide. These three chemicals were chosen for testing by USFWS at Willow Beach NFH to evaluate their effectiveness at killing quagga mussel life stages. Quagga mussel veligers exhibited resistance to most of the concentrations of all three chemicals tested in the 6-7 hour time frame allotted which simulates the average transportation time for stocking fish into the lower Colorado River. Mortality in 100% of veligers was observed only in the two highest concentrations of peracetic acid, however BONY exposed to one half concentrations died in less than 30 minutes.

FY11 Activities: A literature search will be performed to formulate a list of potential chemicals that will be tested for effectiveness on quagga mussel mortality. Investigations will continue in order to find alternative treatment methods and to establish a protocol that is effective at killing quagga mussel larvae without harming native fish.

Proposed FY12 Activities: Investigations will continue until a suitable treatment regime can be found. As protocols must be rigorously tested prior to approval, this work task is being extended in both time and funding.

Pertinent Reports: The scope of work is available upon request. Annual reports from each year will be posted to the LCR MSCP website.

Work Task C31: Razorback Sucker Genetic Diversity Assessment

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$125,000	\$100,903.63	\$204,596.85	\$125,000	\$125,000	\$125,000	\$125,000

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

Start Date: FY09

Expected Duration: FY15

Long-term Goal: Maintain genetic quality of RASU utilized in the LCR MSCP.

Conservation Measures: RASU2, RASU3, RASU5, RASU6.

Location: Arizona State University, Tempe, Arizona.

Purpose: To maintain a sound genetic management program for RASU within the LCR MSCP.

Connections with Other Work Tasks (past and future): This work is related to larval RASU collections (B1) and to management of fish habitat restoration sites (for example, E14, and C40). Fin clips were collected from RASU captured during the Age Characterization Study (C29) and will continue to be captured through work tasks (C45) and (D8).

Project Description: This study will monitor genetic structure of RASU communities in reservoirs, river reaches, and off-channel habitats within the LCR and characterize the various RASU stocks relative to the founder population from Lake Mohave. Our fish augmentation program continues to produce large numbers of fish annually and 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 RASU 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 ASU's genetics research laboratory for analyses. Results will be used to determine the genetic health of these communities, to assess effectiveness of the Fish Augmentation Program, to continue monitoring of the Lake Mohave repatriation effort, and to provide guidance on management of RASU populations developing in newly constructed floodplain habitats within the LCR MSCP area.

Previous Activities: Genetic evaluation of the Lake Mohave Razorback Sucker Repatriation Program, funded by Reclamation prior to the LCR MSCP, was completed in 2008. These studies resulted in genetic characterization of the Lake Mohave RASU population, including the larval fish being used by the LCR MSCP Fish Augmentation Program. This base of information will be the reference point against which the genetic diversity of all future RASU populations will be measured.

An analysis of larval fish samples collected in 2009 showed that genetic variation among and within larval samples of razorback sucker on Lake Mohave continues to be passed to the adult repatriate population, indicating that the Native Fish Work Group program is functioning as originally designed.

FY10 Accomplishments: An additional 657 larvae and 205 adult fin clips were obtained in 2010. DNA has been extracted from all samples and characterization of mtDNA will be initiated in late 2010.

Efforts were expended to complete analysis of microsatellite variation in order to characterize variation in the nuclear genome. These markers have been applied to 979 adult samples and over 1500 larval samples. Initial analyses of microsatellite data 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.

FY11 Activities: Reclamation will continue to assess razorback sucker genetics for the LCR through analyses of RASU fin clips and larvae collected from all spawning areas, reservoirs, river reaches, and off-channel habitats within the LCR MSCP area.

Proposed FY12 Activities: Collection of larval RASU, fin clips, and muscle plugs will continue from all spawning areas within the LCR MSCP area.

Pertinent Reports: The study plan for Razorback Sucker Genetic Diversity Assessment is available upon request. *Razorback Sucker Genetic Diversity Assessment Interim Report* is posted to the LCR MSCP website.

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

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$85,000	\$85,228.77	\$173,121.81	\$100,000	\$125,000	\$125,000	\$125,000

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

Start Date: FY09

Expected Duration: FY17

Long-term Goal: To establish water quality parameters to support backwater habitat management.

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

Location: Native Fish Laboratory, Boulder City, Nevada.

Purpose: To determine thresholds for survival of RASU and BONY life stages for salinity, temperature, pH, and oxygen.

Connections with Other Work Tasks (past and future): This work began under Adaptive Management Research Projects (G3). This work is related to Imperial Ponds Conservation Area (E14), Backwater Site Selection (E15), and Post-Development Monitoring of Fish Restoration Sites (F5).

Project Description: This study will evaluate through laboratory testing the threshold levels of multiple water quality parameters needed to sustain various life stages of RASU and BONY in backwater habitats developed by the LCR MSCP. This study was originally planned to run through FY12 and look at single parameter thresholds (salinity, temperature, dissolved oxygen) of multiple life stages of native fish. This study has been extended for five years to allow for the completion of single parameter testing and to provide time for future multiple parameter tests on early life stages of native fish.

Previous Activities: Laboratory research began in March of FY07 under Adaptive Management Research Projects (G3). Salinity concentrations evaluated during this first study year indicated that upper salinity tolerances ranged from 10,000 to 15,000 $\mu\text{S}/\text{cm}$ and from 23,000 to 26,000 $\mu\text{S}/\text{cm}$ for RASU eggs and larvae respectively. Observations during larval trials showed that long-term survival may be possible at salinities as high 23,000 $\mu\text{S}/\text{cm}$ when larval RASU are properly acclimated.

Research to determine RASU early life stage salinity thresholds resumed in March of FY08. During this second study year, slight modifications were made to the experimental design to further test the role of acclimation as observed in FY07. Refined values for upper salinity tolerances were observed to range from 11,000 to 12,000 $\mu\text{S}/\text{cm}$ for eggs and from 27,300 to 27,750 $\mu\text{S}/\text{cm}$ for larvae.

In FY09, an apparatus for evaluating threshold levels of dissolved oxygen was developed and tested, and research to determine RASU early life stage dissolved oxygen limits was conducted. RASU eggs and larvae were evaluated through exposure to a full range of dissolved oxygen concentrations. Results from egg trials indicate that the lower dissolved oxygen limit for this life stage is in the 2.5 to 3 mg/L range. Egg development below this range was either totally disrupted or resulted in underdeveloped protolarvae. The limit observed for RASU larvae was slightly lower, with increased mortality occurring at dissolved oxygen concentrations near 2 mg/L. Larvae exposed to concentrations of 3mg/L or greater showed low levels of mortality and displayed no behavioral abnormalities (e.g. aquatic surface respiration). Comparative growth of larval RASU was also evaluated during this study year, and no significant differences in growth were observed over a twenty day period.

FY10 Accomplishments: Research during the FY10 study year was focused on determining the threshold levels of pH for early life stage RASU. Although this water quality parameter was not originally listed for evaluation, a need to understand what effect pH levels may have on RASU in backwater habitats does exist. Several of the native fish refugium ponds currently in use have had high pH levels recorded over the last few years. To determine if the current pH levels found in these habitats could be a limiting factor of successful recruitment, RASU eggs and larvae were exposed to a pH range that included those observed in these habitats.

Results from RASU egg trials indicate that the threshold levels for successful embryo development are between pH 9 and 10. While a large number of eggs were observed to hatch at pH 10, less than 2% of protolarvae survived past a few days and there was high incidence of deformity. Eggs hatched at pH 9 and below fared much better in terms of proper development and overall survival. The pH threshold observed for RASU larvae was slightly higher, with long-term exposure (20 days) to pH 10 resulting in 98% survival. An increase in mortality was not observed until pH was elevated above 10.4. Comparative growth of larval RASU was also evaluated during larval trials, but no significant differences in growth were observed for larvae exposed to pH 7 through 10.

FY11 Activities: Research during this study year will be focused on determining the threshold levels of pH for fingerling BONY. This work is being conducted ahead of schedule to take advantage of young BONY that have been made available from recent pond harvests at the Achii Hanyo Rearing Station (B3). This work is closely related to the work performed in FY10 and will further help determine if the current pH levels found in native fish habitats are a limiting factor of successful recruitment and survival. Currently no guidelines are in place for site or project managers to follow.

Proposed FY12 Activities: Research priorities will be evaluated based on findings from previous study years, observations and measurements made during monitoring activities, and the review of available literature. It is anticipated that evaluation of the lower dissolved oxygen limits for BONY will be completed in FY12 as fingerling BONY become available. Lower dissolved oxygen limits for fingerling RASU will also be evaluated as Mohave stock captured during the previous spring reach the appropriate size. Increased funding request is to cover costs of evaluating both species during FY12.

Pertinent Reports: A draft report summarizing the 2009 dissolved oxygen study has been completed, and a draft report detailing the 2010 pH study is in development.

Work Task C33: Comparative Survival of 500-mm Razorback Sucker Released in Reach 3

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$75,000	\$70,817.31	\$276,047.15	\$100,000	\$100,000	\$100,000	\$0

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

Start Date: FY09

Expected Duration: FY13

Long-term Goal: To maintain the effectiveness of the Fish Augmentation Program.

Conservation Measures: RASU3, RASU6.

Location: Mainstem Colorado River within Reach 3 and various off-channel fish grow-out ponds.

Purpose: To determine the relative survival of 500-mm TL RASU versus 300-mm TL RASU released into Reach 3.

Connections with Other Work Tasks (past and future): This work is related to current fish rearing (B2, B5), fish research (C12, C13), post-development monitoring (F5), and any future work tasks for rearing RASU, as data collected from this study will help evaluate the effect that size of released fish has on survival, and ultimately, on conservation of the species.

Project Description: This study will evaluate the relative survival of 500-mm TL RASU versus 300-mm TL RASU released into the Lower Colorado River within Reach 3. Ongoing studies at Lake Mohave (C12) suggest that RASU being raised for broodstock development in that reservoir (Reach 2) should be held in captivity and reared to a total length of 500 mm prior to repatriation to assure survival. It has been suggested that the LCR MSCP should increase its target size for RASU being reared under the Fish Augmentation Program from 300 mm to 500 mm TL.

The primary cause for mortality in Lake Mohave is predation by large striped bass, combined with a lack of cover. RASU in Lake Mead (Reach 1) have shown consistent, albeit low-level, recruitment for the past 20-plus years. Research (C13) suggests that cover is the key component allowing such survival and recruitment. Both predator loads and the amount of cover within Reach 3 differ from what is available in Reach 2. Before this management strategy is agreed to and applied to Reach 3, it is prudent to make paired

releases of both 300-mm TL RASU and 500-mm TL RASU and compare the relative survival of the two size classes.

This work will be conducted over a five-year period. During the first two years, the focus will be on growing and tagging sufficient numbers and sizes of RASU and releasing them into the river system. The LCR MSCP is currently stocking RASU of 300 mm or greater total length into Reach 3. Under the Fish Augmentation Program, 300-mm TL RASU are credited to the program when stocked into off-channel habitats as well as into the mainstem river. Funds from this study will be used to support harvest, tagging, and distribution of large RASU (500 mm or greater TL) harvested from these off-channel habitats.

Previous Activities: More than 28,000 RASU (>300 mm TL) have been PIT tagged and released into Reach 3 since October 2006, and all are research subjects for this study. The stockings have been distributed into the numerous access points within this reach, from Laughlin Lagoon to Bill Williams River NWR, as well as various off-channel habitats that are currently being managed by the USFWS.

Monitoring the growth of RASU in various off-channel habitats has continued. An interagency agreement was initiated between the Reclamation and the USFWS to cover costs at off-channel habitats that the USFWS currently manages. These off-channel habitats are the source of 500-mm plus RASU that will be used to complete this work task.

Numerous additional spawning groups of RASU were located throughout Reach 3. It is expected that surviving fish are best censused while spawning; therefore, identifying spawning sites increases chances for recontacting these fish during future surveys related to this work task.

FY10 Accomplishments: Activities included coordinating and scheduling stock assessment surveys for several grow-out ponds. The harvesting of 500-mm plus RASU was not conducted due to insufficient numbers of large fish. However, the current stock assessment shows that there are approximately 700 fish >400 mm TL available in the grow-out ponds, these fish will be harvested in early FY11. The program has continued the PIT tagging of RASU greater than 300 mm TL for release into Reach 3, and a total of 7,180 were released this past year. Monitoring of the Reach 3 population of RASU relative to differential survival was initiated. Monitoring is conducted using electro-fishing and trammel netting of known congregations of RASU.

FY11 Activities: The activities listed in FY10 will be continued and expanded in order to maximize the number of RASU available as research subjects for this work task. Monitoring surveys will be increased as a result of work task C45, and the additional RASU contacts will be used in the data analysis.

Proposed FY12 Activities: The activities listed in FY11 will be continued and expanded if necessary. Monitoring surveys will continue as part of work task C45, as well as the continued participation in annual surveys which are conducted each spring and fall.

Pertinent Reports: A study plan is available upon request, and a summary report is in development.

Work Task C34: Characterization of Zooplankton Communities in Off-channel Native Fish Habitats

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$60,000	\$69,518.18	\$111,714.31	\$10,000	\$0	\$0	\$0

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

Start Date: FY09

Expected Duration: FY11

Long-term Goal: To maintain effectiveness of restored fish habitats.

Conservation Measures: BONY5, RASU6.

Location: Various off-channel fish grow-out ponds and native fish refugia.

Purpose: To determine the relative abundance of zooplankton in off-channel ponds being used to support native fish communities within the Colorado River floodplain.

Connections with Other Work Tasks (past and future): This work is related to Lake-Side Rearing Ponds (B7), Overton Wildlife Management Area (B11), Imperial Ponds Native Fish Research (C25), Post Development Monitoring of Fish Restoration Sites (F5), and Adaptive Management Research Projects (G3).

Project Description: This study will characterize the existing zooplankton communities of the various flood-plain ponds being used within the LCR to hold and/or rear RASU and/or BONY. Off-channel habitats, including both man-made and natural flood-plain ponds are being used to support communities of RASU and BONY. In some ponds the fish are fed prepared feeds, in some cases the ponds are only fertilized with the assumption that this act boosts development of zooplankton for food, and in some cases neither feed nor fertilizer are added to the ponds and the fish must subsist on whatever food is naturally available.

To maximize management of these habitats, the amounts of zooplankton in these ponds must be determined. This study will collect and analyze zooplankton samples from such ponds quarterly over a 2-year period to characterize these zooplankton communities. Future investigations may be developed to evaluate ways to manipulate zooplankton communities to benefit native fishes.

Previous Activities: Preliminary samples were collected from lake-side rearing ponds (B7) on Lake Mohave, AZ/NV. This effort was conducted to refine sampling procedures

and develop a study design for the three year study. A written protocol for sample collection, including necessary equipment and procedures, was developed.

Quarterly zooplankton samples were collected from a total of 33 native fish ponds during FY09. Samples were analyzed and zooplankton community structures were characterized and identified to the division, genus, and species levels.

FY10 Accomplishments: Zooplankton samples were collected quarterly from a total of 33 native fish ponds located within river reaches 1-5. Reach 1 sampling sites included one pond at Floyd Lamb State Park and two ponds at the Overton Wildlife Management Area (B11), Reach 2 sites included nine lake-side rearing ponds (B7) on Lake Mohave, Reach 3 included Beal Lake, Office Cove pond, and two Needles Golf Course ponds, Reach 4 included Parker Dam Pond, three Emerald Canyon Golf Course ponds, and seven ponds at the Achii Hanyo Rearing Station (B3), and Reach 5 included six ponds at the Imperial Ponds Native Fish Research site (C25). Sample analysis to identify and enumerate the zooplankton community structure was conducted each quarter following sample collection.

Due to the various management strategies used for these sites, not all ponds were available to sample every quarter. Some ponds, such as the lake-side rearing ponds (B7) on Lake Mohave, were dry for a portion of the year to facilitate harvesting of native fish for repatriation to the Colorado River. Even though this prevented fall or winter collections at a few of the sampling sites, well over one hundred samples were collected and analyzed during FY10. In addition to the regular quarterly sampling, a subset of ponds was sampled with increased frequency throughout the spring to provide a more complete picture of what changes were occurring within the zooplankton community between quarterly sampling. Analysis of these samples failed to capture any dramatic shifts in community structure, but samples will be further analyzed to determine any seasonal trends in the zooplankton community.

FY11 Activities: This last year of study will focus on writing a final report that will summarize and interpret data from two years of sampling, review literature detailing the known food and feeding habits of native fish, and correlate and make comparisons between the observed zooplankton community of these ponds and what is known about foraging needs of native fish. Feeding trials will also be carried out in a laboratory environment using young-of-year RASU (and possibly BONY) fed zooplankton captured from Lakes Mead and Mohave. These results will be compared to the extant zooplankton communities found within the study ponds and used to characterize the utility of these communities to grow native fish.

Proposed FY12 Activities: Closed in FY11.

Pertinent Reports: A final report will be completed during 2011.

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

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$50,000	\$33,949.46	\$33,949.46	\$150,000	\$175,000	\$150,000	\$0

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

Start Date: FY10

Expected Duration: FY13

Long-term Goal: To determine roosting characteristics for the western red bat and western yellow bat.

Conservation Measures: MRM1 (WRBA, WYBA).

Location: Within the LCR MSCP project boundary, Bill Williams River NWR, and possibly other riparian areas where western red bats and/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): Work tasks D9 and F4 determine the distribution of each species and determine areas in which to capture the target species.

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 will be used to design habitat creation projects for these species. Few western red bats have been captured within the LCR MSCP program area. It may be necessary to include other riparian areas in the study in order to increase sample size.

Previous Activities: Capture locations for this study were determined by activities associated with D9 and F4.

FY10 Accomplishments: Preliminary mist-netting was conducted to determine likely areas where red and yellow bats could be captured both on the LCR and elsewhere. Equipment was purchased for the project.

FY11 Activities: The first year of the study will be implemented and an annual report will be written. Several areas will be mist-netted to obtain red and yellow bats for placement of transmitters throughout the summer and during late winter. Vegetation data will be collected at day roosts and analysis will be conducted to determine roosting characteristics.

Proposed FY12 Activities: The second year of the study will begin and additional red and yellow bats will be captured in order to achieve a statistically robust sample size. Vegetation data will again be collected and analyzed. If sample size is achieved, a final report will be submitted. If more bats are needed, the project may be extended to FY13.

Pertinent Reports: The study plan is available upon request.

Work Task C36: Elf Owl Detectability Study

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$50,000	\$21,836.95	\$21,836.95	\$50,000	\$20,000	\$0	\$0

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

Start Date: FY09

Expected Duration: FY12

Long-term Goal: To develop a long-term elf owl monitoring plan for the LCR MSCP.

Conservation Measures: MRM1 (ELOW).

Location: Bill Williams River.

Purpose: To conduct a detectability study on a known population of elf owls that breed in riparian habitat.

Connections with Other Work Tasks (past and future): This study will be used to modify the survey protocol used for system-wide (D6) and post-development (F2) presence/absence elf owl surveys.

Project Description: Data to support the current tape-playback presence/absence elf owl survey protocol are lacking. A detectability study will be conducted on a known population of elf owls that breed in riparian habitat along the Bill Williams River. If the population is not large enough, then other populations away from the LCR region, but within other desert riparian areas in the southwest may be studied.

The objectives of this study are to 1) systematically test how varying the parameters of call-playback surveys (distance to owl, time of night, decibel level of call playback, habituation, duration of call playback) affects the response type and response time of elf owls in known locations, 2) recommend survey protocols that optimize detectability, and recommend the number of seasonal surveys and amount of long-term survey effort required for effective population monitoring, and 3) quantify the likelihood of detection if the recommended methods are implemented. Data from this study may be used to modify the existing elf owl presence/absence survey protocol.

Previous Activities: N/A

FY10 Accomplishments: A study plan for the elf owl detectability study was completed in January. Field work for the project took place at the Bill Williams NWR from 1 March

to 2 June. Twelve survey routes within and adjacent to the refuge riparian zone were prepared, mapped and marked in March. Passive listening and call-playback surveys were conducted along the survey routes to inventory elf owls and determine their nesting sites and/or activity centers. When elf owls were detected, follow-up surveys were conducted specifically to determine the center of activity or the nesting site. Seven territories were identified. Efforts to locate owls in the woodland interior were negatively affected by flooding of the Bill Williams River.

Capturing and radio tagging of the elf owls occurred from 1 April to 22 April. Six elf owls were captured and radio-tagged over the course of seven nights of netting. Because elf owls could almost always be located in great precision by the process of passive listening it was determined that radio telemetry would not be required to determine an elf owl's position prior to performing detectability trials. Therefore elf owls from all seven territories could be subject to detectability tests without making it a prerequisite to capture and radio tag them.

Detectability experiments were conducted on these seven pairs from 9 April to 2 June. Parameters tested were distance and time. Three different call-playback distances were tested (100 m, 250 m and 450 m) and three different times of night (Dusk: 30 minutes after sunset until 12 a.m., Mid-night: 12 a.m. to 3 a.m., and Predawn: 3 a.m. until 30 minutes before sunrise) were tested. An experimental matrix was constructed whereby each owl was tested for each combination of distance and time of night.

A total of 53 detectability trials were performed. For surveys at dusk the detectability rate was 94%, for surveys at mid-night the detectability rate was 100% and for surveys at predawn the detectability rate was 72%. For surveys performed 100 m away from the owl the detectability rate was 86%, for surveys performed 250 m away from the owl the detectability rate was 90% and for surveys performed 450 m away from the owl the detectability rate was 89%. When the trials were performed on nights with a full, half, quarter or new moon phase detectability rates were 100%. When trials were performed on nights with a gibbous moon phase detectability rates were 65%.

FY11 Activities: Field work for the second season of study will take place from 1 March to 2 June. Survey routes at the Bill Williams NWR will be mapped and marked. Additional efforts will be made to locate owls nesting in the woodland interior. Passive listening and call-playback surveys will be conducted along the survey routes to inventory elf owls and determine their nesting sites and/or activity centers.

Detectability experiments similar to the ones in 2010 will be conducted on at least 10 elf owls. Habituation testing will be incorporated into the detectability trials. The effect of moon phase on responsiveness will be further investigated. Further data will be gathered on home range size and habitat use using radio-tagged elf owls.

A final report on the project will be completed that will include detailed method and results of the study. This report will also include recommended survey protocols and associated detection probabilities.

Proposed FY12 Activities: The final report will be reviewed and completed.

Pertinent Reports: The report, *Elf Owl Detectability Study 2010*, will be posted on the LCR MSCP website. The study plan is available upon request.

Work Task C37: Hydrology Studies for Avian Riparian Obligate Species

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$150,000	\$266,477.27	\$266,477.27	\$50,000	\$10,000	\$0	\$0

Contact: Chris Dodge, (702) 293-8115, cdodge@usbr.gov

Start Date: FY10

Expected Duration: FY12

Long-term Goal: Species research.

Conservation Measures: MRM1 (WIFL, YBCU, ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, SUTA).

Location: Southwestern willow flycatcher and yellow-billed cuckoo breeding sites and LCR MSCP habitat creation sites.

Purpose: To measure hydrologic conditions such as soil moisture, depth to ground water, and amount of standing water in the habitat for the southwestern willow flycatcher and the yellow-billed cuckoo in order to manage habitat creation sites.

Connections with Other Work Tasks (past and future): Breeding habitat for willow flycatchers is being determined through studies completed under D2 and breeding habitat for yellow-billed cuckoos is being determined through studies completed under D7. Habitat parameters for other obligate riparian species, such as summer tanagers, yellow warblers, and Bell's vireos that may benefit from these type of studies are being addressed under Work Task D6. This study was initiated under G3 in 2009.

Project Description: Based on information gathered during surveys for southwestern willow flycatchers on the LCR since 1997, it has been noted that within the dense, moist riparian habitats where flycatchers are found, several other LCR MSCP covered species are also commonly encountered. These species include yellow-billed cuckoos, summer tanagers, vermilion flycatchers, yellow warblers, gilded flicker, and Gila woodpecker. Some soil moisture and/or standing water may be an important feature of optimal riparian habitat, but the exact role this water has in habitat use is not known. It may increase vegetation health, which may be related to insect abundance, or it may increase humidity and lower temperatures. It is also not known how long moisture needs to be present or how large an area needs to be kept in this state during the breeding season.

Although much has been determined regarding site conditions needed for breeding southwestern willow flycatchers (flycatchers) and yellow-billed cuckoos (cuckoos), quantification of how much moist soil or standing water within breeding locations, and how to maintain needed hydrological conditions is still undetermined. This study will review hydrological studies that have been completed already within other river systems that have nesting flycatchers and cuckoos. Monitoring will also begin on hydrologic conditions such as ground water, soil moisture and standing water under known breeding flycatcher and cuckoos sites along the Virgin and lower Colorado River systems.

Previous Activities: New start in FY10.

FY10 Accomplishments: Additional funds became available in FY10 which enabled Reclamation to complete this work in advance. In February and March of 2010 sites were selected and random plots were placed in known willow flycatcher and yellow-billed cuckoo habitats at Bill Williams River National Wildlife Refuge, Topock Marsh, Mormon Mesa, and at the Cibola Valley Conservation Area. Piezometers were placed at each site and transects were established to measure each point for various hydrologic characteristics. The following characteristics were measured at each site: depth to water table, soil texture, soil organic layer, soil moisture and temperature, standing water, and indices for evapotranspiration were created.

The percent soil moisture was measured using two different methods over the course of the field season. Soil moisture was recorded deeper in the soil to measure the soil moisture conditions closer to the tree root zone. A second method was used for purposes of analysis only in which soil moisture was determined from overall soil samples. Air temperature and relative humidity were used as proxies to estimate evapotranspiration. Standing water was measured using a variation of the line intercept method. Existing wells were measured once per month to obtain depth to ground water. These wells were located at varying distances from the river.

At SWFL sites in this study, soil moisture was best predicted by soil texture and distance from flowing water, and relative humidity was best predicted by vegetation canopy height. Sites with lower percent sand had higher percent soil moisture, and sites closer to flowing water had generally lower percent soil moisture. Relative humidity was higher in sites with higher canopy height.

At YBCU sites in this study, soil moisture was best predicted by soil texture. Sites with lower percent sand had higher percent soil moisture. Preliminary data show no significant relationships between vegetation characteristics and the other measured environmental variables.

The SWFL sites had lower average air temperatures, higher average relative humidity, and higher percent canopy cover compared with the YBCU sites. There were no significant differences in the height of the canopy or the percent ground cover between SWFL and YBCU sites.

FY11 Activities: The second year of sampling will take place at the same areas sampled in year one. The data collected will be used along with data collected in year one to characterize hydrologic conditions of breeding yellow-billed cuckoo and southwestern willow flycatcher habitat. After the second year of data has been collected, a final report will be drafted.

Proposed FY12 Activities: The final report will be posted to the LCR MSCP website.

Pertinent Reports: The annual report for 2010, *Soil Hydrology Conditions in Occupied Southwestern Willow Flycatcher and Yellow-Billed Cuckoo Habitat*, will be posted on the LCR MSCP website. The study plan is available upon request.

Work Task C38: Stable Isotope and Microchemistry Analyses of Fin Rays to Determine Habitat Use and Movement Patterns of Razorback Sucker in Reach 3

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$80,000	\$6,250.70	\$6,250.70	\$0	\$0	\$0	\$0

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

Start Date: FY10

Expected Duration: Closed in FY10

Long-term Goal: Assess the effectiveness of the fish augmentation program.

Conservation Measures: RASU3, RASU6.

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

Purpose: To determine unknown hatchery origins and habitat use of RASU within Reach 3 using strontium isotope microchemistry analyses of fin rays.

Connections with Other Work Tasks (past and future): This work is related to C29 and D8. Fin ray segments that were collected for aging will be retained and further analyzed relative to their stable isotope and microchemistry composition. The results of this work will assist in directing our system monitoring efforts for the program.

Project Description: This study is to determine hatchery origin and age-related habitat use for RASU within Reach 3 of the Colorado River using strontium isotope ratios (^{87}Sr : ^{86}Sr) of pectoral fin ray samples used in the Reach 3 aging study. The use of stable isotopes and microchemistry analyses of bony structures, which utilize naturally occurring chemical compounds from the fish's environment throughout its lifetime, is a promising measure of hatchery origin and habitat use. Matching chemical signatures found in a specific river and hatchery locations with fin ray samples collected during the aging study may identify the association of successful hatchery stockings and age-specific habitat use of repatriated RASU introduced under the Lake Havasu Fishery Improvement Project and the Lower Colorado River Multi-Species Conservation Program.

Previous Activities: Samples from more than 300 RASU collected from Reach 3 of the Colorado River in FY09 as part of work task C29, along with water samples collected throughout Reach 3 (river, backwaters, hatcheries, etc.), were provided to the University of California, Davis for quantifying ^{86}Sr : ^{88}Sr isotopic ratios.

FY10 Accomplishments: An oral presentation of results was given at the Colorado River Aquatic Biologists (CRAB) meeting in Laughlin, Nevada. Results from analyses suggest that there is too little separation between sites and that fish did not appear to spend enough time in any one habitat or water mass to allow differentiation at a level that would be useful to LCR MSCP researchers. A completion report has been prepared.

FY11 Activities: Closed in FY10.

Proposed FY12 Activities: Closed in FY10.

Pertinent Reports: A report titled, *Stable Isotope and Microchemistry Analyses of Fin Rays to Determine Habitat Use and Movement Patterns of Razorback Sucker (*Xyrauchen texanus*) in Reach 3*, is completed and will be posted to the LCR MSCP website.

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

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$90,000	\$251,804.17	\$251,804.17	\$250,000	\$250,000	\$250,000	\$250,000

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

Start Date: FY10

Expected Duration: FY15

Long-term Goal: Assess the effectiveness of the fish augmentation program.

Conservation Measures: BONY3, BONY5.

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

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

Connections with Other Work Tasks (past and future): This work is related to work tasks B2, B3, and B4, all of which provide BONY for augmentation stocking. Study results will add to the database used to complete D8.

Project Description: This study will follow stocked fish 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, electro-fishing, and visual observations. A final report will make recommendations for future BONY augmentation stockings.

Previous Activities: N/A

FY10 Accomplishments: A contract was awarded midyear to conduct the first three years of the BONY survival study. Program funds were available and expended to fund the first year of the project which extends into FY11.

The first round of acoustic telemetry implemented under the reported work task was completed. Twenty bonytail reared at Dexter National Fish Hatchery and Technology Center were each surgically implanted with an acoustic transmitter and released with 1,900 additional bonytail into Lake Havasu at the Bill Williams River National Wildlife Refuge boat ramp. Fish were monitored for a three month post-stocking period using active and passive tracking techniques to determine survival and dispersal. All acoustic

tagged bonytail were contacted and by the end of the 90-day study period fish had dispersed as much as 30-km upstream from the stocking area. Post-stocking survival over the course of the study was high (95%); only one transmitter was recovered by divers from the bottom of the reservoir. All other fish were thought to be living at the end of the study.

Concurrent to the work in Lake Havasu, a captive fish experiment was implemented at Dexter National Fish Hatchery and Technology Center to assess our surgical techniques and to monitor fish health and tag retention over a three month period. Twenty bonytail (ten implanted with 3-month acoustic tags and ten with six-month acoustic tags) and twenty control fish were held in an indoor raceway for a period of three months. At the conclusion of the study, all fish remained healthy and no transmitters were shed. No adverse affects of tag implantation were apparent when necropsies were performed on five fish.

FY11 Activities: Activities during FY11 will focus on a second round of acoustic telemetry which will utilize six-month transmitters implanted in bonytail reared at Achii Hanyo. This work will rely more intensively on Submersible Ultrasonic Receivers, some of which will be retrievable exclusively via SCUBA, to determine the extent of post-stocking dispersal and survival. Active tracking of bonytail will consist of bi-monthly sampling trips. Annual bonytail and razorback sucker trammel netting surveys will be conducted with USFWS, AZDFG, BLM, CDFG, and BLM during February 2011. Continued communication with anglers will be made via flyers and using personal communication to learn more about potential predation events and from hook and line capture of bonytail.

Proposed FY12 Activities: Another iteration of acoustic telemetry to determine post-stocking survival and dispersal of bonytail is planned. All bonytail destined for Lake Havasu will each receive a 134 kHz PIT tag. Remote PIT-scanning stations will be deployed in areas of concentrated habitat use as determined by results from preceding acoustic telemetry work. Annual netting surveys will continue in collaboration with partnering agencies.

Pertinent Reports: Study plans are available upon request and annual reports will be posted to the MSCP website upon completion.

Work Task C40: Genetic and Demographic Studies to Guide Conservation Management of RASU and BONY in Off-Channel Habitats

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$75,000	\$71,936.76	\$71,936.76	\$100,000	\$180,000	\$180,000	\$180,000

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 by the LCR MSCP.

Conservation Measures: RASU2, RASU6, BONY2, BONY5.

Location: Reaches 2, 3, 4, and 5 backwater habitats.

Purpose: Quantify genetic and demographic parameters that are necessary for informed, long-term management of RASU and BONY in off-channel habitats.

Connections with Other Work Tasks (past and future): This work is related to Imperial Ponds Native Fish Research (C25), RASU Genetic Diversity Assessment (C31), and Lake-Side Rearing Ponds (B7).

Project Description: When observed on Lake Mohave and elsewhere, RASU and BONY 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 RASU placed into the Yuma Cove backwater in 1991 and 1992, along with analyses of the larval RASU 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 don't always contribute genetic material to the next generation. This information needs to be verified in order to model 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 robustness of the overall RASU and BONY populations within the LCR MSCP program area.

This study will collect demographic and genetic information that will lead to recommendations to optimize long-term management of off-channel habitats for these

two critically endangered fishes. Genetic data will be collected from larval, juvenile, and adult RASU and BONY 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.

Genetic tissues will be collected from groups of adult RASU and BONY. These fish will be tagged and released into backwater habitats. Remote sensing will be used to specifically track tagged adults and determine their presence in spawning areas at specific times. This combination of population and genetic information will allow us to determine the actual location of spawning and to evaluate reproductive success of specific individuals. These data can then be compared and contrasted to determine the actual number of individuals which participate in annual spawning activities, to census the populations, and to quantify patterns of survivorship.

There are three phases to the study: field observations, laboratory analyses of genetic materials, and modeling of populations 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 two years of the study, but estimated costs are initially high to cover purchase of specialized, analytical equipment.

This project requires stable populations for both RASU and BONY to allow for multiple years of censusing. These stable populations are currently available for RASU, and BONY will be incorporated into the study as habitats and populations of BONY become available.

Previous Activities: Tissues from reared RASU and BONY were collected under C31. RASU larvae from lake-side ponds (B7) were also collected.

FY10 Accomplishments: Adult RASU were selected and stocked into two lake-side ponds on Lake Mohave. These ponds (Arizona Juvenile and Dandy) have a history in which the stocked fish have produced offspring. Tissue samples were collected from the adults, larvae and juveniles. The first year also includes the purchase of specialized, analytical equipment.

FY11 Activities: Adult RASU will again be selected and stocked into lake-side ponds on Lake Mohave in an attempt to promote spawning and recruitment. Samples collected during FY10 and FY11 will be analyzed, and the analyses from both stocked fish and their offspring in refuge and grow-out ponds will be continued so as to build family trees and assess genetic material transfer.

Proposed FY12 Activities: Sample collections and analysis similar to that in FY10 and FY11 will continue. Expansion of this work to other off-channel habitats will be incorporated if possible. Off-channel habitats capable of supporting multiple generations will allow us to track the transfer of genetic material from a founding population to any subsequent generations.

Pertinent Reports: Study plans are available upon request, and annual reports will be posted to the LCR MSCP website upon completion.

Work Task C41: Role of Artificial Habitat in Survival of RASU and BONY

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$25,000	\$5,885.67	\$5,885.67	\$25,000	\$25,000	\$15,000	\$0

Contact: Jeff Anderson (702) 293-8216, jranderson@usbr.gov

Start Date: FY10

Expected Duration: FY13

Long-term Goal: Assess effectiveness of the fish augmentation program.

Conservation Measures: BONY3, BONY5, RASU3, RASU5, RASU6.

Location: Reach 3, Beal Lake.

Purpose: To assess use and role of artificial reefs and structures by native fishes released by the LCR MSCP.

Connections with Other Work Tasks (past and future): This work is related to all work tasks in Section B that provide RASU and BONY for augmentation stocking, particularly B7, C23, and F5. Study results will add to the database used to complete D8.

Project Description: Approximately 800 acres of artificial fish habitat have been constructed and deployed in Lake Havasu over the past 15 years. Similar structures have recently been placed into coves in Lake Mohave. RASU have been periodically observed by SCUBA divers in and around these structures, along with numerous species of exotic fishes. This study will determine which if any of these structures may be preferred by native species.

This study was originally to be done in Beal Lake. It was moved to Davis Cove due to low post-stocking survival in Beal Lake. Davis Cove, a rearing pond along Lake Mohave, provides the best opportunity to monitor and assess a native fish population's response to the deployment of artificial habitat. Davis Cove is a 2.7-acre backwater pond that has supported a native fish community since 2005. It is dominated by rock and sand shorelines with little emergent vegetation, and it is devoid of large submerged habitats. This study will place a variety of constructed habitat types into Davis Cove and attempt to determine which types of structures are preferred 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 will also be used to determine future stocking locations in reaches 2 and 3. For example, 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.

Previous Activities: N/A

FY10 Accomplishments: PIT-tag antennae have been purchased and are being incorporated into artificial habitats. Beal Lake was stocked with 610 PIT tagged RASU in February and fish were tracked throughout the year using remote PIT-tag antenna. The population dropped to approximately 130 individuals by the end of the year with more than 50% of the loss occurring during the first 3 months post stocking. The reasons for the loss of stocked fish are unknown, but some possibilities are predation by migratory birds, mortalities associated with stocking and handling, or water quality deficiencies.

FY11 Activities: In the fall, Beal Lake was again stocked with approximately 400 PIT-tagged RASU and the population was monitored into the spring until it had dropped to well below 100 individuals. This poor survival prompted us to move the study to Davis Cove, which has a more reliable native fish population. Davis Cove was stocked with approximately 400 PIT-tagged subadult RASU as part of the association with B7. Constructed habitats equipped with PIT-tag antennae will be deployed in Davis Cove. Additional stockings of marked fish will occur as needed in order to maintain a detectable population size. Use of artificial structures by the fish will be recorded. Data will be analyzed and results developed into annual reports.

Proposed FY12 Activities: Monitoring use of artificial habitats will continue. Stockings of RASU and BONY will continue as needed. Data will be analyzed and developed into a final report.

Pertinent Reports: The study design is available upon request and annual reports will be posted to the LCR MSCP website upon completion.

Work Task C42: Experiments and Demonstration of Soil Amendments for Use in Restoration Sites

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$200,000	\$49,236.73	\$49,236.73	\$100,000	\$200,000	\$200,000	\$200,000

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

Start Date: FY10

Expected Duration: FY15

Long-term Goal: To determine and demonstrate the feasibility of soil amendments to improve restored habitat and management options for irrigation of habitat restoration sites.

Conservation Measures: MRM1 (WIFL, YBCU, ELOW, SUTA, GIWO, GIFL, VEFL, YWAR, BEVI).

Location: Reclamation's Denver TSC laboratory for controlled experiments; possible sites for large demonstrations include the Beal Restoration Site on Havasu NWR.

Purpose: The purpose of this study 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. Habitat conditions for other covered species will also be improved by maintenance of moist soil conditions. Improving soil water holding capacity will also improve water conservation and lower irrigation costs. This work will parallel species habitat and hydrology studies. This 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 search and laboratory studies were conducted under G3.

Project Description: After a review of soil amendments and their associated costs, availability, water retention capabilities, etc., a product called Lassenite Pozzolan was identified as the most feasible and appropriate product for improving water retention and irrigation practices of sandy soils. 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. Depending on results from these controlled experiments, application demonstrations will be conducted on site at the Beal Restoration

Site, where sandy soil conditions exist. Other demonstration areas may be identified in the future.

Previous Activities: In 2007, under Work Task G3, a preliminary literature and product search was conducted to gather information on soil amendments for use in habitat restoration projects. In 2008-2009, additional information was gathered on Lassenite Pozzolan and a complete study proposal was written.

FY10 Accomplishments: Laboratory work was designed to test the feasibility of Lassenite Pozzolan for restoration purposes by exploring: 1) movement of product through the soil profile under flood irrigation, 2) application rates and soil moisture effects at the surface and upper root zones of targeted riparian plants, 3) facilitation of surface water movement from irrigation source to distant areas compared to untreated soils. Results of these experiments showed that 1) the material does not move out of the soil profile under repeated irrigations, 2) soil-Lassenite mixes with percentages as low as 5-10% Lassenite significantly improve moisture retention in sandy soils and maintained moisture levels above 10%, and using Lassenite at 100% in “corridors” on the surface facilitated movement of water through and across sandy soils significantly faster than sand alone.

FY11 Activities: Based on the positive results of laboratory experiments conducted in 2010, a Study Plan will be written to further test the amendment under field conditions at Beal Riparian Area at HNWR. Biomass resulting from seeding of various riparian trees and shrubs will be examined to determine if the addition of Lassenite Pozzolan has a positive effect on germination, survival, growth and soil moisture retention.

Proposed FY12 Activities: Field trials of the amendment will be conducted in existing fields at Beal that were planted previously but have not produced the desired habitat quality. Implementation of the study plan will begin once the site has been cleared (January/February 2012), prepared with Lassenite, and planted. Monitoring will continue at the study site at Beal.

Pertinent Reports: *Feasibility of Using Soil Amendments to Increase Water Retention at Restoration Sites on the LCR, and Laboratory Testing of Lassenite Pozzolan for Use as a Soil Amendment at Habitat Restoration Sites, 2010* will be posted to the website. The study plan is available upon request.

Work Task C43: Population Demographics and Habitat Use of California Leaf-nosed Bat, a Genetic Evaluation

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$0	\$0	\$0.00	\$20,000	\$40,000	\$60,000	\$0

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

Start Date: FY11

Expected Duration: FY13

Long-term Goal: Determine the population demographics and habitat use of an MSCP evaluation species, the California leaf-nosed bat.

Conservation Measures: CLNB1, CLNB2.

Location: Reaches 3-5.

Purpose: Determine the population genetic history of California leaf-nosed bats along the LCR including geographic structuring, evolutionary history, and other population demographic parameters using modern molecular techniques and determine the distribution of genetic variation in California leaf-nosed bat roost sites and identify where individuals from different roosts are foraging.

Connections with Other Work Tasks (past and future): Data on roost site location and samples collected from restoration sites will come from surveys conducted under D9 and F4.

Project Description: This work task is being initiated to evaluate to status of California leaf-nosed bats along the LCR within the framework of the LCR MSCP using a modern molecular approach. This will allow a better understanding of how far individuals are willing to travel to forage (currently assumed to be only 5 miles) and what constitutes appropriate habitat.

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 roost sites and allow various population demographic parameters to be estimated. These parameters include population size, previous population expansion or contraction, and dispersal between roosts. Individuals collected during conservation area monitoring will be assigned to their most likely roost site based on their unique genetic signature.

Distance from roosts to restoration sites and other pertinent habitat information will be determined using GIS.

Previous Activities: N/A

FY10 Accomplishments: Preliminary activities prior to FY11 were conducted under G3. Study design and initial sampling of LCR roosts has been conducted. Some samples from Mexico have been secured. Mitochondrial sequencing for initial candidate samples has been completed.

FY11 Activities: Genetic sampling will continue along the LCR in nearby roosts in Arizona and California. These samples, along with genetic samples taken during activities associated with mist netting at restoration sites will be used for microsatellite development.

Proposed FY12 Activities: Genetic sampling will continue along the LCR in nearby roosts in Arizona and California. These samples, along with genetic samples taken during activities associated with mist netting at restoration sites will be used for microsatellite development and analysis of genetic markers. All genetic data from both the roosts and restoration sites will be compared and analyzed to determine if distance from roost sites can be calculated, and which roost sites the bats captured at restoration sites are coming from. A final report including management recommendations will be developed.

Pertinent Reports: An annual report will be posted on the LCR MSCP website. The research design is available upon request.

Work Task C44: Management of Fish Food Resources in Off-channel Native Fish Habitats

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$0	\$0	\$0.00	\$60,000	\$100,000	\$100,000	\$0

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

Start Date: FY11

Expected Duration: FY13

Long-term Goal: To maintain effectiveness of restored fish habitats.

Conservation Measures: BONY5, RASU6.

Location: Various off-channel fish grow-out ponds and native fish refugia.

Purpose: To evaluate techniques for maintaining ample food resources for native fishes in off-channel ponds within the Colorado River floodplain.

Connections with Other Work Tasks (past and future): This work is related to Lake-Side Rearing Ponds (B7), Overton Wildlife Management Area (B11), Imperial Ponds Native Fish Research (C25), Characterization of Zooplankton Communities in Off-Channel Native Fish Habitats (C34), Post-Development Monitoring of Fish Restoration Sites (F5), and Adaptive Management Research Projects (G3).

Project Description: This three year study will evaluate means to enhance food resources in the various flood-plain ponds being used within the LCR to hold and/or rear RASU and/or BONY. Off-channel habitats, including both man-made and natural flood-plain ponds are being used to support communities of RASU and BONY. In some ponds the fish are fed prepared feeds, in other ponds organic and/or inorganic fertilizers are used based on the assumption that they boost development of plankton for food, and in some cases neither feed nor fertilizer are added to the ponds and the fish must subsist on whatever food is naturally available. To maximize management of these habitats, the amounts of zooplankton in these ponds must be determined. This study evaluates ways to manipulate zooplankton communities to benefit native fishes, as well as develop recommendations for adding feed and/or fertilization to maintain food levels needed by native fish to attain targeted growth rates.

Previous Activities: Information characterizing the zooplankton communities of 33 separate native fish ponds was collected quarterly during FY09 and FY10. This

information was gathered through Characterization of Zooplankton Communities in Off-Channel Native Fish Habitats (C34), and will be used as a baseline for comparison.

FY10 Accomplishments: New start in FY11.

FY11 Activities: The first year of this study will investigate the effects of pond fertilization on composition, density, and duration of zooplankton communities in Lake-Side Rearing Ponds (B7) on Lake Mohave. Ponds will be fertilized prior to being stocked with native fish in early spring, and zooplankton samples will be collected monthly following fertilization. Zooplankton samples will also continue to be collected from all other native fish rearing ponds previously sampled under Characterization of Zooplankton Communities in Off-Channel Native Fish Habitats (C34). Results of fertilized pond sample analysis will be compared to baseline data to evaluate the most effective ways to manipulate zooplankton communities to the benefit of native fishes.

Proposed FY12 Activities: Investigation into the effects of pond fertilization on zooplankton communities in native fish rearing ponds will continue. Based on findings from the first study year, modifications may be made to the study design and additional treatments or methods of fertilization may be tested. All tests will focus on ways to manage food resources in off-channel habitats to improve quantity and quality of fish reared for the program.

Pertinent Reports: A report characterizing zooplankton communities in off-channel native fish habitats will be completed in 2011.

Work Task C45: Ecology and Habitat Use of Stocked RASU in Reach 3

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$0	\$0	\$0.00	\$170,000	\$200,000	\$200,000	\$200,000

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

Start Date: FY11

Expected Duration: FY15

Long-term Goal: To assess survival and habitat use of stocked RASU.

Conservation Measures: RASU6.

Location: Reach 3 from Davis to Parker dams.

Purpose: To assess ecology and distribution of habitats available to stocked RASU in Reach 3, and to evaluate the overall effectiveness of the Fish Augmentation Program.

Connections with Other Work Tasks (past and future): Work is related to C33, D8, and G3.

Project Description: There have been more than 28,000 RASU reared and released into Reach 3 through the Fish Augmentation Program and roughly 30,000 more RASU stocked prior to the LCR MSCP. We regularly contact several hundred of these fish each year through annual surveys and associated work task. 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 RASU. In winter and spring, fish are located at known spawning areas near Needles, California, and Laughlin, Nevada. During summer and fall, stocked fish are found throughout the main channels, and in numerous off-channel lakes and ponds within Topock Gorge. This five-year study will assess the availability of physical, chemical, and biological fish habitats within Reach 3 to help identify habitat limitations to survival and to allow assessment of possible habitat saturation.

Previous Activities: This effort will utilize the extant RASU distribution and stocking data accumulated over the first five years of the program.

FY10 Accomplishments: The study design for this new FY11 start was developed under G3.

FY11 Activities: The first year of the study will focus on habitat mapping of Reach 3 and superimposing RASU monitoring data onto these maps. Field investigations will focus on gaps in geographic coverage of netting, shocking, and telemetry data. Findings will be used to focus study actions for FY12 and FY13.

Proposed FY12 Activities: Habitat mapping of Reach 3 will continue as needed and field investigations will target specific RASU habitats which are being used to varying degrees. Physical, chemical, and biological parameters will be recorded for all habitats to help identify habitat limitations to survival, and to allow assessment of possible habitat saturation.

Pertinent Reports: The study design is available upon request and annual reports will be posted to the LCR MSCP website upon completion.

Work Task C46: Physiological Response in BONY and RASU to Transport Stress

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$0	\$0	\$0.00	\$120,000	\$120,000	\$70,000	\$0

Contact: Andrea Montony, (702) 293-8203, amontony@usbr.gov

Start Date: FY11

Expected Duration: FY13

Long-term Goal: To maintain effective fish augmentation program.

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

Location: Dexter NFH.

Purpose: Characterize the physiological stress response of BONY and RASU during pond harvest, tagging, and before, during, and after transport, discern levels of recovery and post hauling mortality to develop an effective transport protocol.

Connections with Other Work Tasks (past and future): This work is related to Dexter National Fish Hatchery (B4), Razorback Sucker Rearing Studies (C10) and Bonytail Rearing Studies (C11).

Project Description: This three year study will characterize the physiological stress response of BONY and RASU before, during, and after a 12 hour transport. Results will be used to develop and test revised hauling procedures to minimize such stress.

Previous Activities: This effort is building upon research conducted under Razorback Sucker Rearing Studies (C10) and Bonytail Rearing Studies (C11).

FY10 Accomplishments: New start in FY11.

FY11 Activities: The first year of the study will measure and record levels of blood plasma cortisol, glucose, osmolality, and chloride levels in BONY before, during, and after a 12-hour transportation before returning to Dexter NFH. BONY are to be netted from the truck and held in 500-liter circular tanks for three weeks to monitor for disease and mortality.

Proposed FY12 Activities: The second year of the study will measure and record levels of blood plasma cortisol, glucose, osmolality, and chloride levels in RASU before,

during, and after a 12 hour transportation before returning to Dexter NFH. BONY are to be netted from the truck and held in 500-liter circular tanks for three weeks to monitor for disease and mortality.

Pertinent Reports: The scope of work is available upon request.

Work Task C47: Genetic Monitoring and Management of BONY Recruitment in Hatchery Rearing Ponds

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$0	\$0	\$0.00	\$220,000	\$250,000	\$250,000	\$250,000

Contact: Andrea Montony, (702) 293-8203, amontony@usbr.gov

Start Date: FY11

Expected Duration: FY14

Long-term Goal: To assess the effectiveness of the fish augmentation program.

Conservation Measures: BONY3, BONY4, and BONY5.

Location: Off-site rearing stations (Dexter NFH, Achii Hanyo Rearing Station and Uvalde NFH).

Purpose: To assess effects of volunteer spawning by BONY 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 is related to Willow Beach National Fish Hatchery (B2), Dexter National Fish Hatcher (B4), Uvalde National Fish Hatchery (B10), and Bonytail Rearing Studies (C11).

Project Description: This three year study will characterize the genetic diversity of inadvertently spawned BONY in ponds at Achii Hanyo Rearing Facility, Dexter NFH, and Uvalde NFH and compare these to the founder population of BONY broodstock at Dexter. This project will determine average diversity of pond recruitment. The study will also assess utility of using a biological control (piscivorous fish) to reduce or eliminate inadvertent spawns in grow-out ponds.

Previous Activities: This effort is building upon research conducted under Dexter National Fish Hatchery (B4), Uvalde National Fish Hatchery (B10), and Bonytail Rearing Studies (C11).

FY10 Accomplishments: New start in FY11.

FY11 Activities: Tissue samples will be collected from young of year BONY resulting from inadvertent spawning in rearing ponds at Dexter NFH and Achii Hanyo Rearing Station. Uvalde NFH will provide tissue samples preserved from the 2010 recruitment year class. Samples are to be analyzed and compared to the diversity in the original

broodstock of BONY, and evaluated to assess impact of inadvertent recruitment by determining the average number of parental contributors.

Investigate biological controls (piscivorous fish) to reduce or eliminate inadvertent spawns which may lead to overcrowding, high densities resulting in oxygen depletion, and increased susceptibility to disease. Trials will be conducted at Dexter NFH and Achii Hanyo Rearing Station to develop biological controls for pond recruitment in BONY. Treatments include BONY with no piscivorous fish, one half pound piscivorous fish for every 50 pounds of BONY, and one pound piscivorous fish for every 50 pounds of BONY.

Proposed FY12 Activities: Tissue samples will be taken from an additional 1,000 bonytail and analyzed. Initial treatment protocols looking at a biological control will be repeated in FY12, and adjustments based on previous year's results.

Pertinent Reports: Scopes of work are available upon request.

Work Task C48: Genetic Characterization of RASU Broodstock at Dexter NFH

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$0	\$0	\$0.00	\$60,000	\$60,000	\$0	\$0

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

Start Date: FY11

Expected Duration: FY12

Long-term Goal: To assess the effectiveness of the fish augmentation program.

Conservation Measures: RASU3, RASU4.

Location: Dexter NFH.

Purpose: To genetically assess RASU captive broodstock.

Connections with Other Work Tasks (past and future): Willow Beach National Fish Hatchery (B2), Dexter National Fish Hatchery (B4), Bubbling Ponds Fish Hatchery (B5), Uvalde National Fish Hatchery (B10), Razorback Sucker Rearing Studies (C10), and Razorback Sucker Genetic Diversity Assessment (C31).

Project Description: This two-year study will compare the genetic diversity of captive RASU broodstock and the source stock at Lake Mohave. Dexter NFH maintains three different stocks of RASU that originated from Lake Mohave. Concern has been expressed that captive fish stocks have lowered genetic diversity and thus less utility for conservation activities. To address this concern, razorback sucker broodstocks will be tested to ensure that they are genetically diverse and representative of wild populations. Levels of inbreeding, allelic diversity, and statistical measures used to identify genetic divergence will be calculated.

Previous Activities: This effort builds upon research from Dexter National Fish Hatchery (B4), Uvalde National Fish Hatchery (B10), Razorback Sucker Rearing Studies (C10), and Razorback Sucker Genetic Diversity Assessment (C31).

FY10 Accomplishments: New start in FY11.

FY11 Activities: A study design detailing how captive stocks of RASU will be genetically assessed was completed. The captive stocks held at Dexter NFH will be assessed for genetic similarity and compared to wild samples. Objectives to be

accomplished include assessment of the genetic variability within and between razorback sucker broodstocks, including the progeny of wild fish and F1 adults held at Dexter NFH, and analysis of broodstock tissues from Ouray NFH and Grand Valley FRO razorback sucker stocks for comparison to the Dexter stock. Microsatellite data will be used to generate an individual genotype (genetic profile) for each of the brood fish from the three stocks at Dexter NFH, in addition to captive stocks from the upper basin and from wild razorback sucker in Lake Mohave and in the Colorado River above Lake Mohave. Population genetics analysis will be performed using statistical programs to test for Hardy-Weinberg equilibrium (in which both alleles and genotype frequencies remain constant in a randomly breeding population), population subdivision, inbreeding, and levels of gene flow. Levels of polymorphism, population subdivision, and heterozygosity will also be assessed.

Proposed FY12 Activities: Research will continue based on findings from the first study year. Following individual genetic assessment, a pairwise relatedness analysis of all individuals potentially used for production at both Ouray NFH and Dexter NFH will be performed. Relatedness estimates will then be compared to the wild stock estimates to determine if the broodstocks are proportionally more related than the wild stocks. The results of this analysis will be used to ensure production of fish that are genetically diverse by allowing managers to avoid mating individuals that are related.

Pertinent Reports: The scope of work is available upon request. Annual reports will be posted to the LCR MSCP website upon completion.

Work Task C49: Investigations of RASU and BONY Movements and Habitat Use Between Parker and Palo Verde Dams

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$0	\$0	\$0.00	\$125,000	\$150,000	\$150,000	\$0

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

Start Date: FY11

Expected Duration: FY13

Long-term Goal: To maintain an effective fish augmentation program.

Conservation Measures: BONY3, BONY 4, BONY5, RASU3, RASU4, and RASU6.

Location: Reach 4, Colorado River, between Parker and Palo Verde dams.

Purpose: Assess distribution and habitat use of stocked RASU and BONY.

Connections with Other Work Tasks (past and future): This work is related to C8 and D8.

Project Description: The upper portions of Reach 4, specifically the area between Headgate Rock and Palo Verde dams, maintain the diversity of habitats that were historically common in the lower river; these habitats include backwaters, as well as swift and slow moving riverine habitats. This three-year study will evaluate post-stocking survival, movement, and habitat use of RASU and BONY released between Parker and Palo Verde dams. 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 Colorado River Indian Tribes land and has not previously been examined by LCR MSCP staff.

Previous Activities: This effort is building upon research conducted under C8. RASU and BONY have been stocked below Parker Dam since 2005.

FY10 Accomplishments: New start in FY11.

FY11 Activities: The study will consist of electro-fishing and trammel net surveys across a variety of habitats, as well as seasonal water quality profiles in areas of known use. Literature reviews will be conducted and fish sampling data from previous state and federal studies will be reviewed and compiled.

Proposed FY12 Activities: Activities from FY11 will continue and will include sonic tracking. RASU and BONY will continue to be stocked as part of the fish augmentation program.

Pertinent Reports: The study design is available upon request and annual reports will be posted to the LCR MSCP website upon completion.

Work Task C50: Food Habits of Adult RASU Below Hoover Dam

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$0	\$0	\$0.00	\$60,000	\$0	\$0	\$0

Contact: Andrea Montony, (702) 293-8203, amontony@usbr.gov

Start Date: FY11

Expected Duration: Closed in FY11

Long-term Goal: To maintain effective fish augmentation program.

Conservation Measures: RASU6.

Location: Colorado River between Hoover Dam and Willow Beach.

Purpose: To update life history information for RASU.

Connections with Other Work Tasks (past and future): This work is related to Demographics and Post-Stocking Survival of Repatriated Razorback Sucker in Lake Mohave (C12) and Razorback Sucker and Bonytail Stock Assessment (D8).

Project Description: Literature reviews show that feeding habits of RASU are based on indirect observation, usually from post-mortem examination of stomach contents. Natural environments were generally too silty and turbid for direct observations. Augmentation stockings from the LCR MSCP have resulted in a population of 200 adult RASU using gravel shoals below Hoover Dam. The water clarity is extremely good, allowing for high quality video capture of feeding activities of these fish. This work will use divers to video the feeding activities and to collect substrate samples from feeding areas. Samples will be analyzed for composition and volume of food items. Electrofishing will be conducted to capture adult RASU from this area, and stomach contents will be captured by lavage (back-flushing with water). Data will be analyzed and reported.

Previous Activities: This effort stems from preliminary observations derived by activities conducted under work tasks Demographics and Post-Stocking Survival of Repatriated Razorback Sucker in Lake Mohave (C12) and Razorback Sucker and Bonytail Stock Assessment (D8).

FY10 Accomplishments: N/A

FY11 Activities: Due to budget constraints, a decision was made to delay the start to FY12. Upon further scientific review, a decision was made to close this work task.

Proposed FY12 Activities: Closed in FY11.

Pertinent Reports: The study design available upon request.

Work Task: C51 Vermilion Flycatcher Detectability and Distribution Study

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$0	\$0	\$0.00	\$0	\$20,000	\$150,000	\$150,000

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

Start Date: FY12

Expected Duration: FY15

Long-term Goal: Determine current distribution and abundance of VEFL along the LCR.

Conservation Measures: MRM1, MRM2.

Location: Various sites from Lake Mead to Yuma.

Purpose: To determine best field method for surveying and determine the current population abundance and location of VEFL within the LCR MSCP boundary.

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 D6. Information obtained through this work task will also be used in association with C24 to help define habitat requirements for riparian obligate bird species.

Project Description: General bird surveys conducted under D6 in habitats recently occupied by VEFL (Bill Williams River NWR) have not detected VEFL in the numbers expected. Species-specific surveys conducted non-randomly, and much earlier in the spring than the multi-species surveys, may be required to determine current LCR population numbers and locations. Literature reviews will be conducted, a species specific survey design will be developed, and potential survey site locations will be determined. Species specific surveys will be conducted based on survey design and data will be used to determine population abundance and distribution. Vegetation data may also be collected at detection sites to determine suitability of habitat for VEFL.

Previous Activities: N/A

FY10 Accomplishments: New start in FY12.

FY11 Activities: New start in FY12.

Proposed FY12 Activities: A literature review will be conducted to examine Christmas Bird Count Data and other information. A study design and field protocol will be developed for the targeted surveys that will be conducted in FY13 and FY14. Several preliminary surveys will be conducted December through April to assist in determining the initial study design and field protocols.

Pertinent Reports: N/A

Work Task C52: Gilded Flicker Detectability and Distribution Study

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$0	\$0	\$0.00	\$0	\$20,000	\$150,000	\$150,000

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

Start Date: FY12

Expected Duration: FY15

Long-term Goal: Determine current distribution and abundance of Gilded flicker on LCR by conducting species specific, non-random surveys.

Conservation Measures: GIFL1, MRM1.

Location: Habitat within and adjacent to the LCR MSCP project area.

Purpose: To determine best field method for surveying and determine the current population abundance and location of Gilded flicker within the LCR MSCP boundary.

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 D6. Information obtained through this work task will also be used in association with C24 to help define requirements for riparian obligate bird species.

Project Description: General bird surveys conducted by D6 in habitats recently occupied by gilded flickers have not detected them in numbers expected. Species specific surveys conducted non-randomly, and much earlier than the surveys begin, may be required to determine current LCR population numbers and locations. Literature reviews will be conducted, a species specific survey design will be developed, and potential survey site locations will be determined. Species specific surveys will be conducted based on survey design and data will be used to determine population abundance and distribution. Vegetation data may also be collected at detection sites to determine suitability of habitat for gilded flicker.

Hybridization is known to occur between the red-shafted and the gilded flicker. The extent to which hybridization occurs on the breeding flicker population in and adjacent to the LCR MSCP project area also needs to be determined.

Previous Activities: N/A

FY10 Accomplishments: New start in FY12.

FY11 Activities: New start in FY12.

Proposed FY12 Activities: A literature review will be conducted to examine historical habitat, previous sightings and occurrence of hybridization within the LCR MSCP project area. A study design and field protocol will be developed for the targeted surveys that will be conducted in FY13 and FY14. Preliminary field visits will begin in February extending through early June to assist in determining the initial study design and field protocols.

Pertinent Reports: N/A

Work Task C53: Sonic Telemetry of Juvenile Flannelmouth Suckers in Reach 3

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$0	\$0	\$0.00	\$0	\$120,000	\$120,000	\$120,000

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

Start Date: FY12

Expected Duration: FY15

Long-term Goal: Support flannelmouth sucker (FLSU) conservation.

Conservation Measures: FLSU1 and FLSU3.

Location: Reach 3, Arizona/Nevada/California.

Purpose: Determine habitat use and preference for juvenile FLSU in Reach 3. Provide resource managers with recommendations to enhance juvenile flannelmouth sucker habitats as a requirement for MSCP habitat creation goals.

Connections with Other Work Tasks (past and future): Work conducted under this task is related to C15 and C45.

Project Description: Flannelmouth sucker were reintroduced into the Colorado River below Davis Dam by 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 of Davis Dam.

The LCR MSCP completed five years of research on this population. The study contacted all life stages of flannelmouth sucker and telemetry of adults gave us great insight as to movements and habitat use of adult flannelmouth suckers. However, only 9 juvenile flannelmouth suckers greater than 100 mm and less than 350 mm total length were contacted during this study. Previous studies by U.S. Geological Survey in the 20 river miles above Lake Havasu had similar difficulty contacting juveniles, but found that while flannelmouth sucker contacts were rare, the majority (85%) of flannelmouth captured consisted of these smaller size classes. This study will define the habitats used by these younger fish and provide managers a complete life history of FLSU within Reach 3.

Previous Activities: This study will build upon the previous work accomplished through C15.

FY10 Accomplishments: New start in FY12.

FY11 Activities: New start in FY12. Tagging studies and larval collections were accomplished under D8 in preparation for this study.

Proposed FY12 Activities: The first year of this study will consist of the tagging of hatchery reared suckers which will take place in late winter when predators are less active. We propose to use 4 different model tags with a battery life of 7 days to 9 months. Twenty hatchery reared suckers of varying sizes will be selected and tagged with appropriate sized transmitters. Additional tags will be available for any wild captured flannelmouth suckers encountered while in the field. Tagged fish will be released near Laughlin and tracking will commence immediately following their release.

Pertinent Reports: The study plan is available upon request.

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WORK TASKS SECTION D

SYSTEM MONITORING

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Work Task D1: Marsh Bird Surveys

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$35,000	\$18,997.38	\$166,227.66	\$25,000	\$35,000	\$25,000	\$25,000

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 (CLRA, BLRA).

Location: Havasu National Wildlife Refuge, Arizona and California.

Purpose: Monitor Yuma clapper rail (CLRA), California black rail (BLRA), and western least bittern (LEBI) along a designated reach of the LCR as part of the inter-agency system monitoring program.

Connections with Other Work Tasks (past and future): Data obtained from F2 may also be used in the marsh bird system monitoring program described in D1. The protocol developed for D1 will also be used for F2.

Project Description: Yuma clapper rail and other marsh bird surveys have been conducted annually since the 1980s by multiple agencies. The LCR MSCP surveys are conducted in the Topock Gorge in the Havasu National Wildlife Refuge.

Prior to implementation of the LCR MSCP, a study was conducted to determine whether CLRA surveys could be expanded to a multi-species protocol without compromising CLRA detection rates. Information obtained from this study has produced a multi-species protocol for marsh birds, including the LCR MSCP covered species (CLRA, BLRA, and LEBI). Marsh bird surveys will continue at designated survey points to track detections of covered species utilizing the multi-species protocol.

Previous Activities: Reclamation has monitored CLRA within Topock Gorge since 1996.

FY10 Accomplishments: Marsh bird surveys were conducted between the I-40 Bridge, near Needles, California, and Lake Havasu during March, April, and May 2010. Total CLRA detections ranged from 36 and 45 to 59 individuals per survey period. CLRA detections were similar to those of 2009 surveys. LEBI detections ranged from 7 in

March to 51 in May. This is the highest number of LEBI detected during any survey period in Topock Gorge. One BLRA was detected during the 2010 survey period. This was in April and at the same site as 1 BLRA was detected during the March and April surveys of 2009. Data were compiled and entered into the National Marsh Bird database, <http://www.pwrc.usgs.gov/point/mb/>, which is maintained by the USFWS.

FY11 Activities: Marsh bird surveys are being conducted in Topock Gorge and the upper reaches of Lake Havasu using the multi-species marsh bird survey protocol. Data will be submitted to the USFWS. Information obtained through this work task may be used in planning future marsh bird habitat creation activities.

Proposed FY12 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. Data will be submitted to the USFWS. Information obtained through this work task may be used in planning future marsh bird habitat creation activities. Also, Reclamation will retrieve paper copies currently stored by the USFWS and enter historical CLRA survey data into the database.

Pertinent Reports: *Marsh Bird Surveys–2009*, and *Marsh Bird Survey–2010* will be posted to the LCR MSCP website.

Work Task D2: Southwestern Willow Flycatcher Presence/Absence Surveys

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$650,000	\$152,316.08	\$4,597,478.56	\$675,000	\$675,000	\$675,000	\$675,000

Contact: Chris Dodge, (702) 293-8115, cdodge@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: System monitoring for southwestern willow flycatcher.

Conservation Measures: MRM1, MRM2, MRM4 (WIFL).

Location: Reaches 1-7 along the LCR, the Virgin River between the Virgin River Gorge and Lake Mead, NPS lands in the Grand Canyon below Separation Canyon, and Pahranaagat NWR. Life history study sites are located at 1) Pahranaagat NWR in east-central Nevada, 2) along the Virgin River at Mesquite, Nevada, 3) along the Virgin River, near Mormon Mesa, Nevada, and 4) Topock Marsh, Havasu NWR, Arizona.

Connections with Other Work Tasks (past and future): Information gathered under this work task, and D3 provide data on SWFL population numbers and demographics along the LCR.

Project Description: Presence/absence surveys are conducted along the LCR from the Southerly International Boundary with Mexico (SIB) to Separation Canyon in the Grand Canyon (excluding Hualapai tribal lands), including the lower Virgin River, lower Bill Williams River, and lower Gila River. Life history and cowbird control studies are conducted at four known breeding areas.

Previous Activities: Presence/absence surveys and life history studies for SWFL have been conducted along the LCR since 1996.

FY10 Accomplishments: Contract costs were obligated in FY09 for the FY10 study. Presence/absence surveys were conducted at 74 sites in 15 study areas along the LCR and its tributaries in 2010. Life history studies were conducted at the following sites: Pahranaagat NWR, Nevada; Mesquite, Nevada; Mormon Mesa, Nevada; Muddy River, Nevada; Littlefield, Arizona; Topock Marsh, Arizona; and Bill Williams NWR, Arizona. Sites were not surveyed in the Grand Canyon in 2010 due to low water and inaccessibility. Surveys in the Grand Canyon will be discontinued until water levels rise to a point where access is once again possible.

Studies included banding, nest monitoring, extensive vegetation analysis, and microclimate analysis. Brown-headed cowbird trapping studies were discontinued after 2007, but information from life history studies were utilized to determine effectiveness of post-trapping.

Willow flycatchers were detected on at least one occasion at 44 sites. Breeding SWFLs were detected at 16 sites within the following six study areas: Pahrnagat NWR, Littlefield, Mesquite, Mormon Mesa, Muddy River, Topock Marsh, and Bill Williams River NWR. No flycatcher detections were recorded at any sites south of Bill Williams River NWR after June 16, 2010, and no breeding was confirmed south of Bill Williams River NWR.

During the summer of 2009, the breeding population of flycatchers at Topock Marsh severely declined from a high of 59 birds in 2004 to only one nesting pair, and one successful nest. In 2010 breeding population numbers were also low with two nesting pairs and one successful nest. A study and demonstration is being conducted to monitor the hydrology closely within the stand and to place additional water in a portion of the stand to determine the effects this would have to increasing nesting pairs and potentially successful nests. This was originally scheduled to take place in 2010 but has been postponed until 2011. Pre-monitoring for this study was conducted in 2009 and 2010. Pumping costs associated with this study are being covered under G3.

A total of 21 adult flycatchers were captured in 2010 at the four life history study areas and at Muddy River, and Bill Williams River NWR. An additional 49 adults banded in previous years were resighted. A total of 52 nestlings from 22 nests were banded. Flycatchers were banded opportunistically at St. George. Three new adults and five nestlings were color banded from two nests at St. George. A total of 64 territories were recorded with 39 territories consisting of paired flycatchers and 25 consisting of unpaired individuals. Of the 75 adult flycatchers identified to individuals in 2009, 38 (49%) were located in 2010; 5 (13%) were detected at a different study area from where they were last detected in 2009. Of the 40 banded juveniles from 2009, 8 (20%) were recaptured and identified in 2010. Thirteen individuals originally banded as nestlings in previous years were identified for the first time in 2010.

Nest success was calculated for 60 SWFL nests. Twenty-six (43%) nests were successful and fledged young. Depredation was the major cause of nest failure, accounting for 45% of all failed nests and 59% of nests that failed after flycatcher eggs were laid. Brown-headed cowbird brood parasitism was observed in 12 of 56 nests (21%). One flycatcher nest at Pahrnagat was brood parasitized and subsequently abandoned by the flycatchers; this is the first recorded instance of brood parasitism at Pahrnagat since a 5-year cowbird trapping program was implemented in 2003.

Vegetation and microhabitat data were collected from the territories of the 14 territorial male flycatchers at Mesquite and Bill Williams. Four habitat types were delineated at these sites: 1) coyote willow, 2) tamarisk with coyote willow, 3) Goodding's willow with tamarisk understory, and 4) cottonwood-willow.

FY11 Activities: Presence/absence SWFL surveys will be conducted at approximately 70-90 sites, in 16 study areas, along the Virgin River, Pahrangat NWR, and the LCR to the Southerly International Boundary. Key Pitman was added and funded by NDOW. Grand Canyon below Separation Canyon will not be surveyed in 2011 due to low water levels and access problems.

Life history studies are being conducted at Pahrangat NWR, Mesquite, Mormon Mesa, and Topock Marsh. Studies include banding, nest monitoring, vegetation analysis, and microclimate analysis. The brown-headed cowbird trapping study was completed in 2007, but post-trapping data will continue to be collected.

The study and demonstration adding additional water to a subset of sites at Topock Marsh is continuing with the actual demonstration of adding the water to the sites and continuing to monitor the hydrology, presence of breeding pairs, and nest success.

A study on the effects of salt cedar beetles on nesting willow flycatcher habitat in the areas of St. George, Utah and Mormon Mesa, Nevada will continue. This is a cooperative study between the Utah Department of Natural Resources, USGS, Reclamation, and the LCR MSCP. The salt cedar beetle was present in 2010 defoliating plants in the St. George area and is moving south into Nevada. The defoliation caused by the beetle could have detrimental effects to willow flycatcher nesting success in areas where salt cedar is used as nesting habitat. The study will be used to evaluate the possible impact further southward expansion of the beetle may have on willow flycatcher populations along the LCR.

Proposed FY12 Activities: Presence/absence SWFL surveys along the Virgin River, Pahrangat NWR, and the LCR to the SIB will continue. Grand Canyon below Separation Canyon will be reviewed from the air to determine habitat status. If the habitat has improved and there is access, this area will once again be surveyed.

Life history data will continue to be collected at four sites, including Pahrangat NWR, Mesquite, Mormon Mesa, and Topock Marsh. Monitoring activities will concentrate on collecting demographic data including banding and nest monitoring, and habitat data including vegetation and microclimate, but at a reduced level from previous efforts. Existing brown-headed cowbird control has been discontinued and post-trap data will be collected and analyzed to determine trapping frequency.

Pertinent Reports: *Southwestern Willow Flycatcher Surveys, Demography, and Ecology along the LCR and Tributaries, 2010* will be posted on the LCR MSCP website.

Work Task D3: Southwestern Willow Flycatcher Habitat Monitoring

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$90,000	\$104,750.84	\$715,216.04	\$90,000	\$90,000	\$90,000	\$90,000

Contact: Chris Dodge, (702) 293-8115, cdodge@usbr.gov

Start Date: FY05

Expected Duration: Five years after implementation of all water transfers covered under the SIA BO. As of FY11, all water transfers have not been implemented.

Long-term Goal: Monitor the effects of reduced flows and the associated reduction in groundwater table, specifically associated with the SIA, on southwestern willow flycatcher breeding habitat between Parker and Imperial dams.

Conservation Measures: MRM1, MRM2 (WIFL).

Location: Reaches 4 and 5, California and Arizona.

Purpose: Monitor SWFL habitat conditions until 5 years after implementation of all water transfers covered under the SIA.

Connections with Other Work Tasks (past and future): This work task, in conjunction with surveys conducted under D2, will provide information necessary for the Existing Habitat Maintenance (H1). Data collected may also be used in future habitat creation projects listed under Section E.

Project Description: In 2001, Reclamation received a BO on the SIA for the change in point of diversion of up to 400,000 acre-feet of water between Imperial and Parker dams. This work is being implemented through the LCR MSCP. Reduced river flows, created by the change in the point of diversion, may affect SWFL breeding habitat located between these two dams.

In 2005, Reclamation began monitoring 372 acres of SWFL breeding habitat to document changes in habitat conditions specifically attributable to covered SIA activities, and will continue to do so until 5 years after implementation of all water transfers covered under the SIA.

Previous Activities: In 2004, Reclamation identified 372 acres of SWFL habitat between Parker and Imperial dams to monitor for the SIA BO requirements. In each identified site, three to five temperature/humidity data loggers and one groundwater

observation well were installed. Soil moisture measurements were collected at each data logger location during each flycatcher survey period. Vegetation data were also collected after the surveys were completed.

The previously identified 372 acres of SWFL occupied habitat at 11 sites, along with two control sites, were monitored between Parker and Imperial dams by collecting and analyzing microclimate data, groundwater monitoring, and vegetation monitoring, using similar protocols to those in place for the life history studies. Daily, weekly, and seasonal cycles in groundwater levels were apparent. Water levels drop during afternoon hours when evapotranspiration is high and on weekends when water releases from Parker Dam decline. Seasonal cycle in groundwater levels mirrors the seasonal fluctuations in river flow. Analysis of groundwater data indicates a strong correlation between piezometer water levels and releases from Parker Dam. Data did not show strong correlations between piezometer water level and soil moisture within the habitat monitoring sites

FY10 Accomplishments: Each site was monitored for temperature, relative humidity, soil moisture, vegetation, and groundwater. In 2010 data was compiled since 2005 and compared across this period. Comparisons of microclimate characteristics among years in 2005-2010 at the habitat monitoring sites indicated hotter and more humid conditions in 2006, cooler conditions in 2009, and less humid conditions in 2010 than in other years. These interannual changes were similar between test and control sites, suggesting that these changes were regional, rather than being influenced by local conditions. The interannual changes in soil moisture in 2005-2006, 2007-2008, and 2009-2010 were not similar between test and control sites, with soil moisture declining more sharply at the control sites during the first two periods and then rising sharply during the third. This suggests that local conditions, in addition to regional climate, may have influenced soil moisture. Mean daily temperature range and mean maximum diurnal temperature were higher at test sites but lower at control sites in 2008 versus 2007. These metrics decreased sharply in 2009 and then increased in 2010 at both test and control sites, presumably in response to climate conditions during portions of each summer. Thus, there have not been any consistent patterns in the changes in microclimate characteristics at test versus control sites that could be attributed to changes in river flows.

Between-year differences were noted at the habitat monitoring sites for several vegetation variables. None of the variables exhibited a constant change across time. Woody ground cover and the percentage of basal area comprising native vegetation were the only variables for which there was a significant interaction with location, meaning the changes in all other variables between years among test sites were not significantly different from the changes at control sites.

FY11 Activities: The 372 acres of SWFL breeding habitat between Parker and Imperial dams will continue to be monitored by collecting and analyzing microclimate data, groundwater monitoring, and vegetation monitoring utilizing similar protocols as those in place for the life history studies. Based upon the results of the evaluation being completed in FY10, a determination will be made to determine whether the level of this monitoring effort is appropriate to monitor effects of water transfer actions or can be reduced for the remainder of the period that water transfer actions are occurring.

Proposed FY12 Activities: Once the level of monitoring is determined, monitoring of the 372 acres of SWFL breeding habitat between Parker and Imperial dams will continue based on recommendation from the review and the USFWS.

Pertinent Reports: *Southwestern Willow Flycatcher Surveys, Demography, and Ecology along the LCR and Tributaries, 2010* will be posted on the LCR MSCP website.

Work Task D5: Monitoring Avian Productivity and Survivorship

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$250,000	\$224,813.84	\$1,539,731.50	\$275,000	\$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, MRM2 (WIFL, YBCU, ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, SUTA).

Location: Cibola NWR and Havasu NWR.

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 (Monitoring Avian Production and Survivorship) stations located at habitat creation sites may also be used for post-development monitoring.

Project Description: This project intensively monitors habitat creation sites and sites that represent habitat typically found along the LCR for avian use. Banding collects more detailed information about avian species use patterns and demographics. This site-specific data can be used to characterize habitats and, along with less intensive, widespread monitoring methods, is used to monitor habitat use, population trends, and demographics of avian species along the LCR.

The MAPS program monitors avian populations, using a standardized protocol, throughout the United States, Canada, and Mexico. Long-term population trend data is collected by conducting intensive banding throughout the breeding season. Data collected are analyzed by the Institute for Bird Populations (IBP), and long-term population trends are determined on a regional and continental level. Population trends can be more readily

determined by using a national database as larger databases have increased statistical power that cannot be economically duplicated at a site-specific level.

In 2002, prior to LCR MSCP implementation, Reclamation established a MAPS station (CIBO) at the Cibola Nature Trail Demonstration site on Cibola NWR. In 2005, an additional MAPS station (HAVA) was established on Havasu NWR, at New South Dike, in mixed cottonwood-saltcedar habitats. These sites provide data from different reaches of the LCR and from different habitat types to allow comparisons between habitat creation sites and other areas more typically found along the LCR. The IBP recommends conducting MAPS stations a minimum of 5 years to acquire site-specific data. After 5 years, each site will be evaluated and a decision will be made to continue, discontinue, or move the MAPS station to a new location.

Previous Activities: Winter banding was conducted from 2002 through 2005 at the Pratt restoration site (PRAT) near Yuma, AZ, at the Cibola Nature Trail site since 2002, and at the Havasu NWR site (HAVA) from 2005 to 2009. Summer MAPS banding has been conducted at the CIBO site since 2002 and at HAVA site from 2005 to 2008. In addition, a MAPS station (HERO) was run for 5 years on Colorado River Indian Tribe lands, near Headgate Rock Dam (2000-2004), in mixed native and nonnative habitat. 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.

In late September 2008, a fire occurred at the Havasu NWR site (HAVA) and burned a significant portion of it. This site (HAVA) was last used for winter banding in 2008-2009 and was abandoned as a MAPS site. A new MAPS site (BERS) was selected at the Beal Lake restoration site also on Havasu NWR and started operating in 2009.

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 MOSI protocol that is used in Mesoamerica. Data from these surveys will help define habitat use by birds during the non-breeding season.

FY10 Accomplishments: During the winter, banding was conducted at Cibola NWR (CIBO) and at Havasu NWR (BERS), for 2 days a month, from October to March. During the winter banding period, 181 individuals were captured at the Cibola site and 189 individuals were captured at the Havasu site. Through this effort it was found that Bell's vireos were utilizing the habitat through January at these sites.

During the summer, banding was conducted at both sites using the MAPS protocol. Banding was conducted for 5 hours a day, beginning 1 half-hour before sunrise. Banding was conducted once every 10-day period, at each site, for a total of 10 days of banding. During the breeding season, there were a total of 224 captures at the Cibola site and 206 total captures at the Beal site. Three LCR MSCP listed species were captured, including yellow warbler (four captures at Cibola, and nine captures at the Beal site), summer tanager (one capture at the Beal site), and Bell's vireo (twelve captures at the Beal site). All of the yellow warblers, summer tanagers, and Bell's vireos were color banded except

for one yellow warbler at the Cibola NWR site. Three Bell's vireos were target netted and color banded at the Beal site, two during the MAPS season and one afterwards. Resightings of yellow warblers, Bell's vireos, and summer tanagers were made at the Beal site during and after the MAPS season. Single willow flycatchers were heard calling at the Beal site on June 3, 19, and 23, as well as on July 30.

FY11 Activities: Winter banding will be continued in 2011 at the Cibola Nature Trail and Beal sites. The MAPS banding stations will be continued at both sites during the 2011 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. Other restoration sites such as CVCA and PVER will be reviewed as potential banding stations.

Proposed FY12 Activities: Breeding season monitoring will continue in 2012. Information obtained will be used for the system monitoring program and to inform habitat creation projects listed in Section E.

Pertinent Reports: *Operation of Two Monitoring Avian Productivity and Survivorship (MAPS) and Winter Banding Stations along the LCR, 2010* will be posted to the LCR MSCP website.

Work Task D6: System Monitoring for Riparian Obligate Avian Species

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$210,000	\$226,354.82	\$988,127.37	\$210,000	\$280,000	\$280,000	\$280,000

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, MRM2 (ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, SUTA).

Location: System-wide.

Purpose: 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 in conjunction with data from D5 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 work task will also be used in association with C24 to help define habitat requirements for riparian obligate bird species.

Project Description: The LCR MSCP includes conservation measures for 26 covered species and 5 evaluation species, including 9 neo-tropical migratory bird species. It is inefficient to monitor every covered species individually throughout the entire LCR MSCP planning area. Many bird populations can be monitored effectively using multi-species survey protocols.

Avian system monitoring protocols have been developed that can incorporate data into a coordinated bird monitoring network. Data from the LCR can be incorporated into a larger, regional database, which makes the data more powerful during analysis. Population trends can be derived over time, thus enabling Reclamation to monitor existing avian populations. The avian multi-species protocol described below is designed to monitor six LCR MSCP covered species as well as non-covered neo-tropical migratory bird species. The six LCR MSCP covered species are gilded flicker, Gila woodpecker, summer tanager, vermilion flycatcher, Sonoran yellow warbler, and Arizona Bell's vireo.

Single-species surveys for the elf owl are necessary due to the nocturnal nature of this species and its rarity along the LCR. Single-species tape playback surveys of the elf owl will be conducted in suitable habitat in the LCR MSCP planning area. Suitable habitat includes known historical locations, locations of incidental sightings, and all HMIII, CWI, and CWII habitat.

Previous Activities:

Multi-species Bird Surveys: In 2005-06, existing vegetation, characterized using the Anderson and Ohmart classification system, was stratified and random point-count transects were established and conducted. After reviewing data collected during the 2005-06 breeding seasons, the monitoring plan shifted to a double sampling technique in 2007. System-wide avian monitoring was conducted during the 2007-2009 breeding seasons utilizing a double sampling rapid/intensive area search protocol. This protocol was utilized to provide density estimates of the six focal species and other common species in the LCR MSCP planning area. The Sonoran yellow warbler and Arizona Bell's vireo were the most abundant species detected. The summer tanager and the Gila woodpecker were detected in moderate numbers. The vermilion flycatcher was detected in low numbers and the gilded flicker was not detected. In 2008 and 2009, system monitoring, post-development monitoring, and habitat suitability modeling were combined into one agreement to more efficiently manage avian monitoring programs.

Elf Owl Surveys: Twenty-one survey sites and 45 single call stations in suitable habitat in the LCR MSCP planning area were selected to be surveyed for elf owls in 2008 and 2009. Suitable habitat was defined as historical locations, incidental sightings, and HMIII, CWI, and CWII habitat. Surveys were conducted from 27 March to 1 May 2008, and used a tape-playback presence-absence survey protocol. One elf owl was detected near Blankenship Bend.

FY10 Accomplishments:

Multi-species Bird Surveys: In 2010, the habitat definitions were changed based on the 2007-2009 data. The final scheme had four habitat types: tall woody, low woody, herbaceous, and not vegetated. In 2010, 80 plots were randomly selected, using the new GIS plots layer. Each rapid area search plot was surveyed twice in 2010; one plot was surveyed between mid-April and mid-May and the other plot was surveyed between mid-May and Mid-June. A random subsample of eight plots was surveyed intensively to determine actual numbers of breeding birds present in each plot. Each intensive area search plot was surveyed eight times between 13 April and 16 June 2010. Data from intensive surveys and rapid surveys were combined to provide detection ratios and density estimates for the six focal species and other common species in the LCR MSCP planning area for 2010. Population estimates from 2010 were compared to population estimates from 2007-2009.

During system-wide rapid area searches in 2010, 166 species were recorded. Of these, 96 species were presumed breeders and 70 were migrants or presumed non-breeders. During system-wide intensive area searches, 218 breeding territories of 32 species were

recorded. The most common of the focal species in 2010 was the Bell's vireo, the rarest was the vermilion flycatcher, and the gilded flicker was absent during all surveys. The population estimates for the number of territories of focal species in the LCR MSCP planning area from 2010 were: 1) Arizona Bell's vireo (4,613), 2) Sonoran yellow warbler (2310), 3) Gila woodpecker (938), 4) summer tanager (259), and 5) vermilion flycatcher (8). The vermilion flycatcher population estimates are skewed due to difficulties in detections of this species. The gilded flicker was not detected in any surveys conducted for the past three years. Population size estimates for covered species were generally higher in 2007-2009 than in 2010. The 2010 estimates may overall be lower based on the smaller sample size of plots occupied by covered species and the lack of access to the Bill Williams River area.

A final three year project report (2008-2010) was submitted including detailed methods and evaluation sampling design. The sampling plan for riparian birds of the lower Colorado River was finalized. A software program (DS) to automate the calculation of the detection ratios was developed. A Sampling Large Landscape Workshop was held to educate others on the double sampling method, and to receive feedback on the survey methods.

Elf Owl Surveys: Elf owl surveys in 2010 utilized the same protocol as in 2008 and 2009, and were conducted at the same three sites that were not surveyed in 2008 but surveyed in 2009. No elf owls were detected. An elf owl detectability study was initiated and will continue in FY10 under work C36. This study will evaluate the current protocol to make it more efficient and effective.

Proposed FY11 Activities:

Multi-species Bird Surveys: Area searches will be conducted during the breeding season of 2011 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 new 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.

The user's manuals for the GIS tools and the DS program will be finalized. Finishing touches will be put on the trend program, DS program and power program. These programs were specifically developed to be used with the Lower Colorado Riparian Bird sampling design, but can also be used for similar sampling designs.

Elf Owl Surveys: A final three-year project (2008-2010) report for elf owl monitoring will be written.

Proposed FY12 Activities: System-wide area search surveys for riparian obligate species including the six focal species will continue in 2012. Area searches will be conducted during the breeding season of 2012 following the double sampling intensive/rapid area search protocol used in previous years. These surveys will determine the population estimates and distribution of LCR MSCP species to use to compare to

populations at restoration sites. Area searches will be conducted during the breeding season of 2011 following the double sampling intensive/rapid area search protocol used in previous years. 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.

Pertinent Reports: *Nevada Bird Count: Searches and Spot Mapping, Sampling Plan for Riparian Birds of the Lower Colorado River, and Elf Owl Surveys Along the Lower Colorado River 2009* are posted on the LCR MSCP website.

Work Task D7: Yellow-billed Cuckoo Presence/Absence Surveys

FY10 Estimates	FY010 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$540,000	\$548,459.47	\$2,507,026.93	\$550,000	\$550,000	\$550,000	\$550,000

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

Start Date: FY06

Expected Duration: FY55

Long-term Goal: Acquire yellow-billed cuckoo data as part of the system monitoring program.

Conservation Measures: MRM1, MRM2 (YBCU).

Location: General presence/absence surveys are conducted in approximately 55 sites of suitable habitat within the LCR MSCP project boundary.

Purpose: Conduct surveys to determine existing yellow-billed cuckoo (YBCU) 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): Data collected in this work task will be utilized in the YBCU modeling being conducted under C24.

Project Description: Yellow-billed cuckoo utilize cottonwood-willow habitat and may act as an umbrella species for other covered avian species that use these mature habitats. Existing YBCU populations and habitat are being determined along the LCR as systematic surveys are conducted over the project area. This work task assesses existing YBCU populations and evaluates required habitat characteristics. Data collected on vegetation characteristics of occupied sites are used to design habitat creation sites for YBCU and recommend future demographic studies necessary to understand more about the YBCU populations along the LCR.

Previous Activities: The YBCU life history and monitoring studies began in FY06.

FY10 Accomplishments: In FY10, monitoring and research activities continued. Surveys were conducted system-wide and at all restoration sites. Activities included presence/absence surveys, vegetation monitoring, microclimate data collection, telemetry, nest searching, and monitoring and prey studies.

Call-playback surveys were conducted for Yellow-billed Cuckoos at 46 sites with the LCR MSCP area in potentially suitable habitat. Cuckoos were detected 272 times during the breeding season, representing an estimated 56 breeding pairs. Breeding was confirmed for 22 pairs at 5 sites: the Beal Riparian Restoration Area at Havasu National Wildlife Refuge, the Bill Williams River National Wildlife Refuge, Palo Verde Ecological Reserve, Phases 2 and 3, Cibola Valley Conservation Area, Phases 1 and 2, the Cibola Nature Trail at Cibola National Wildlife Refuge Unit #1. Seventeen nests were found and monitored. Nesting success was 88% with all but two nests successful and at least 31 young fledged. Twenty-seven adult cuckoos were mist-netted, 25 were banded and 23 were fitted with transmitters. Transmitted birds were followed for a seasonal total of 250 days.

FY11 Activities: Activities in FY11 will be similar to previous years. Surveys will be conducted system-wide and at all restoration sites that are suitable habitat for yellow-billed cuckoos. As many cuckoos as possible will be captured, banded and tracked using telemetry. Nest searching will be conducted and nests found will be monitored. Vegetation and microclimate data will be collected.

Proposed FY12 Activities: Activities in FY12 will be similar to what was done in previous years of this project. FY12 will be the last year under the existing contract; solicitation for further work will begin in FY12, with award expected by January 2013.

Pertinent Reports: *Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use on the Lower Colorado River and Tributaries, 2009 Annual Report* is posted to the website. *Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use on the Lower Colorado River and Tributaries, 2010 Annual Report* will be posted to the website when final.

Work Task D8: Razorback Sucker and Bonytail Stock Assessment

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$400,000	\$676,835.76	\$2,291,213.07	\$575,000	\$575,000	\$600,000	\$650,000

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

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Conduct long-term system monitoring of RASU and BONY.

Conservation Measures: RASU6 and BONY5.

Location: Lower Colorado River within the LCR MSCP planning area, including reservoirs and connected channels, from Lake Mead downstream to Imperial Dam.

Purpose: Supplement and maintain sufficient knowledge and understanding of RASU and BONY populations within the LCR MSCP planning area to have an effective AMP.

Connections with Other Work Tasks (past and future): Monitoring data for RASU and BONY have been or will be gleaned from work accomplished under Razorback Sucker Survival Studies (C8-Closed FY10), Demographics and Post-Stocking Survival of Repatriated Razorback Suckers in Lake Mohave (C12), Lake Mead Razorback Sucker Study (C13), Flannelmouth Sucker Habitat Use, Preference and Recruitment Downstream of Davis Dam (C15), Evaluation of Remote Sensing Techniques for PIT-Tagged Fish (C23-Closed FY09), Post-Development Monitoring of Fish Restoration Sites (F5), and Adaptive Management Research Projects (G3).

Project Description: This project collects and organizes RASU and BONY population and distribution data to maintain up-to-date, system-wide, stock assessments for these species. Data acquisition work is accomplished by: 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.

Work routinely includes trammel netting and electro-fishing, but visual surveys using Reclamation's helicopter are periodically conducted, as well as surveys using specialized equipment and techniques (e.g., aerial and underwater photography and video recordings). Costs described under this work task are for salary, travel, and materials necessary for Reclamation staff to accomplish this work. Project costs include all costs associated with conducting field surveys, gleaning or capturing data from ongoing

research actions and monitoring programs (both internal and external to the LCR MSCP), transfer of these data into record archives, and organizing these data into a cohesive report.

Previous Activities: Reclamation has cooperatively conducted fish surveys with Nevada and Arizona on Lake Mead each fall since 1999, and has provided funding and support to the Lake Mead Razorback Sucker Study (C13) since 1995. Interagency cooperative native fish roundups have been occurring since 1987 on Lake Mohave and since 1999 on Lake Havasu (including the river reach below Davis Dam). Fish monitoring on reaches 4 and 5 has been conducted as part of the Razorback Sucker Survival Study (C8), which ended in 2009.

FY10 Accomplishments: Accomplishments for this work task have been summarized by river reach. The additional funds expended during the fiscal year reflect the scaling up of monitoring efforts as more fish are put into the system.

Reach 1 (Lake Mead). Reclamation, in cooperation with the AZGFD, NDOW, and NPS, conducted annual fall surveys of Lake Mead. Techniques employed in this lakewide effort included gill netting and electro-fishing and resulted in the capture of over 2,600 fish including 14 different species and 5 RASU.

Collection of wild-born RASU larvae took place at all major spawning sites over the course of the spawning season. A total of 852 RASU larvae were collected and subsequently delivered to Lake Mead Fish Hatchery (B6) for rearing.

Monitoring of the Lake Mead RASU population under the Lake Mead Razorback Sucker Study (C13) also continued. Tracking of sonic-tagged fish continued to gather information on habitat use and movement patterns of RASU, and provided valuable information including the general location of RASU populations and the location of spawning sites. Trammel netting surveys conducted during the spawning season resulted in the capture of 61 total RASU. Six of the RASU collected were subadult fish, and 12 were recaptures. Seven FLSU were also captured in the Muddy River/Virgin River inflow area. This is the first year FLSU have been documented through these monitoring efforts.

The monitoring activities for RASU previously conducted under the Lake Mead Razorback Sucker Study (C13) and described in the preceding paragraphs are being relocated to this work task.

Reach 2 (Lake Mohave). Reclamation repatriated 9,203 RASU into Lake Mohave in 2010. This is a significant increase in the number of RASU stocked in 2008 (770), indicative of availability of the largest RASU obtainable (overall average of 456 mm TL) from all sources in 2008, but is fewer than the number of RASU stocked in 2009 (12,496).

Lake-wide surveys for native fish were conducted, including trammel netting (44 net nights, 60 RASU contacted), electro-fishing (5,580 seconds, 70 RASU contacted), and remote sensing, which resulted in 7,364 total PIT-tag contacts from 984.5 hours of deployment time representing 473 unique RASU contacted. Improvements in antennae design have contributed to an increasing number of contacts while actually reducing the hours of deployment. All native fish contact data were analyzed under Demographics and Post-Stocking Survival of Repatriated Razorback Suckers in Lake Mohave (C12) resulting in the current population estimate of 1,463 adult RASU.

Annual RASU (May and November) and BONY (May) roundups were conducted. Bimonthly helicopter surveys were conducted to verify presence of RASU on known spawning beds and to search for new spawning congregations during the spawning season. A total of 33,889 RASU larvae were collected and delivered to Willow Beach National Fish Hatchery (B2) for rearing.

Reach 3 (Davis Dam to Parker Dam or Lake Havasu). Under the Fish Augmentation Program, 7,180 RASU and 4,032 BONY were stocked into Reach 3 during calendar year 2010.

Reclamation participated in the ongoing multi-agency native fish roundup, and collected data from other annual surveys conducted by LCR MSCP partners. A fall netting/electrofishing survey was conducted through Topock Gorge to look for young native fishes, and eight trips to monitor movements of sonic-tagged razorback suckers between Davis and Parker dams were completed. Large numbers of RASU continue to be contacted in the riverine portions of Reach 3 (182 RASU). Younger, recently released RASU dominate the catch from the backwaters within the reach, while more mature RASU are contacted during surveys of the numerous spawning aggregations. A single BONY was contacted during the annual Lake Havasu roundup, and several accidental captures of BONY were made by fisherman near the Bill Williams Refuge. The non-native fish community did not show any significant changes and was represented by 13 different species.

A population estimate of 4,376 adult RASU was generated based on capture data from all sampling events within this reach. The current estimate is more than double the previous estimates, and this is a direct result of an increase in RASU contacts which can be attributed to the number of fish stocked through the fish augmentation program.

Sampling trips conducted during the FLSU field season targeted larval, juvenile, and adult FLSU. Over 200 adult FLSU were contacted, producing an adult population estimate of 1,476 fish. A comprehensive final report is being completed and will be posted to the LCR MSCP website under Flannelmouth Sucker Habitat Use, Preference and Recruitment Downstream of Davis Dam (C15).

Reaches 4 and 5 (Parker Dam to Imperial Dam). Under the Fish Augmentation Program, 6,093 RASU and 961 BONY were stocked into Reach 4 (between Parker and Headgate Rock dams) during calendar year 2010.

Field sampling of fish within the confines of the Colorado River Indian Tribes Reservation (CRIT) on Reach 4 was not initiated due to permitting issues. However, the FWS was able to facilitate access for FY11 as part of Investigations of RASU and BONY Movements and Habitat Use Downstream of Parker Dam (C49). A winter sampling event focused from Parker Dam to Headgate Rock Dam located a small group of RASU in the main channel near River Island State Park. A preliminary survey was conducted below Palo Verde Dam in an attempt to locate spawning adult RASU, but no native fish were located. All fisheries surveys in Reach 5 were restricted to Imperial Ponds Native Fish Research (C25).

FY11 Activities: Monitoring data will be collected for reaches 1 through 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, electro-fishing, remote sensing of PIT-tagged fish, and active and passive tracking of sonic tagged fish. Several surgical techniques were examined for sonic/radio tagging juvenile size classes of flannelmouth and razorback suckers, and several hundred larval flannelmouth suckers were captured and are being reared for use upcoming studies.

Proposed FY12 Activities: Monitoring will continue in all reaches. The LCR MSCP staff will continue to participate in multi-agency field surveys. An increase in effort for reaches 4 and 5 is expected as associated work tasks mature and native fishes continue to be released through the Fish Augmentation Program.

Pertinent Reports: *Lake Mead Razorback Sucker Monitoring Recommendations* will be posted to the website when available. *Movements of Sonic Tagged Razorback Suckers Between Davis and Parker Dams (Lake Havasu)* is posted on the LCR MSCP website.

Work Task D9: System Monitoring and Research of Covered Bat Species

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$150,000	\$162,881.50	\$648,195.67	\$150,000	\$150,000	\$150,000	\$150,000

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 determine distribution and to evaluate habitat implementation success.

Conservation Measures: MRM1 (WRBA, WYBA, CLNB, PTBB) WRBA1, and WYBA1.

Location: System-wide along the Lower Colorado River below Hoover Dam.

Purpose: Conduct system monitoring and research for the distribution of covered bat species utilizing roost surveys, acoustic survey techniques, and capture techniques following a protocol developed in FY06 and additional information gathered since then.

Connections with Other Work Tasks (past and future): System monitoring data will be used in conjunction with post-development monitoring (F4) to determine habitat needs and characteristics of covered bat species. Data collected will be used in future habitat creation projects listed in Section E.

Project Description: Several survey techniques will be utilized to detect covered species or provide equivalent data using indicator species. Acoustic surveys, conducted with Anabat or Sonobat technology, will be used to identify foraging behavior in native riparian stands for covered bat species. Roost surveys will be conducted to track bat populations and to survey species that are not readily detected by acoustic technology, such as Townsend's big-eared bat and California leaf-nosed bat. 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: Indigenous bat species were surveyed annually along the LCR from 2001 to 2006. A Lower Colorado River 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

through the Arizona Game and Fish Department (AGFD) that coordinated the collection and analysis of acoustic bat data for system-wide monitoring of the LCR. Four permanent acoustic detector stations were placed along the river and are providing data that may be useful for analyzing migration movements along the river as well as correlating bat activity with environmental variables.

FY10 Accomplishments: A set of 72 sampling locations were surveyed for two-night periods during each of four seasons. Placement of these detectors was stratified in three reaches of the LCR across four vegetation types (cottonwood-willow, saltcedar, mesquite, and marsh). All four covered species have been detected in all three reaches, although detection rates are fairly low. Results showed a strong correlation between western red and western yellow bat detections with cottonwood-willow habitat. A weak correlation for distance to mines was found for California leaf-nosed bats and Townsend's big-eared bats. No habitat correlations were found for these two species. A final report was completed for this project.

Data collected from permanent stations placed strategically throughout the study area suggest that bat activity was low during the winter but increased in early spring and remained high through fall. Mist-netting surveys were conducted at six different areas in 2010. A western red bat was captured at Mineral Wash on the Bill Williams River NWR. A western yellow bat was captured at Imperial NWR. California leaf-nosed bats were captured at the Bill Williams River NWR, Imperial NWR and Betty's Kitchen. Out-flight counts were conducted in February and May 2010 at most of the known roosts of California leaf-nosed bats and Townsend's big-eared bats.

FY11 Activities: The four permanent Anabat monitoring stations will continue to operate to provide year-round data. Outflight counts will be conducted at various mines along the LCR in the winter and early summer. These counts will be used to determine trends in California leaf-nosed bat and Townsends big-eared bat populations. Archived California leaf-nosed bat banding data will be compiled and entered into a single database. Archived acoustic data will be organized, analyzed, and compiled so that it may be entered into a single database.

Proposed FY12 Activities: The four permanent Anabat monitoring stations will continue to operate. Data will be collected and analyzed. The Sonobat software that is used to analyze and identify calls from a different type of bat detector is now becoming automated. This new technology will be researched and tested, which may result in switching from Anabat to another bat detector that uses this new technology. Outflight counts will be conducted at various mines along the LCR in the winter and early summer. These counts will be used to determine trends in California leaf-nosed bat and Townsends big-eared bat populations. Banding and acoustic data will continue to be compiled for the database.

Pertinent Reports: *Monitoring of Covered and Evaluation Bat Species for the Lower Colorado River Multi-Species Conservation Program, Annual Report, 2010* will be posted to the LCR MSCP website. A final mine survey summary report for years 2002-2010 will be prepared and posted to the website.

Work Task D10: System Monitoring of Rodent Populations

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$0	\$0	\$52,197.81	\$65,000	\$40,000	\$40,000	\$40,000

Contact: Chris Dodge, (702) 293-8115, cdodge@usbr.gov

Start Date: FY11

Expected Duration: FY55

Long-term Goal: System monitoring to document 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 lower Colorado River, including the Bill Williams River.

Purpose: Implement presence/absence sampling for system monitoring of LCR MSCP covered and evaluation rodent species. This survey is being conducted to determine the extent of the geographic range limits of the covered and evaluation rodent species: Yuma hispid cotton rat, the Colorado River cotton rat, and the Desert pocket mouse. Another goal of this survey is to document all possible source populations of immigrants to restoration sites, to the extent practicable. YHCR has been detected at several locations in Reach 6; however, a stable or even consistent population has yet to be identified making habitat analysis difficult.

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 determine habitat needs and likely source populations for covered rodent species. Data will be used in future habitat creation project design under Section E.

Project Description: This survey is designed to determine the presence of rodents: the Colorado River cotton rat and the Yuma hispid cotton rat in an attempt to document all current and any newly established populations on or near the LCR. Furthermore, Reclamation is interested in the geographic limits of the desert pocket mouse, and how future restoration activities may affect the habitat and distribution of this species in reaches 1-3.

Ecological niche models (ENM) for each of the species will be developed using historic collection data and museum locality information. Ground, boat, and aerial surveys for

potential habitat followed by presence/absence trapping will be concentrated in the core predicted areas from the ENM. Surveys will also be conducted in the extreme edges of each species' range in an attempt to document the outer limits of their respective distributions within the MSCP planning area. Particular attention will be given to the area surrounding the proposed barrier between the two cotton rat species, the Trigo and Chocolate Mountains, to determine if the species are in fact geographically isolated by this barrier. Potential site surveys will be based on the ENM, habitat availability in the area, and expert knowledge. Because cotton rat populations are known to experience extreme cycles, multiple sampling occasions across different years and seasons will be conducted before determining that a species is absent from a particular site. Potential genetic analyses, including karyotyping (genetic analysis) and DNA sequencing, are being investigated to better understand direction and extent of dispersal of *Sigmodon* to the LCR and to clarify the distribution of DPMO.

Previous Activities: N/A

FY11 Accomplishments: Several areas are being surveyed to better understand *Sigmodon* populations outside of restoration sites. We identified different habitat types that may help in designing appropriate habitat for CRCR and YHCR. We have yet to locate a large source population for YHCR. Karyotype and genetic analyses are being researched for feasibility in determining dispersal from source populations off of the LCR and to potentially clarify the distribution of DPMO.

Proposed FY12 Activities: Coordinate with state and federal resource agencies and other interested parties to implement system-wide rodent surveys for covered species. Emphasis will be on areal and ground surveys for YHCR habitat from the Trigo and Chocolate mountains south to the Mexican border. Other surveys will include the Bill Williams, Gila River, and northern Lake Mead for DPMO.

Pertinent Reports: Annual reports will be posted on the LCR MSCP website.

Work Task D12: Lowland Leopard Frog and Colorado River Toad Surveys

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$20,000	\$12,886.12	\$12,886.12	\$120,000	\$150,000	\$100,000	\$0

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

Start Date: FY10

Expected Duration: FY13

Long-term Goal: Determine the extant populations of the lowland leopard frog and Colorado River toad along the LCR, and understand their habitat requirements.

Conservation Measures: LLFR1, CRT01.

Location: Within reaches 3-7 of the LCR MSCP boundary and the Bill Williams River.

Purpose: Better define 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): N/A

Project Description: A system-wide survey for these two species will be conducted along the LCR and the Bill Williams River. It is unknown if any extant populations exist for either species along the LCR. The lowland leopard frog has been observed on the Bill Williams River and surveys will help determine the stability of this population. If it is decided to attempt to establish this species by reintroduction along the mainstem LCR, the Bill Williams River population would be the most likely source. Habitat characteristics will also be gathered in conjunction with surveys where presence of either species is confirmed.

Previous Activities: N/A

FY10 Accomplishments: A study plan was designed, survey areas were chosen, and planning for this study was completed. Equipment was purchased for the first full year of study to be completed in FY11.

FY11 Activities: The first year of the project will be implemented and an annual report will be completed. Both species will be surveyed using multiple methods (e.g., visual encounter surveys, call surveys, pitfall traps). Using multiple methods to survey will

maximize the likelihood of finding either species. Surveys will begin in January and will be repeated once each month through August. Surveys from January through May will focus on the lowland leopard frog, and surveys from July through August will focus on the Colorado River toad. Once populations are located, habitat assessments will begin.

Proposed FY12 Activities: The second year of the surveys will be implemented and a final report will be completed based on data collected during the two years. If there is insufficient data to determine populations and presence/absence of the species, this survey may be extended.

Pertinent Reports: N/A

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WORK TASKS SECTION E

CONSERVATION AREA DEVELOPMENT AND MANAGEMENT

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Work Task E1: Beal Lake Conservation Area

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate*	FY13 Proposed Estimate*	FY14 Proposed Estimate*
\$130,000	\$204,821.21	\$2,617,313.92	\$200,000	\$950,000	\$300,000	\$300,000

*Beginning in FY12 the budget of E2 will be incorporated into the E1: Beal Lake Conservation Area work task.

Contact: Ashlee Rudolph, (702) 293-8178, arudolph@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, CLNB2, PTBB2, MNSW2.

Location: Reach 3, Havasu NWR, Arizona, 0.5 miles east of river miles 238 and 239.

Purpose: Create and manage a mosaic of native land cover types for LCR MSCP covered species.

Connections with Other Work Tasks (past and future): Dredge material from Beal Lake Native Fish (E2) was leveled in 2001 to create the substrate for planting the riparian habitat adjacent to Beal Lake. Vegetation and species monitoring are being addressed under F1-F4.

Project Description: The development of the Beal Conservation Area was initiated to research effective ways of using dredge material. The plan called for blending dredge material from Beal Lake with adjacent soils and replanting the mixed soils 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, irrigating, monitoring, and managing.

After various restoration planting techniques were tested on site, many of the test fields developed into habitat that has attracted LCR MSCP covered species. At the end of the 2010 monitoring season, the Beal Lake Conservation Area had nesting pairs of Sonoran yellow warbler, Arizona Bell's vireo, summer tanager, and yellow-billed cuckoo. The riparian restoration site currently provides approximately 107 acres of cottonwood, willow, and mesquite habitats, but also continues to contribute valuable information about restoration techniques and management practices.

Previous Activities: The dredging of Beal Lake began in 2001. Following site preparation (clearing, root plowing, mixing soils, and installing the irrigation system) the planting of Phase 1 (59 acres) began in 2002. The planting of Phase 2 (48 acres) followed in 2004. Phase 3 (80 acres) was cleared but not planted and has subsequently developed into a mix of screwbean mesquite, saltgrass, tumbleweed, arrowweed, and sparse saltcedar. Post-development habitat and avian monitoring has been conducted since FY04. Monitoring of post-development microclimate, small mammals, and bats has been conducted since FY06.

FY10 Accomplishments: In April 2010, Beal Lake Riparian Restoration was confirmed by the Steering Committee as a LCR MSCP Conservation Area, to be managed and monitored for the remaining life of the program. The increase in expenditures utilized funds made available from the closure of Work Task E3: Ahakhav Tribal Preserve and reflect the increased activity required to maintain the project.

Maintenance/Management: No new planting occurred at the Beal Lake Conservation Area in 2010.

During June 2010 soil and plant tissue samples were taken and analyzed by a contracted crop consultant. The samples indicated Nitrogen, Phosphorous, Potassium, Zinc, Manganese levels were all still below optimal levels. A mixture of the prescribed fertilizers was applied using the fertigation system September through October 2010.

Irrigation, maintenance, and on-site management was completed using a variety of staff from Havasu National Wildlife Refuge, the LCR MSCP and a members of the Student Conservation Association.

Monitoring: Ground water depth was monitored monthly at 14 piezometers. Temperature and relative humidity were measured using HOBO H8 data loggers.

Post-development vegetation monitoring was conducted in 13 fields (B, C, H, G, F, Q, K, M, L, O, P, FF and JJ). A new monitoring protocol was implemented this year and included rapid plots for quick estimates of density and intensive plots for assessing density, vegetation structure and community composition. Six rapid plots and one intensive plot were evaluated in each of the 13 fields for a total of 78 rapid and 13 intensive plots evaluated. Data are currently being analyzed.

Small mammal surveys were conducted and no cotton rat species were detected. Acoustic bat surveys were conducted quarterly. All four bat species were detected acoustically: California leaf-nosed bat, Townsend's big-eared bat, western red bat, and western yellow bat.

General avian surveys were conducted using an intensive area search method. Bell's vireo (20 territories), yellow warbler (12 territories) and summer tanager (1 territory) were confirmed breeding. Single species surveys were conducted for the southwestern willow flycatcher and western yellow-billed cuckoo during their respective breeding

seasons. Yellow-billed cuckoos were confirmed breeding at Beal with one nest successfully fledging 1 young. The site was surveyed five separate times for willow flycatchers. Three birds were detected before June 16th and were considered migrants; no breeding southwestern willow flycatchers were detected.

Avian mist netting following the Monitoring Avian Productivity and Survivorship protocol was conducted from 6 May to 4 August. Sonoran yellow warblers, Arizona Bell's vireos, and summer tanagers were color banded to better monitor their breeding activities at Beal Lake.

FY11 Activities: A Land Use Agreement between Reclamation and USFWS was signed in December 2010 for the Beal Lake Conservation Area on the Havasu National Wildlife Refuge. The agreement permits Reclamation staff and contractors access to the site to perform restoration and monitoring activities for the remainder of the program.

Designs are being prepared for the conversion of 14 acres, with a shallow groundwater table and sparsely vegetated with salt cedar, into a patch of willow-marsh that targets the habitat requirements of SWFL. Under the design, one field from Phase 2 and a small low area (9 acres) between Phase 2 and Topock Marsh will be cleared and contoured to elevations that correspond with spring and summer groundwater levels. Saline soils will be excavated from the area to allow planted vegetation to establish. Additionally, four fields that did not respond well to the original planting will be cleared and used to demonstrate the feasibility of using the soil amendment Lassenite Pozzolan. Two of the fields (7 acres) will be used to test the influence of the amendment on seeding success. This project is an extension of C42: Experiments and Demonstration of Soils Amendments for Use in Restoration Sites, which will provide funding for this research. The two remaining fields (9 acres) will have Lassenite Pozzolan incorporated into the top 6 inches of the soil and mass transplanted with cottonwood-willow.

The application of Lassenite Pozzolan is anticipated to reduce irrigation time and frequency (saving funds) by increasing the moisture holding capacity of the soil. The combination of the soil amendment and willow-marsh aims to create the moist understory conditions required for SWFL to select a nesting site. The relatively high cost per acre, net increase of 9 acres, is reasonable due to the Conservation Areas proximity to the only occupied SWFL habitat on the mainstem of the lower Colorado River. Permits for the project are currently being acquired, and construction-planting would occur in FY12.

A Youth Corps Initiative Project, funded by Reclamation's Commissioner's Office in support of the Secretary of Interior's *Youth in the Great Outdoors Initiative*, will occur on the northeast bank line of Beal Lake. A conservation crew will spend eight days collecting willow poles, removing salt cedar, and planting collected poles along the bank line in an effort to create nesting site characteristics required by SWFL: moist soil conditions under a willow canopy.

Management/Maintenance: No new planting is anticipated at the Beal Lake Conservation Area in 2011. Irrigation, maintenance, and on-site management are

anticipated and would be similar to actions taken in FY10 and would continue to utilize a variety of staff from Havasu National Wildlife Refuge, the LCR MSCP and a members of the Student Conservation Association.

Monitoring: Ground water depth will be monitored. Temperature, rainfall, and relative humidity will be monitored using HOBO H8 data logger stations. Vegetation monitoring will occur using rapid and intensive plots. Small mammal monitoring will be conducted annually. Acoustic bat surveys will be conducted quarterly and acoustic data will be collected from the permanent bat monitoring station. General avian surveys utilizing intensive area searches will be conducted. Single species surveys for the southwestern willow flycatcher and yellow-billed cuckoo will be conducted during their respective breeding seasons.

Proposed FY12 Activities: Site management including irrigation, fertilization, screen cleaning, and water level monitoring will continue.

Clearing and planting of two fields within Phase 2 and construction of the willow-marsh designed in FY11 will begin in January 2012. The sites will be cleared, grubbed, and contoured. Willows and wetland vegetation will be acquired and planted. Lassenite pozzolan would be incorporated into the soil prior to planting the fields.

In addition to and in conjunction with the construction mobilization for the willow-marsh habitat, a soil amendment will be tested on 16 unproductive acres within the Conservation Area. Due to the extremely sandy soils throughout the Beal Lake Conservation Area the water holding capacity of the soil is extremely limited, and therefore requires continually irrigation during the summer months. The acreage will be amended with Lassenite Pozzolan, a volcanic ash mixed with diatomaceous earth mined out of Lassen County, California. Adding Lassenite Pozzolan to sand has shown to increase the retention of plant available water within the soil long after an irrigation event. Increasing the water holding capacity of the soil has the potential to reduce both irrigation time and frequency, which could eventually lead to a reduction in management costs.

The Beal Lake Riparian Restoration site (E1) is now a confirmed LCR MSCP Conservation Area to be managed for the remaining term of the program, and the Beal Lake Native Fish site (E2) also involves long term maintenance commitments. Because the two sites are directly adjacent to one another and many of the maintenance activities already overlap E2 will be incorporated into the E1 work task as the Beal Lake Conservation Area.

Monitoring: Ground water depth will be monitored. Temperature, rainfall, and relative humidity will be monitored at HOBO H8 data logger stations. Vegetation monitoring will occur using rapid and intensive plots. Small mammal monitoring will be conducted annually. Acoustic bat surveys will be conducted quarterly and acoustic data will be collected from the permanent bat monitoring station. General avian surveys utilizing intensive area searches will be conducted. Single species surveys for the southwestern

willow flycatcher and yellow-billed cuckoo will be conducted during their respective breeding seasons.

Pertinent Reports: *Beal Lake Riparian Restoration Development and Monitoring Plan* is posted on the LCR MSCP website, and *2008 Beal Lake Riparian Annual Report* is in review prior to posting on the website.

Work Task E2: Beal Lake Native Fish

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate*	FY13 Proposed Estimate*	FY14 Proposed Estimate*
\$50,000	\$91,981.79	\$781,408.31	\$120,000	\$0	\$0	\$0

*Beginning in FY12 the E2 budget will be incorporated into the E1: Beal Lake Conservation Area work task.

Contact: Ashlee Rudolph, (702) 293-8178, arudolph@usbr.gov

Start Date: FY05

Expected Duration: FY11

Long-term Goal: Habitat creation.

Conservation Measures: BONY2 and RASU2.

Location: Reach 3, Arizona, Havasu NWR, one-half mile east of River Mile 237.

Purpose: Reclamation maintains the backwater created for native fishes under the 1997 Biological Opinion (BO). Reclamation is simultaneously making improvements to the backwater and conducting restoration research at the site. Information from this research will be used to adaptively manage the backwater and increase efficiency and effectiveness in future backwater habitat creation projects.

Connections with Other Work Tasks (past and future): Monitoring of native fish is being addressed under F5. Portions of restoration research at Beal Lake are funded under G3. Starting in FY12, costs incurred for management of this Work Task will be tracked under Work Task E1: Beal Lake Conservation Area.

Project Description: Beal Lake was approximately 225 acres of shallow, low-quality aquatic habitat that was dredged beginning in 2001 to create a functioning backwater dedicated to native fish. The Beal Lake restoration project 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 assumed under the LCR MSCP in 2005.

Previous Activities: The costs of initial backwater creation, including dredging and isolating the backwater with a semi-permeable rock structure, were incurred prior to FY05 and implementation of the LCR MSCP. The restoration research and management of Beal Lake included the installation of a cylindrical wedge-wire screen system. Beal Lake was initially isolated from Topock Marsh with a passive rock filtration system. However, after several months the rock structure became clogged and an inadequate

volume of water was being transferred through the structure to compensate for the evaporative losses in Beal Lake. In response, Reclamation decided to test a new technology that would supplement water flow into the lake and effectively exclude life stages of nonnative fishes. A cylindrical wedge-wire screen system was selected because of its potentially easy maintenance and long-term performance.

Because cylindrical wedge-wire screen technology had never been used for this application, information was needed to estimate the hydraulic capacity of the system and its true exclusion capabilities. A two-phase investigation, including in situ hydraulic testing and a laboratory exclusion evaluation, was conducted and the reports are available on the LCR MSCP website.

A number of existing water control structures at Beal Lake were replaced during the screen system installation. The existing features were not adequately sized to supply the necessary volume of water to the irrigation pump or to Beal Lake.

Additional improvements were made to allow for more effective management of water in Beal Lake: a water management system enabling large-scale water removal, water level control for fisheries management, and large-scale water circulation capabilities was installed. The system consists of a permanent platform, ramp, and discharge pipe that allows for the intermittent deployment of various pumps, depending on the specific management need. The water management system was successfully used to assist the irrigation pump in lowering the water level in Beal Lake for lake renovation (this process included pre-treatment fish salvage, chemical treatment of the water to kill remaining nonnative fish, post-detoxification sampling, and restocking with native fish). In addition, the system can be used to circulate water from the south end of Beal Lake and induce freshening flows into the lake from Topock Marsh to maintain adequate levels of water quality for native fish.

FY10 Accomplishments: On-site activities included monthly cleaning of the wedge-wire screens, opening and closing of water control structures, calibration of water elevation sensors, and visual inspection of the backwater. These tasks were coordinated with on-site activities associated with Beal Lake Riparian Restoration (E1).

A 5-year evaluation of the rock structure screen system was conducted in November 2009. In addition to an intensive cleaning effort, a fourth set of screens were installed on a fourth pipe, which had been previously capped with blank flanges. Cleaning in conjunction with the installation of the fourth pair of screens was successful in providing the flow capacity necessary to transfer enough water through the system to allow for an equilibration of hydraulic head on either side of the rock structure for several months after the 5-year evaluation. A report was prepared and is posted on the MSCP website.

While a crew was mobilized on site for the system evaluation in November, access ports were installed on the three pipes that previously had no opening from which to sample the inside of the pipe, and the debris that had accumulated in the Beal Ditch was removed to increase flow through the canal.

Monitoring of the screen system's hydraulic performance continued through the temporary water level sensor system. Using additional funding made available from the closure of E3 ('Ahakhav Tribal Preserve), field data were collected to allow for the design and permitting for the water control structure, which was also completed this fiscal year.

Water quality instrumentation measuring temperature, turbidity, pH, dissolved oxygen, and conductivity were deployed at four locations of interest throughout Beal Lake in May 2010. The data gathered from these sensors will be used to establish a baseline for water quality and eventually provide a base of knowledge from which to make habitat management decisions.

FY11 Activities: Basic management activities such as monthly screen cleaning and pump maintenance will be performed. The temporary water level sensor system on site was replaced in January 2011 with a permanent gauging station. Annual operation and maintenance of the station, which entails data collection, calibration, and an annual report, will also be performed.

The water control structure within the Beal Ditch, which was redesigned in FY10, was replaced. The purpose of replacing the structure is to once again allow the embayment on the west side of the rock structure to be isolated and drawn down for maintenance purposes.

Water quality and fisheries monitoring activities will be coordinated with USFWS and are covered under F5. Coordination with resource agencies will continue to determine future operations and maintenance of existing features at Beal Lake.

Proposed FY12 Activities: In April 2010 the Steering Committee confirmed the Beal Lake Riparian Restoration site as a LCR MSCP Conservation Area to be managed for the remaining term of the program. The obligation to maintain the Beal Lake Native Fish site was assigned to Reclamation under the 1997 Biological Opinion and assumed under the LCR MSCP at its inception in 2005. Because the two sites are directly adjacent to one another and many of the maintenance activities already overlap, this work task will be closed in FY12 and the two sites will be incorporated into the E1 work task as the Beal Lake Conservation Area.

Pertinent Reports: *Evaluation of a Cylindrical Wedge-Wire Screen System at Beal Lake, Arizona, 2005*, and *Evaluation of a Cylindrical Wedge-Wire Screen System at Beal Lake, Arizona, 2006 Phase II Testing, Five-Year Evaluation of a Remote Screen System at Beal Lake, Arizona* are posted on the LCR MSCP website.

Work Task E4: Palo Verde Ecological Reserve

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$1,683,000	\$1,553,565.67	\$5,171,860.32	\$1,950,000	\$1,950,000	\$1,011,013	\$732,493

Contact: Gail Iglitz, (702) 293-8138, giglitz@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Habitat creation.

Conservation Measures: WIFL1, WRBA2, WYBA3, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEV11, YWAR1, SUTA1, MNSW2, CLMB2, PTBB2.

Location: Reach 4, CDFG, river miles 129-133, California.

Purpose: 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 F1-F4, and F6. Insect populations are being evaluated under C5 and C7.

Project Description: The Palo Verde Ecological Reserve (PVER) encompasses more than 1,300 acres. This property (formerly known as the Travis Ranch) has been made available to the LCR MSCP for habitat restoration activities by CDFG.

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. Currently, the acreage is leased to a contract farmer and is planted with crops of alfalfa and wheat. Each year a portion of the active crop acreage will be taken out of production to develop the next phase of native habitat. The intent is to create as much riparian habitat as practical. Generally, all phases at PVER are targeted for SWFL, YBCU, and other covered species.

To date, standard farming practices are an efficient and effective way to convert agricultural cropland to habitat. Costs for development and maintenance of the habitat include such farming methods as land leveling, disking, irrigation of crops, repair and maintenance of the irrigation system, and the application of fertilizer and herbicide. Palo Verde Irrigation District provides water to PVER. The costs associated with irrigation,

electricity, and water is proportional to the amount of acreage that has been converted to habitat.

It is essential to have a mosaic of habitats that contain areas of riparian species (including mesquite), and ground covers or open areas. Ground cover is an effective method of controlling nonnative species and provides another layer of vegetation for habitat. Ground covers are 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. This provides additional flexibility to create and maintain standing water or saturated soil areas for covered species.

Previous Activities: To date, 539 acres of cottonwood-willow, honey mesquite, and upland-buffer land cover types have been established in phases 1-5 and are being managed for the LCR MSCP covered species.

FY10 Accomplishments: *The Palo Verde Ecological Reserve Development Plan: Phase 6* document was reviewed and approved by CDFG. In March, 216 acres of cottonwood-willow were planted in Phase 5.

Soil samples were taken by the contract crop consultant in Phase 5 prior to planting. The samples indicated deficiencies of NO₃-N (nitrogen), and PO₃-P (phosphorus). An application of 10-34-0 was added in an irrigation cycle.

In March, 2010, trees and shrubs were planted in Phase 5, Checks 2-11, 13-6 and 18-24 utilizing mass transplanting. Over 390,000 trees and shrubs were planted within a 14-day period. This year the cottonwood trees propagation rate was lower than previous years, as a result fewer cottonwood trees and more willows were planted. Changes to the planting plan are reflected in the final as-built (*Palo Verde Ecological Reserve: Annual Report 2010*). The 2010 planting contained the following averaged percentages of plants and trees: 6.1% *Atriplex*, 19.4% cottonwood, 5.3% *Baccharis*, 43% Goodding's willow, and 25.7% coyote willow and 0.5% mesquite. The average number was 2,100 plants per acre. Checks 1 and 17 were planted with both *Atriplex* and mesquite, and checks 12 and 25 were planted with mesquite only. An understory of blue grama grass and alkali sacaton were seeded in the previously mentioned checks of *Atriplex* and mesquite.

In addition to the small population of *Sigmodon* on the accretion bench just below Phase 4 of PVER, Colorado River cotton rats have been documented within the site.

Acoustic survey methods were used to monitor bats at PVER in 2010, with Anabat bat detectors deployed across the site quarterly to determine bat activity across habitat types. A dramatic increase in western red bat and western yellow bat activity was observed in 2010 sampling. For a detailed analysis of this data see the report *Post-Development Bat*

Monitoring of Habitat Creation Areas along the Lower Colorado River – 2010 Acoustic Surveys.

General avian surveys of habitat creation sites with more than two years growth were conducted using an intensive area search method. The Arizona Bell's vireo and yellow warbler were confirmed breeding. Summer tanagers were detected but classified as non-breeders.

Yellow-billed cuckoos were confirmed nesting in Phase 2 and Phase 3, with one nest found in each Phase. The Phase 2 nest, found July 13, was successful in fledging 2 young. Two young were also fledged from the nest found July 15 in Phase 3.

Southwestern willow flycatchers were surveyed 5 times during the breeding season in both Phases 2 and 3. Two flycatchers were detected in Phase 2, 1 on 25 May and 1 on 10 June; both are considered migrants. None were detected in Phase 3.

FY11 Activities: The development of Phase 6 (220 acres) is the focus in FY11. The ground will be prepped for Phase 6 planting, which includes disking, laser leveling, and plowing as needed for mass transplanting the trees and shrubs. Since the dense matting of cover crop was successful with reducing weed infestations in all previous phases (2-5), this method will continue to be utilized in Phase 6. In the checks planted with cottonwood-willow land cover types, crops of alfalfa and rye will be seeded, while in the checks of mesquite, a native seed mix will be used. Mass transplanting of approximately 218 acres of riparian species (approximately 420,000 of cottonwood, willows, and *Baccharis*) will take place in March. Spacing will be 6-foot inline with 40 inches between rows to reduce cost and still provide the structural density required by the species. Mesquite and *Atriplex* will also be hand planted on the remaining 22 acres. The planting will integrate three different percentages of Goodding's willow and coyote willow, and cottonwood. Open areas will be incorporated along the borders, allowing for the flexibility to rework the borders, if needed, without disturbing the trees and shrubs. Trees and shrubs will be planted a minimum of 40 feet away from the roads and irrigation canals.

Weeds will be managed with the application of a pre-emergent herbicide, manual removal where possible and target herbicides. Visual monitoring for destructive insects will continue and when applicable pesticides may be used.

Irrigation will continue on the same schedule until data becomes available that indicates adjustments are needed.

The plan and design for Phase 7, development of approximately 226 acres, will be drafted and is expected to establish this phase with cottonwood-willow land cover type.

Data will continue to be collected on vegetation, *Sigmodon*, bats, and avian species following the same protocols and schedules as in previous years.

Proposed FY12 Activities: Field preparation and planting of Phase 7 will be conducted to create as much riparian habitat as practical with the intent to target habitat for SWFL, YBCU, and other covered species. Previous phases will be monitored and adaptively managed for the targeted species. Site preparation for mass transplanting of riparian trees and shrubs on approximately 226 acres will be conducted. The plan and design will be developed for continued expansion of riparian habitat and will be included in Phase 8.

Pertinent Reports: The *Palo Verde Ecological Reserve Restoration Development Plan: Overview* and the *Palo Verde Ecological Reserve Restoration Development Plan: Phase 6* are posted on the LCR MSCP website. *Palo Verde Ecological Reserve Annual Report 2010* will be posted when available.

Work Task E5: Cibola Valley Conservation Area

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$900,000	\$770,765.54	\$9,980,630.20	\$1,100,000	\$650,000	\$650,000	\$700,000

Contact: Bill Singleton, (702) 293-8159, wsingleton@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, MNSW2, CLMB2, PTBB2.

Location: Reach 4, AGFD, river miles 99-104, Arizona.

Purpose: 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 F1-F4, and F6. Insect populations may be investigated as described in C5.

Project Description: In 2007, Reclamation secured 1,309 acres of land serviced by the Cibola Valley Irrigation and Drainage District and established the Cibola Valley Conservation Area (CVCA). The Arizona Game and Fish Department (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, AGFD acquired CVCA fee title and water entitlements and agreed to manage the site.

Cibola Valley Conservation Area 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 lower Colorado River and a remnant oxbow on the west side of the river (Palo Verde Oxbow). It is currently farmed for cotton and alfalfa. The area is bordered to the south by Cibola NWR and on the east by unimproved land under the jurisdiction of the Bureau of Land Management. The river forms the north and west boundaries, except for the Palo Verde Oxbow, from river miles 98.8 to 104.9.

Reclamation has secured 1,300 acre feet of irrigation water per year for the AGFD and 1,419 acre feet per year of the Hopi Tribe's fourth priority Colorado River water

entitlement. In addition, Reclamation already maintains a fourth-priority entitlement of 118.94 ac-ft per year at CVCA. The irrigation water will be used for establishment and maintenance of land cover types throughout the life of the program. 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. This provides additional flexibility to create and maintain saturated soil areas for covered species.

Previous Activities: Through FY09, 547 acres of cottonwood-willow, honey mesquite, and buffer-stabilized ground have been established in phases 1-4 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 was 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 quailbush, needle grama, curly mesquite, desert bluebells, and desert Indian wheat. A sprinkler system was rented for four months to provide irrigation water for initial plant germination.

A Memorandum of Understanding was signed in September 2008 between Reclamation and AGFD that assures availability of land and water resources for the 50-year term of the program. Additionally, 1,419 acre-feet of water was purchased from the Hopi Tribe for the site. Reclamation and AGFD continued joint planning for development and creation of habitat on CVCA.

Ivyleaf morning-glory is present at various levels throughout all of CVCA. Working with the local Farm Advisory Board and CVCA's contract farmer, many different techniques were used to control or minimize the spread of this invasive non-native species. Through this successful partnership, morning-glory, although still present, is not significantly affecting growth or survivorship of planted native land cover types.

FY10 Accomplishments:

Maintenance/Restoration/Management: Phase 5, consisting of 71 acres, was planted in March 2010 in accordance with the restoration development plan. This planting effort established approximately 10,000 honey mesquite trees and 7,500 *Atriplex*. Phase 5 was planted in furrows approximately 2-feet deep with a 20-foot separation between the rows. This wide furrow spacing saves irrigation water and provides adequate room for mechanical disking of invasive saltcedar and volunteer cotton, which grows between the planted furrows. The fields are still flood irrigated; however the water only travels in the furrows, saving as much as 2/3 of the water applied to a level field.

Limited ivyleaf morning-glory was present in the phases. The shade from the tree canopies helped to prevent the morning glory establishing a foothold. No chemicals were applied in an attempt to control the morning glory. However, field crews were utilized to remove some morning glory which appeared in more open areas.

Maintenance activities included using a piece of farm equipment (stalk cutter), in November 2009, to cut tumbleweeds in the 80 acre ground stabilization area of Phase 4. Barley was planted here to augment the native seeds previously planted and to aid in reducing the effects of blowing sand. Field crews continued to control morning-glory, volunteer cotton, and saltcedar 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 remove invasive plants from the fields twice a year, in the spring and in the fall.

Mechanical disking occurred between the mesquite-planted furrows in Phases 4 and 5. The invasive grasses/weeds and volunteer cotton created a dense presence. This disking practice between the furrows may occur every 6 months or as required, until the plants establish a strong foothold.

Vegetation growing near concrete-lined canals was mechanically cleared several times to keep the tree roots from damaging or blocking the irrigation canals. Chemical spraying is also used to control plants and invasives from growing along the canals.

Pole cutting in the nursery was undertaken during the winter months by the LCR MSCP and the BLM. Collection of poles from a LCR MSCP Conservation Area by other entities involved in restoration of the lower Colorado River requires submitting a written request and receiving approval from the LCR MSCP.

Soil samples used for recommending fertilizer applications and providing soil moisture monitoring information were taken. An agronomist conducted inspections focusing on general plant health, evidence of disease, over-irrigation, under-irrigation, water drainage, general nutrition, and insect problems. All reports were forwarded to Reclamation with recommendations for treatment.

The Cibola Valley Irrigation and Drainage District hosts monthly meetings with its water users. MSCP is represented at each meeting. All topics are discussed ranging from irrigation issues, to maintenance, to upcoming events and activities.

A document titled, *Cibola Valley Conservation Area Restoration Development Plan: Phase 6*, was drafted that includes the design and planting plan for Phase 6, which would be established in FY11. Approximately 89 acres of honey mesquite will be planted. Also included will be the fallowing of Phase 7. This will be disked and planted with a winter wheat cover crop.

Monitoring: Post-development vegetation monitoring was conducted at Phases 1, 2, 3, 4 west, and 5. A new monitoring protocol was implemented this year and included rapid plots for quick estimates of density and intensive plots for assessing density, vegetation structure and community composition. The number of plots per phase is dependent on the size of the phase being monitored. Each phase will have a proportional amount of intensive plots distributed within the phase depending on the total managed acreage.

MacNeill's sootywings were monitored every 2-3 weeks during April-September 2010. Sootywing numbers ranged from 0 adults to over 200 adults with the largest population at Phase 4 (west). Sootywing populations collapsed in late August, possibly due to a lack of rainfall that caused nectar-producing plants to die-back.

Rodent surveys were conducted at CVCA during 2010 and Colorado River cotton rats have been documented at the site on Phase 3.

Anabat bat detectors were deployed quarterly across the site in different habitat types to determine bat activity. The western red bat, western yellow bat, and California leaf-nosed bat were all recorded acoustically, with a large increase in red and yellow bat activity in 2010. Capture surveys were conducted once per month from May to September and one winter survey was conducted in February. The western red bat, western yellow bat, and California leaf-nosed bat were all captured, and acoustic voucher calls were obtained.

Avian species were surveyed at phases 1, 2, and 3 using an intensive area search method during 2010. The Sonoran yellow warbler, a LCR MSCP covered species, was confirmed breeding. Non-breeding yellow warblers were also detected at the site. A yellow warbler also was captured and color banded at CVCA (Phase 1) in June. This is part of the color banding of target species at restoration sites.

No breeding southwestern willow flycatchers were detected at CVCA, and all birds were detected before June 16th when birds are considered to be residents. Phases 1, 2, and 3 were surveyed and 19 birds were detected in Phase 1, 18 birds were detected in Phase 2, and 4 birds were detected in Phase 3. Each phase was surveyed five separate times.

Three nests of yellow-billed cuckoos were found in CVCA Phase 1 and all were successful. The nest found on July 18 fledged 3 young; the nest found on July 23 fledged 2 young and the nest found on Aug 2 also fledged 3 young. Three nests were also found in CVCA Phase 2 and two successful nests fledged 5 young.

FY11 Activities: Planting and field preparation of Phase 6 is intended to create approximately 89 acres of honey mesquite land cover, which in coordination with earlier and later planting phases, is designed to create a native vegetation mosaic. Phase 6 consists of four large fields, or checks, that will be planted in east-west rows. The rows will be planted in curved rows to provide a less crop-like appearance.

The ground will be prepared for planting by disking, laser leveling, and creating furrows in preparation for hand planting of 1-gallon potted mesquites (14,000). Soil samples may be taken prior to planting to provide nutrient availability information. *Atriplex* plants will be added in the third year after planting, to allow the slower-growing mesquites to mature without competition from the *Atriplex*. These plants will be planted in furrows with a plant in-line spacing of 15 feet and a furrow row spacing of 20 feet. This wide furrow spacing saves irrigation water and allows for a tractor to disk invasive saltcedar and volunteer cotton that grow between the planted furrows.

Monitoring activities conducted in 2010 will continue in 2011. Locations of surveys will be adjusted based on the growth and development of the planted phases.

Phase 7 will be planted in a low water usage crop, such as wheat, until FY2015. Arizona Game and Fish has been notified that we do not intend on restoring or stabilizing fields within Phases 8-11 until 2015. At that time, all phases will begin management under the program and either be converted to cottonwood-willow, honey mesquite, or upland buffer depending on water availability. The delay will allow us to fully assess long-term water requirements of phases currently planted and identify any options for obtaining additional water.

A small portion of Phase 5, honey mesquite, appears to have suffered mortality over the winter. Based on laboratory results, the cause appears to be a canker caused by a fungus. Fortunately, this can be controlled with an aerial application of a fungicide and is underway.

Proposed FY12 Activities: Irrigation and on-site maintenance will continue on Phase 1-7. No additional planting or site development is scheduled until 2015. Monitoring activities will continue in 2012. Locations of surveys will be adjusted based on the growth and development of the planted phases.

Pertinent Reports: *Soil-Plant-Water-Nutrient Relationships of Populus fremontii, Salix gooddingii, and Salix exigua During Native Habitat Restoration*, the study plan from the Department of Soil, Water, and Environmental Science, University of Arizona, is available upon request. *Cibola Valley Conservation Area Restoration Development Plan: Overview*; *Cibola Valley Conservation Area Annual Report, 2007*; and *Cibola Valley Conservation Area Annual Report 2008* are posted on the LCR MSCP website.

Work Task E9: Hart Mine Marsh

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$2,380,000	\$2,129,989.54	\$4,854,161.22	\$500,000	\$300,000	\$750,000	\$200,000

Contact: Gregg Garnett, (702) 293-8644, ggarnett@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Habitat creation.

Conservation Measures: CLRA1, LEBI1, and CRCR2.

Location: Reach 4, Cibola NWR, River Mile 92, Arizona.

Purpose: Create and manage marsh habitat for Yuma clapper rail, least bittern, and Colorado River cotton rat.

Connections with Other Work Tasks (past and future): Vegetation and species monitoring are being addressed under F1-F4.

Project Description: Hart Mine Marsh is a decadent marsh located on Cibola NWR. Currently, drainage water from the refuge's agricultural fields enters Hart Mine Marsh through gated structures in the Arnett Ditch. Previous management practices have not allowed any outflow from the marsh; therefore, the drain water terminates in the marsh to evaporate and stagnate. The result is poor water quality, limited marsh habitat, and saline upland areas, some completely devoid of vegetation or dominated by saltcedar.

Habitat requirements for marsh-covered species include areas of permanent open water and larger areas of adjacent emergent marsh vegetation with water depths ranging from 1 to 12 inches. At least 80 acres adjacent to deep areas will be re-graded to provide more suitable marsh areas, adjacent permanent open water, and controllable water levels. This would provide permanent open water adjacent to emergent vegetation. By managing water levels and providing appropriate vegetation, suitable habitat for covered marsh species can be created. Water, diverted by gravity from the Arnett Ditch, would be used to flood-leveled fields and create marsh habitat conditions. Water levels would be managed by a series of small water control structures such as culverts or stop logs.

Previous Activities: Through 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 CWA, and Section 106 of the NHPA. In FY09 the first phase of construction was completed and resulted in 92 acres of marsh.

FY10 Accomplishments: The second phase of construction was completed in FY10 resulting in 163 acres of marsh. The project was completed within the specified time window and within the limits of the approved budget. This phase included removal of saltcedar, the dredging of channels and contouring of cell 1, and the installation of additional control structures for marsh water level management. Maintenance of the site, including water level management and nonnative vegetation control, was accomplished through a combination of resources from the USFWS staff and commercially procured sources.

After the completion of cell 1 construction, over 700,000 emergent and marsh transitional vegetation species were planted. When these cells were completed, native vegetation was planted as needed according to its particular requirements. Plants and planting services were obtained through commercial sources. Table 1 contains the species and number of individual containers that were planted in March 2010. The species were chosen based on their USDA native plant status, for their relatively high tolerance to saline conditions, for their diversity in structure, and for their adaptation to different water depths or environmental conditions. The remainder of the cell was not planted, however by managing water levels native plants are being established.

Table 1. Species, common name, and number of containers of plants ordered for cell 1 of HMM for planting in March, 2010.

Species	Common Name	Number of Plants
<i>Schoenoplectus californicus</i>	California bulrush	35,200
<i>Scirpus tabernaemontani</i>	Great bulrush	4,800
<i>Scirpus olneyi</i>	Three-square bulrush	65,000
<i>Eleocharis palustris</i>	Common spikerush	20,000
<i>Distichlis spicata</i>	Inland saltgrass	575,000
<i>Atriplex lentiformis</i>	Quail bush	1,500
<i>Prosopis glandulosa</i>	Honey mesquite	200
Total		701,700

The 40 cfs pump that supplies water to HMM, suffered irreparable damage to multiple mechanical components during FY10. Water was supplied to HMM using the refuge’s smaller 20 cfs pump, however is not a viable long-term solution. Since the 40 cfs unit was primarily dedicated to HMM, funds were supplied to procure and replace this pump. Installation of the new pump is expected in FY11.

FY11 Activities: The third and final phase of construction at Hart Mine Marsh will be completed in FY11. This will include the construction of an additional fresh water inlet for the constructed marsh cells. An additional water control structure for this new inlet will also be installed. Additional refinement of the established infrastructure will be

accomplished during FY11. This will include the addition of stoplog structures between cells for greater ease and flexibility of water management on the site. Road construction and road surfacing activities will also be completed in FY11 to improve site access for planting and maintenance activities. Replacement (installation) of a new 40cfs pump to supply larger volume of water to HMM, dependent upon procurement and fabrication time, is expected in FY11.

As part of an effort to increase vegetation species diversity at HMM, supplemental planting is planned for Phase 3 in FY11. This will include additional three-square bulrush planting in shallow areas on the north side of cell 1. Saltgrass plugs will be planted along the north side of cell 1 at elevation 217' in an attempt to vegetate the margin of the marsh cell. Additionally, three-square bulrush, great bulrush, and California bulrush will be planted on the eastern side of cell 2 (table 2).

Table 2. Species, common name, and number of containers of plants ordered for cells 1 and 2 of HMM for planting in February, 2011.

Species	Common Name	Number of Plants
<i>Schoenoplectus californicus</i>	California bulrush	10,000
<i>Scirpus tabernaemontani</i>	Great bulrush	10,000
<i>Scirpus olneyi</i>	Three-square bulrush	30,000
<i>Distichlis spicata</i>	Inland saltgrass	70,000
Total		120,000

In addition, alkali sacaton (*Sporobolus airoides*) seed will be spread in some of the adjacent upland areas around the marsh for ground stabilization and to add to the native vegetation mosaic of the site. In subsequent years, additional marsh and upland plant species may be established within and adjacent to both cells 1 and 2 to fill in non-vegetated areas, stabilize ground, inhibit invasion of nonnative species, and to promote vegetation diversity, as necessary.

Abiotic monitoring will be conducted starting in spring 2011. This will include regular measurement and recording of water quality parameters, soil conditions and site hydrology. Marshbird surveys will begin in FY11.

Proposed FY12 Activities: The majority of the activities planned for FY12 deal with management, maintenance, and monitoring. Water management, including the maintenance of water levels and water delivery activities on the site will be performed by the USFWS. Invasive and nonnative vegetation control will continue to be performed by contracted services. Monitoring of abiotic and biotic parameters will be conducted by USFWS and the LCR MSCP.

Although no construction activities are planned for FY12, planning and procurement of materials for future infrastructure repair is projected. The water delivery infrastructure for the Unit 2 management area on Cibola NWR (that also supplies HMM) is aging and will

need to be replaced at some point; the 40 cfs pump at Unit 2 failed in FY10 and some similar water conveyance infrastructure of the same age and made of similar components on the island unit failed this past year. To avoid system failures during critical times for covered species breeding seasons and to maintain adequate water levels to keep vegetation at HMM alive, pro-active steps to upgrade the infrastructure components will be made to protect the investments made by the LCR MSCP. A revised estimated budget for FY13 reflects the replacement of the Unit 2 water supply lines for HMM.

Pertinent Reports: *Hart Mine Marsh, Existing Conditions Report*, the *Comprehensive Conceptual Restoration Plan*, and *Hart Mine Marsh Conservation Area Development Plan* are posted on the LCR MSCP website. *Hart Mine Marsh Annual Report 2010* will be posted when available.

Work Task E14: Imperial Ponds Conservation Area

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$651,840	\$655,197.95	\$7,570,575.36	\$610,000	\$525,000	\$395,000	\$395,000

Contact: Nicole Bolton, (702) 293-8119, nbolton@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: Create and manage a mosaic of native land cover types for LCR MSCP covered species.

Connections with Other Work Tasks (past and future): Work task vegetation and species monitoring is being conducted under F1, F2, F3, F4, F5, and D9.

Project Description: The Imperial Ponds Conservation Area is an integrated mosaic of native land cover types, including isolated backwaters, cottonwood/willow, and marsh. It is situated within the Intensive Management Area of the Imperial National Wildlife Refuge, an area of focused management for sensitive wildlife species including native fish, marsh birds, neo-tropical migratory birds, and migratory waterfowl. By partnering with Imperial NWR to implement this project within an area already so rich in biodiversity, the LCR MSCP is creating a unique native landscape like no other found on the LCR.

Previous Activities:

Ponds: Between FY05 and FY07, extensive site development was undertaken to excavate six isolated, independently managed backwater ponds, to create habitat primarily for razorback sucker and bonytail. Since that time, the ponds have been stocked and managed primarily for razorback sucker and bonytail, and secondarily for the benefit of marsh species. Six ponds have been constructed to provide approximately 80 surface acres of backwater habitat for endangered razorback sucker and bonytail, as well as provide marsh habitat for western least bittern and Yuma clapper rail. The ponds provide a diversity of depths and habitat features, including rip-rap for fish cover and hummocks on which to place native wetlands plants.

Colorado River water is supplied to the ponds by a pump that uses state of the art fish screening technology (wedge-wire screen). The screen was constructed to prevent the eggs and larvae of nonnative, predatory fish from entering into the ponds. The ponds are not interlinked; each pond is independently managed. In FY09, through work task (G3) an evaluation of the wedge wire screen system on the 6,000 gallon per minute pump, supplying the ponds, was conducted. As mentioned in G3, the preliminary results found that eggs and larvae of the smallest size class of nonnative fishes (those with eggs less than 1 mm in diameter) were entrained through the screen in nearly all the samples taken, which raised concern over continued use of the screened pump to supply the ponds without additional filtering. Additionally, pH levels in two of the ponds during mid-summer exceeded 9.0; these levels were quickly resolved by pumping from the well (which has a consistently lower pH than the Colorado River). Since the summer of 2009, water supply to the ponds has been exclusively via the 750-1,500 gallon per minute well pump, to reduce the risk of introducing non-native fish larvae into the ponds, as well as to manage pH. When water is released from a pond, it enters a drainage ditch where native wetland and riparian vegetation has been planted.

Riparian: Using material excavated from the ponds, an existing 4 acre cottonwood nursery on the refuge will be expanded by 34 acres to develop cottonwood-willow land cover for the yellow-billed cuckoo. The pond material was spread over approximately 100 acres; the acreage not used for cottonwood-willow will be managed by the refuge for migratory waterfowl. Both the yellow-billed cuckoo and willow flycatchers have been sighted in the existing nursery. Field leveling and irrigation system installation for the area were completed in FY08. However, due to unfavorable soil conditions, tree planting is not anticipated until at least FY13.

Marsh: A 12 acre marsh unit was created at Field 18 in the southeast corner of Imperial NWR. This field was cleared in the winter of 2007-2008, and was converted into a bulrush-dominated marsh. Because the field is adjacent to several marsh units currently occupied by California black rail, the objective was to increase habitat acreage for this species and other species of concern.

During FY09, onsite maintenance, utility payments, and water management for the site were conducted. This funding and tasks are reviewed and modified annually by both agencies. Additionally, a fuel contract was executed to supply heavy equipment use onsite, in support of site maintenance and development.

FY10 Accomplishments:

Maintenance/Restoration/Management: Onsite maintenance, utility payments, and water management for the site continued. E14 was also used to support dewatering, evaluations, maintenance of Pond 1.

Several infrastructure maintenance tasks were conducted in FY10. Reclamation has performed patching of cracks in the concrete of the new irrigation canal. Gravel road base was purchased and stockpiled for later use as road base.

Staff gauges were purchased and installed throughout the site in FY10 to monitor and manage water levels. A series of surveyed benchmarks were placed in FY09 as reference points for positioning the staff gages, relative to actual elevations. Design, purchase, and installation of a data telemetry system to manage water levels and water quality were initiated, using the staff gauges installed in FY09.

Ponds. Construction was done in a series of six spawning beds for Pond 1, in support of ongoing native fish habitat. The design of these spawning beds was intended to evaluate the use of geotextiles (as a vegetation barrier), a prototype gradation of gravels and rock, and site fidelity of razorback suckers to a particular spawning location.

During FY10, clearing, preparing, planting, irrigating, and monitoring of shoreline plantings along selected areas of the pond shorelines with native grasses, baccharis, mesquite, and coyote willows occurred. In total 30,772 plants were installed along the shorelines of ponds 1, 2, 3, and 5. The functions these plantings are intended to provide a reduction in shoreline erosion, limit encroachment of undesirable non-native vegetation, maintain open areas for wind circulation in the ponds, and improve marsh habitat in the ponds.

Riparian. Reclamation performed soil mapping and sampling of the future cottonwood-willow field areas to evaluate salt concentrations and nutrient levels. The results indicated moderately high salinity and nitrogen deficiencies in the soils. Therefore, the cottonwood-willow planting has been delayed until at least FY13. During the spring and fall of FY10 the fields were fertilized with a high nitrogen fertilizer (to increase nutrients) and humic acid to help mobilize salts and facilitate salt flushing. The previous rye grass cover crop was rotated to a salt-tolerant grass cover crop, to continue amending and managing the soil.

Monitoring: Rodent surveys were conducted and Yuma hispid cotton rats have been documented at the site. The area was surveyed five times for southwestern willow flycatchers from May to July and no birds were detected. Anabat bat detectors were deployed across the site quarterly to determine bat activity across habitat types. In 2010, 8 call minutes were recorded for western red bats, 42 call minutes were recorded for western yellow bats, 81 call minutes were recorded for California leaf-nosed bats, and 1 call minute was recorded for Townsend's big-eared bat. Yellow-billed cuckoo surveys were conducted at the area and no nesting birds were found.

The following water quality parameters, dissolved oxygen, temperature, conductivity, pH, and total dissolved solids were monitored monthly until water temperatures reached 27°C monitoring was then increased biweekly. Monitoring data are used to direct pumping operations.

Population and habitat monitoring were conducted in ponds 2, 4, and 6. Population estimates were calculated for RASU, no population estimates were calculated for BONY as no adults were captured although they are known to persist in pond 2. In pond 2, the RASU population is at 60% of what was stocked and 24% in pond 6. Pond 4 has not had

a population estimate since March due to low recaptures however individuals continue to be contacted suggesting 11% survival.

Habitat use for RASU shifted across seasons, but habitat preference in any given season was different for RASU populations in each pond. In addition, radio telemetry conducted in ponds 2 and 4 during the summer months located the fish in deep open water locations.

Autumn sampling was conducted in October 2009 and resulted in the capture of 17, 18, and 10 adult RASU in ponds 2, 4, and 6 respectively. No adult BONY were captured in FY10 although they are known to persist in Pond 2. One BONY larvae and 11 RASU larvae were collected in Pond 2.

FY11 Activities:

Maintenance/Restoration/Management: Funding for onsite maintenance, utility payments, and water management for the site will continue. E14 will also be used to support the dewatering, evaluations, maintenance of each pond. Vegetation management is an ongoing action which keeps the pond shorelines clear of excessive growth of undesired *Phragmites*.

During FY11, the data telemetry instrumentation purchased and installed in FY10 will be connected and networked to a single data collection hub. Future plans include beginning wireless transmitting of the recorded data off site.

Ponds. Additional non-native fish entrainment studies will be conducted, to test secondary filtering of Colorado River surface water to a size capable of excluding all non-native fish eggs and larvae, in the spring at Imperial Ponds. This research is intended to supplement the primary wedge wire screen system, by providing secondary filtration. We are currently evaluating the installation of a temporary line from the existing well into pond one using left over pipe material available from other projects.

Riparian. Soil mapping and sampling was conducted on the 34 acres of the future cottonwood-willow field areas to evaluate salt concentrations and nutrient levels. Fertilizing of the riparian fields will continue during the fall and spring, with a high nitrogen fertilizer and humic acid, to help mobilize salts and facilitate salt flushing.

FY12 Activities:

Maintenance/Restoration/Management: Onsite maintenance, utility payments, and water management for the site will continue.

Ponds. Management of water surface elevation (WSE) and water quality will cease on ponds 2-6. Monitoring will be conducted monthly during this time, to answer questions regarding the similarity or contrast of the natural WSE and water quality parameters between the ponds, the LCR, and the Martinez lake inlet. After monitoring has been completed, collected information will be used to develop and study methods to reduce or simplify water delivery to the ponds and enhance water quality.

Riparian. Soil sampling will continue on the 34 acres of the future cottonwood-willow field areas to evaluate salt concentrations and nutrient levels. Fertilizing of the riparian fields will continue during the fall and spring, with a high-nitrogen fertilizer and humic acid, to help mobilize salts and facilitate salt flushing. If favorable soil conditions are found, crop rotation (replacing the existing grass with native vegetation having salt tolerances comparable to cottonwoods and willows) will occur.

Pertinent Reports: *Evaluation of the Cylindrical Wedge-Wire Screen System at Imperial NWR 2009* is posted on the LCR MSCP website. *Imperial Ponds Conservation Area 2008 Annual Report* and *Imperial Ponds Conservation Area 2009 Annual Report* will be posted to the LCR MSCP website.

Work Task E15: Backwater Site Selection

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$286,750	\$4,331.69	\$1,286,599.50	\$20,000	\$20,000	\$20,000	\$20,000

Contact: Terry Murphy, (702) 293-8140, tmurphy@usbr.gov

Start Date: FY06

Expected Duration: FY19

Long-term Goal: Habitat creation.

Conservation Measures: BONY2, RASU2, and FLSU1.

Location: Reaches 3-6; California, and Nevada, River Mile 22-276, Arizona, California, and Nevada.

Purpose: The backwater site selection process is used to evaluate and prioritize potential sites for backwater habitat creation for razorback sucker, bonytail, and flannelmouth sucker.

Connections with Other Work Tasks (past and future): E16 is used with this work task to identify projects other than existing backwaters for habitat creation.

Project Description: Backwater site selection consists of a five-step process to evaluate existing backwaters along the Colorado River within the LCR MSCP planning area, from reaches 3 to 6. This ultimately results in the conceptual-level planning efforts for a select number of sites, which would become available for the Program Manager to select for inclusion into the program. New backwaters, which may be constructed separate from the existing river channel (and its associated backwaters), are excluded from this effort, and would follow the general site-selection process (E16). Backwaters may be disconnected or connected with the main channel of the Lower Colorado River. Backwaters that are disconnected from the LCR channel are of considerably higher value to bonytail and razorback sucker than connected backwaters in the LCR, and are the preferred type of backwater to achieve LCR MSCP conservation goals for these species.

Because some 1,000 backwaters currently exist within LCR MSCP reaches 3-6, the backwater site selection effort was divided into two phases: reaches 5-6 represent the first phase, and reaches 3-4 will represent the second.

Previous Activities: Backwater Site Selection starts with Step 1, an inventory and review of existing GIS data, aerial videos, and photographs to quantify the number, size, and location of currently existing backwaters, and to identify land ownership at a broad

level. Reclamation personnel work with land managers and resource agencies to identify land use issues, and other regulatory constraints, which is used to generate a list of candidate sites (approximately 25) for further evaluation. Helicopter reconnaissance flights are conducted during winter low-flow periods to confirm the presence of water year-around at these candidate sites, prior to conducting any site visits.

Steps 2 and 3 entail conducting brief (1-2) day visits at each of the (25) candidate sites, and a biological rating effort. Biological and physical data are collected and entered into a biological suitability model, established specifically for this effort. The model generates a biological suitability rating, such as poor, moderate, good, or excellent. This rating provides decision makers with a basic scientific understanding of the potential of each site, in their existing conditions, to provide habitat for LCR MSCP covered fish species. Once the biological ratings are established, Reclamation solicits input from cooperating land managers, resource agencies, and the general public, as sites are selected and prioritized for further evaluation and planning. Approximately four to five sites are chosen for further evaluation from the (25) candidate sites evaluated in steps 2-3.

Step 4 of the process includes conducting quarterly sampling to construct a one-year environmental baseline for each of the four to five candidate backwater sites that proceed to this point. While this environmental baseline is being constructed, Reclamation works with the landowner (and appropriate project stakeholders) to develop a conceptual habitat creation plan and preliminary cost estimates for project implementation. At the conclusion of Step 4, sites may be selected by the Program Manager for implementation into the program Step 5. Site selection is considered to be final once an executed land use agreement is in place between Reclamation and the appropriate land manager.

FY10 Accomplishments: In response to technical challenges associated with creating and maintaining backwaters free from non-native species, as well as public comments associated with current isolated LCR MSCP backwaters, the decision has been made to postpone further conceptual planning for backwater habitat creation to provide additional time to perform further research on screening requirements for non-native fish, revising backwater habitat design criteria, and evaluating alternative water supply and filtration methods. A five-year backwater strategy has been drafted to address how the program will address backwater-related research and development issues.

A workshop was held in January 2010, focusing on habitat goals by reach and state. Although backwaters were not specifically discussed, the program commitments and focus of future backwaters will reflect the intent to focus on backwaters within the state of California. The step 1 inventory report for backwaters in reaches 3 and 4 will be completed and the final report posted to the LCR MSCP website. Following the completion of this report, further backwater site selection efforts will be suspended, with future work following the direction of the new backwater strategy.

The following activities are taking place in support of the backwater strategy, but are funded through Imperial Ponds Conservation Area (E14):

1. Additional non-native fish entrainment studies to resolve outstanding needs to filter Colorado River surface water to a slot size capable of excluding all non-native fish eggs and larvae will be performed. The expanded research will be performed at Imperial Ponds. This research is intended to result in a set of revised slot size criteria for filtering water through a primary system (wedge wire screen), as well as development of secondary screening systems (sand filter or other technique). The study would also include testing of a secondary filtration system, to determine the effectiveness of such a configuration. If the recommended slot size criteria can be met, this information would be used to determine what site improvements to make at Imperial Ponds (or potentially Beal Lake also) to meet the needs of the program. In FY10 the contract is in place to test sand filters as a secondary filtration technique. The testing will be conducted in FY11
2. A series of six spawning beds were installed at Imperial Ponds, in support of ongoing native fish habitat use research. The design of these spawning beds is intended to evaluate the use of geotextiles (as a vegetation barrier), a prototype gradation of gravels and rock, and site fidelity of razorback suckers to a particular spawning location. On-going fishery related monitoring is evaluating usage of the spawning beds.

FY11 Activities: Evaluating sand filters as a secondary filtration tool is scheduled for March to coincide with the presence of larval fishes. The summary of the findings of the testing is expected later in the year. Additional secondary treatment technologies, such as the use of microscreens, are also being evaluated through literature searches and potential by on-site visits at facilities currently using this technology. During this fiscal year, the distribution and comment on the 5 year strategy is anticipated.

Additional activities identified in the strategy that will help guide the selection process, such as determining salinity, oxygen, and temperatures limitations of native fish, are on-going, but funded through other work tasks.

Proposed FY12 Activities: Minimal activities are projected until the five-year backwater strategy is completed. At that time, backwater inventory and selection is anticipated to resume at increased funding levels and focus on backwaters within the state of California. However, the budgets may be revised in the future based on promising technologies and would follow the normal work plan process.

Pertinent Reports: N/A

Work Task E16: Conservation Area Site Selection

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$360,000	\$294,547.68	\$1,129,547.85	\$375,000	\$375,000	\$375,000	\$375,000

Contact: Terry Murphy, (702) 293-8140, tmurphy@usbr.gov

Start Date: FY05

Expected Duration: FY30

Long-term Goal: Request, identify, prioritize, visit, and recommend potential conservation areas to the Steering Committee for development under the habitat creation requirements of the LCR MSCP.

Conservation Measures: CLRA1, WIFL1, BONY2, RASU2, WRBA2, WYBA2, CRCR2, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, FLSU1, MNSW2, CLMB2, PTBB2.

Location: Reaches 1-7, Arizona, California, and Nevada.

Purpose: Secure land and water resources to be developed as Conservation Areas to fulfill 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 Section E work tasks.

Project Description: Guidelines have been developed to describe the process for 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.

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 LCR MSCP.

When developing a financial value for subject lands and water, Reclamation must administer a Federal appraisal using the Department of Interior's designated appraisal services office. The cost of appraisal services is typically captured in the 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 guiding implementation of the conservation area. Backwaters proposed for management of native fish are reviewed under E15.

FY10 Accomplishments: FY10 activities are focused on building partnerships with resource agencies, identifying properties for future development, and securing lands occupied by Flat-tailed horned lizards to satisfy the FTHL conservation measure. The need to develop lands within the state of California has been identified and is a priority of the program.

We continued to attend and contribute at numerous meetings held with other resources agencies and tribal entities. In particular, we regularly attended “Healthy Landscapes” meetings hosted by the BLM, Cocopah bi-national meetings hosted by the tribe, “Riparian Restoration Workshop” hosted by the Yuma Crossing National Heritage, as well as the Laguna Division Planning group which is hosted by the LCR MSCP. We also conduct quarterly meetings with FWS representatives from all 4 federal refuges on the lower Colorado River, both Complex Managers, and staff from both the Ecological Services and the Arizona Fisheries Research Office of the FWS.

With the passing by the Steering Committee of Program Decision Document 10-001: Land Approval in October 2009, Reclamation which directed to evaluate unprotected properties within the Salt Creek ACEC of the Dos Palmas Preserve for inclusion into the program for the protection of FTHL. A review of parcel maps and discussions with FTHL biologists indicate the private lands within the Salt Creek ACEC suitable for FTHL consist of a narrow strip. Parcels within this area are small in size, typically 5-10 acres, and would require extensive appraisal, site assessment and title work to secure.

Costs associated with acquiring multiple small parcels outweigh the benefit to the species and the LCR MSCP at this time. Therefore, we revised decision document 10-001(r) to allow for acquisition in any of the four ACEC’s specifically managed for FTHL. Our intent is to secure all 230 acres within one ACEC; however, that may not be possible given the interest being generated by the search for renewable energy sources, specifically construction of solar plants in the desert southwest.

Reclamation has been working with the Bureau of Land Management (BLM), El Centro Field Office to identify private lands occupied by FTHL within the Yuma Desert ACEC located within the greater El Centro Area. Using information from the Imperial County Assessor office, thirteen parcels, with acreages ranging from 70-319 acres have been identified and will be the first to receive letters of interest. If additional acreage is required to meet the minimum of 230 acres, land owners with the two remaining FTHL management areas in the greater El Centro area; East Mesa ACEC and West Mesa ACEC would be contacted. Secured properties would be donated to the BLM and managed as FTHL habitat. All FTHL acquisition costs prior to FY11 will be captured under this work task. Costs include preliminary site visits for lands and realty personnel, discussions with the BLM, working with landowners, and costs of appraisals. Beginning in FY11, Flat-

tailed Horned Lizard (E30) will track expenditures to secure properties and turn over management to the BLM.

In January 2010 the LCR MSCP held a technical two-day workshop in Boulder City, Nevada to review the draft land cover type creation goals by reach and state presented at the October 2009 Steering Committee meeting in Laughlin. All LCR MSCP stakeholders were invited to attend and participate in the meeting, which will help refine the creation goals. As a result of the workshop, working with our partners the LCR MSCP will be actively talking with potential landowners to secure additional lands, primarily in California, to meet the goals of the program.

FY11 Activities: Coordination with resource agencies and attendance at planning meetings is expected to be similar to those in FY10. In FY10 it was anticipated that at least one backwater, which would be created on existing ground at existing or potential conservation areas, may be identified and evaluated in California during this interim period. This effort is being initiated to bring a backwater, created from dry ground, to parity with existing backwaters identified under E15. However, those efforts are temporarily on hold in accordance with the discussion in Work Task E15.

Two development plans are currently being drafted and are expected to be sent to the California Department of Fish and Game for evaluation and approval. The first is the establishment of honey mesquite on lands adjacent to the Palo Verde Ecological Reserve and owned by the Palo Verde Irrigation District. The second is the development of over 500 acres located on Cibola National Wildlife Refuge into primarily honey mesquite. Both properties, if developed, would satisfy over ½ of the programs honey mesquite goal for the state of California.

Development of marsh and backwater projects require the collection of significantly more site specific data than projects targeting honey mesquite and therefore their development plans will take longer to be drafted.

Proposed FY12 Activities: Coordination with resource agencies and attendance at planning meetings is expected to be similar to those in FY11. FY12 activities will focus on the identification and evaluation of potential conservation areas, primarily in California. Specific activities may include: Completion of the site-selection process for sites identified under the 2008 RFP. Steps 2-6 of the *Draft Final Guidelines for the Screening and Evaluation of Potential Conservation Areas* will be conducted if the sites meet the goals identified in the workshop held in FY10.

Pertinent Reports: *Draft Guidelines for the Screening and Evaluation of Potential Conservation Areas*, and *October 2008 Trip Reports* are posted on the LCR MSCP website.

Work Task E17: Topock Marsh Pumping

FY10 Estimates*	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate**	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$800,000	\$1,013,487.38	\$1,037,563.98	\$270,000	\$2,550,000	\$0	\$0

*The FY10 approved budget was revised with the concurrence of the Steering Committee in October of 2009.

**\$200,000 of the FY11 budget was redistributed to fund the completion of MSCP's construction commitment under AMM2 in FY10.

Contact: Ashlee Rudolph, (702) 293-8178, arudolph@usbr.gov

Start Date: FY06

Expected Duration: FY12

Long-term Goal: Avoid impacts of 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 impacts of covered actions on covered species habitats at Topock Marsh by constructing a reliable and manageable water control structure that diverts water both gravitationally and through pumping.

Connections with Other Work Tasks (past and future): N/A

Project Description: Topock Marsh has been identified as an important area for LCR MSCP covered species such as 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 through both gravitational and pumped means ensures the delivery of water to the marsh even when river elevations are low. It is anticipated that the gravitational diversion of river water, paired with supplemental pumping to maintain the water surface elevation of the marsh, would avoid negative effects on the groundwater elevation.

Previous Activities: The *Final Havasu National Wildlife Refuge Water Management Plan* has been drafted by the USFWS and is posted on the LCR MSCP website.

FY10 Activities: In October 2009, the Steering Committee passed Resolution 10-003, which authorized Reclamation to provide funding to the USFWS for the construction of designated portions of a new fire break. Transfer of this funding, which included \$800,000 with the flexibility to use an additional \$200,000 if required, met the LCR

MSCP's construction requirement under AMM2. These funds were joined with USFWS funds to finish the initial phases of the Topock Marsh Water Infrastructure Improvement Project. In return for funding a portion of the canal construction, correspondence was issued to Reclamation by USFWS releasing the LCR MSCP from any further construction obligations under AMM2. In April 2010, the Steering Committee passed Resolution 10-004, which authorized Reclamation to provide an additional \$2.5 million to the USFWS to meet the operation and maintenance requirements under AMM2.

Proposed FY11 Activities: The approved budget has been reduced by \$200,000 as the funds were transferred in FY10. Another Interagency Acquisition will be drafted to transfer a lump sum of \$2.5 million for long-term operation and maintenance costs from LCR MSCP to USFWS in FY12. This transfer will be the final action under the E17 work task, as all LCR MSCP's construction as well as operation and maintenance commits under AMM2 will be complete.

Proposed FY12 Activities: Upon transfer of \$2.5 million the LCR MSCP will have satisfied its long-term operation and maintenance requirements of AMM2 and the work task will be closed. The FY12 budget was revised with the concurrence of the Steering Committee in April of 2010.

Long-term maintenance of the entire water management system will be the responsibility of the USFWS. A memorandum documenting completion of AMM2 will be prepared and transmitted to the USFWS.

Pertinent Reports: N/A

Work Task E18: Law Enforcement and Fire Suppression

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$250,000	\$197,050.80	\$429,702.40	\$250,000	\$325,000	\$325,000	\$325,000

Contact: Jed Blake, (702) 293-8165, jblake@usbr.gov

Start Date: FY06

Expected Duration: FY55

Long-term Goal: Created habitat protection.

Conservation Measures: CMM1.

Location: Reaches 1-7.

Purpose: 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 Section E work tasks.

Project Description: This project funds law enforcement and fire protection for created habitat. It is assumed that BLM, USFWS, AGFD, CDFG, NDOW, BIA, CAL-Fire and other agencies will conduct law enforcement and fire fighting activities on the river. Law enforcement and fire suppression strategies have been developed at the programmatic level and for each individual Conservation Area. As new Conservation Areas are incorporated into the program, site specific fire plans will be drafted.

Previous Activities: Coordination meetings with law and fire agencies determining jurisdictions and authorities have been conducted. A comprehensive law and fire strategy for the LCR MSCP has been developed and shared with stakeholders. Seven conservation area specific law and fire plans were drafted and are updated annually.

FY10 Accomplishments: A federal inter-agency agreement was awarded to the Bureau of Land Management (BLM)-Colorado River District office based in Lake Havasu, Arizona. The agreement requires the BLM to be the lead fire management agency in support of habitat on the Palo Verde Ecological Reserve and the Cibola Valley Conservation and Wildlife Area. In addition to wildland fire suppression, the BLM also conducts patrols on the sites, pre and post fire season site inspections, site mapping to identify engine turn around areas, and available site infrastructure.

The inspections are intended to proactively identify and address potential law enforcement or fire suppression issues. The recommendations are discussed with the land owner and LCR MSCP project manager. These recommendations help identify high risk areas, areas in need of fuels reduction, and management of visitor use areas.

Coordination meetings were conducted with USFWS Wildland, BIA Wildland, and City of Yuma Fire personnel. Stakeholders were made aware of the purpose of the conservation areas, location, habitat types and access routes.

A fire suppression and law enforcement plan was drafted for the Yuma East Wetlands conservation area. This document will be finalized in FY11.

FY11 Activities: The BLM inter-agency agreement will continue to be funded and site recommendations submitted to land owners and project managers.

Tools and techniques used to implement the recommendations by the BLM will be researched and shared with land owners. Tools and techniques may include: use of heavy equipment for clearing, herbicide use both from a vehicle and hand operated, roadside mower that keeps fuel loads down, incinerator used to burn debris, chipping of exotic species and manual removal.

Fuel load reduction may occur on the conservation areas to minimize the risk of wildland fire. Chemical treatments, manual and mechanical removal, and chipping are all potential fuel reduction methods. The BLM and USFWS will help advise on the implementation of new fire breaks, infrastructure upgrades, and associated fire management actions. Working with our land management partners, signage pertinent to the rules and regulations for the Conservation Area are being developed, approved, and posted.

Proposed FY12 Activities: It is envisioned that the BLM inter-agency awarded FY10 will be renewed in FY12. New conservation areas may be added and funding levels adjusted per law and fire work load. Fuel load reduction work is also expected to be carried out as a yearly action. As deemed necessary by the landowner's fire management office, proactive measures will be implemented at the conservation areas.

Pertinent Reports: *Lower Colorado River Multi-Species Conservation Program Fire Management & Law Enforcement Strategy 2009*, and *Lower Colorado River Multi-Species Conservation Area-Specific Fire Management and Law Enforcement Strategy 2009* are posted to the LCR MSCP website.

Work Task E21: Planet Ranch, Bill Williams River

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY13 Proposed Estimate
\$100,000	\$26,129.72	\$129,196.40	\$8,900,000	\$1,500,000	\$750,000	\$500,000

Contact: Gregg Garnett, (702) 293-8347, ggarnett@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Habitat creation.

Conservation Measures: CLRA1, WIFL1, WIFL2, WRBA2, WYBA3, CRCR2, LEB1, YBCU1, YBCU2, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, MNSW2, CLNB2, PTBB2.

Location: Reach 3, Bill Williams River, 11 miles east of River Mile 190, Arizona.

Purpose: 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 Planet Ranch, Bill Williams River (E4). Costs associated with a federal land and water appraisal conducted in FY08 were captured under work task Conservation Area Site Selection (E16). E21 was closed at the end of FY05, but was reopened in FY09.

Project Description: Planet Ranch (currently owned by the City of Scottsdale), 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 authorizes Reclamation to enter into negotiations to secure approximately 3,418 acres of land and 4,668 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 Bureau of Land Management 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 primarily cottonwood-willow land cover type is anticipated to be developed on Planet Ranch. In addition, another 396 acres of cottonwood-willow land cover type on the Bill Williams River National Wildlife Refuge is afforded protection by securing the Planet Ranch property.

Previous Activities: Reclamation evaluated Planet Ranch and developed a conceptual design, assuming the entire ranch and water entitlement were secured for the program. This information is posted on the LCR MSCP website as *Planet Ranch: Potential Restoration Site, Preliminary Site Analysis and Conceptual Design*.

FY10 Accomplishments: Negotiations to secure the land and water resources for the project continued. A lease with Freeport MacMoran was drafted, which included the donation of the land and water resources to the Arizona Game and Fish Commission for on-site activities, and included discussing the transition of property ownership from the City of Scottsdale to the Arizona Game and Fish Commission.

Because the final details of the lease, donation, and water agreements are still being negotiated, regulatory compliance activities required under the National Environmental Policy Act, the Endangered Species Act, and the National Historic Preservation Act were continued into FY11. Expenditures were below the projected budget in FY10 which reflects the ongoing negotiation. These activities are expected to include an Environmental Assessment with a public comment period, Native American consultation, and a class I cultural survey. In addition, state regulatory compliance from the Arizona Department of Environmental Quality ADEQ is being coordinated by the City of Scottsdale.

Proposed FY11 Activities: Negotiations to secure the land and water resources for the project will continue. Once an agreement has been reached, a land and water resolution will be presented to the Steering Committee. A transition plan will be drafted to address the need for on-site staff and appurtenances such as vehicles and farming equipment. Given the property's remote location, the city of Scottsdale currently employs a caretaker, living year-round on the property, for maintenance and security purposes. Draft land use agreements with Arizona Game and Fish Commission as well as the Bill Williams River National Wildlife Refuge will be finalized. The land use agreements will address the roles and commitments of all parties. Issues and high priority items identified in the transition plan would be addressed in anticipation of the securing and transition of property ownership in FY12.

Proposed FY12 Activities: Assuming the property and its resources have been secured, the AGFD will provide on-site staffing. Activities to be conducted include maintenance of existing roads and river crossings, evaluation and repair of existing irrigation infrastructure, repair and maintenance of resident housing, procurement and deployment of vehicles and equipment necessary to maintain the ranch, and continued monitoring and research being conducted under other work tasks.

Pertinent Reports: N/A

Work Task E24: Cibola NWR Unit #1

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$600,000	\$523,414.75	\$2,344,505.12	\$636,000	\$1,000,000	\$1,100,000	\$1,200,000

Contact: Gregg Garnett, (702) 293-8347, ggarnett@usbr.gov

Start Date: FY07

Expected Duration: FY55

Long-term Goal: Habitat creation.

Conservation Measures: WIFL1, WRBA2, WYBA3, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, CLNB2, PTBB2.

Location: Reach 4, Cibola National Wildlife Refuge, one-half mile east of River Mile 97, Arizona.

Purpose: 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 incorporates Cottonwood Genetics Study (E6), Mass Transplanting Demonstration (E7), and upon completion, the Seed Feasibility Study (E8) with additional adjacent acreage on Unit #1 of Cibola NWR. After completion of the research projects in FY07, operation and maintenance of these work tasks will be tracked under E24.

Project Description: Reclamation currently has a number of established projects at Unit #1, which includes restoration research and demonstration projects that began as a precursor to the LCR MSCP. In 1999, the USFWS and Reclamation planted the Cibola Nature Trail and established 34 acres of cottonwood-willow and mesquite land cover type within Unit #1. In 2002, the USFWS and Reclamation planted another approximately 18 acres of cottonwood-willow in Unit #1 north of the Nature Trail. Four additional fields of approximately 20 acres each in Unit #1 are occupied by three projects that have been fully or partially funded by the LCR MSCP. These include Cottonwood Genetics Study (E6), Mass Transplanting Demonstration (E7), and Seed Feasibility Study (E8). To the east of these projects are an additional two agricultural fields. A 50-year land use agreement with the USFWS to develop and maintain land covers on Unit #1 has been signed.

Work Task E24 incorporates the aforementioned existing projects and agricultural land as well as substantial additional adjacent acreage into a single conservation area. The land

included in 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 cover type development for SWFL, but will also likely include a mosaic of native habitats including riparian, wetland, and riparian-upland interface areas.

The acreage in 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. Cibola NWR has performed substantial capital improvements to this area over the past few years including clearing, laser-leveling, field construction, and irrigation and drainage infrastructure installation. The area is currently planted in a cover crop and is being 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, 154 acres) has been cleared and leveled and is currently irrigable. A portion of this area has been planted with cottonwood, willow, and mesquite species. The area will require upgrades to the irrigation system and needs further soil conditioning to continue development.

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.

FY10 Accomplishments: Ongoing infrastructure improvements including additional drain construction and repair occurred during this fiscal year. Based on observations of variable establishment in the Crane Roost, an additional season of soil conditioning was projected for fields in the next phase of development (Hippy Fire). No tree purchases were made and no riparian tree planting occurred on the Cibola NWR Unit #1 Conservation Area for FY10. Site maintenance including irrigation, weeding, and other associated farm services were conducted on the existing planted acres using contracted services through FY10.

Monitoring. Post-development vegetation monitoring was conducted at Nature Trail, the Mass Transplanting site, and Crane Roost. A new monitoring protocol was implemented this year and included rapid plots for quick estimates of density and intensive plots for assessing density, vegetation structure and community composition. The number of plots per phase is dependent on the size of the phase being monitored. Each phase will have a proportional amount of intensive plots distributed within the phase depending on the total managed acreage. Data are currently being analyzed.

Small mammal trapping was conducted at the Nature Trail and cotton rats were documented again in 2010. Anabat bat detectors were deployed quarterly across the site in different habitat types to determine bat activity. The western red bat, western yellow

bat, California leaf-nosed bat, and Townsend's big-eared bat were all detected in 2010, although all but the red bat were detected in low numbers. Capture surveys were conducted once per month from May to September. The California leaf-nosed bat was the only LCR MSCP species captured.

General avian species were surveyed to determine breeding status at the Nature Trail and Mass Transplanting areas using area search and spot mapping techniques. The Sonoran yellow warbler and Arizona bell's vireo were the only LCR MSCP covered avian species found breeding within the conservation area.

No breeding southwestern willow flycatchers were detected at the Cibola Nature Trail, and all birds were detected before June 16th when birds are considered to be residents. Two birds were detected and the site was surveyed five separate times.

Two yellow-billed cuckoos and one nest were found at Cibola Nature Trail on July 27. This nest later failed and no further nesting attempts were documented at the site.

Proposed FY11 Activities: The decision has been made to delay the purchase of trees for approximately 80 acres of fields available in the Hippy Fire Area until FY12. These riparian trees would then be planted in FY13.

Overall, site maintenance will continue including regular watering and field maintenance of all the established fields within the Conservation Area's portion of Unit #1. Pre- and post-development monitoring will continue at Cibola NWR Unit #1 Conservation Area. Habitat, avian, small mammal, and bat monitoring will continue.

Proposed FY12 Activities: In FY13, approximately 80 acres in the northern section of the Hippy Fire Area will be planted with riparian trees. The trees will be purchased in FY12. The area has been in a cover crop since 2008, beginning with a salt-tolerant grass and converted to alfalfa in 2010. The area currently shows none of the signs of heavy soils or saline conditions that were observed in the Crane Roost. Site maintenance will increase as new acres of riparian cover-type are established, but these activities are expected to include the same services needed across the rest of the established portions of the conservation area.

Pertinent Reports: *Cibola NWR Unit #1 Conservation Area Annual Report, 2009* will be posted to the LCR MSCP website.

Work Task E25: Big Bend Conservation Area

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$500,000	\$499,672.19	\$637,394.44	\$500,000	\$30,000	\$30,000	\$30,000

Contact: Nicole Bolton, (702) 293-8119, nbolton@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: Protection of an existing backwater from development which would result in 15 acres of backwater credit.

Connections with Other Work Tasks (past and future): Marsh bird surveys are conducted under D1 while fish surveys have been conducted under multiple Work Tasks in section C and 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 Big Bend Conservation Area. 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 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. This location may also provide an opportunity for restoration in the future.

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 priority for the LCR MSCP. The Colorado River and Reach 3 in particular are experiencing extensive urban development. The Big Bend Conservation Area, formally 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 land owners, and controls future development in the surrounding areas. Long-term security of the property would also provide protection to the backwater and allow for future restoration activities.

A long-term lease with the option to renew between Reclamation and SNWA was finalized in FY09. This lease would compensate SNWA for the acquisition cost of the 15 acres of upland. The compensation price of the upland was determined by a federal appraisal, which valued the property at \$872,000. The compensation was split equally over 2 fiscal years beginning in FY10. The 10 ac-ft of water attached to the Boy Scout Camp property and acquired by SNWA was excluded from the federal appraisal. Compensation was approved by the Steering Committee in October of 2008.

A land use agreement between Reclamation, NDOW, SNWA and Nevada Division of State Parks was signed and finalized in FY09. The land use agreement documents the roles and responsibility of each party pertaining to continual management of the Big Bend Conservation Area. A land and water resolution was approved by the Steering Committee in October 2008.

Previous Activities: The land use agreement documents the roles and responsibility of each party pertaining to continual management of the Big Bend Conservation Area.

SNWA assumed the responsibility of restoring the upland portion of Conservation Area at minimal cost to the program. Reclamation reviewed and concurred with the site improvement plans to ensure compatibility with LCR MSCP. Saltcedar was removed from the upland site and roughly 800 mesquite trees were planted. The LCR MSCP provided the mesquite trees, development of the existing groundwater well, and procurement of a portion of the irrigation system in support of SNWA's upland restoration action.

FY10 Accomplishments:

Maintenance/Restoration/Management: The SNWA was reimbursed for approximately ½ of the funding used to secure the Boy Scout Camp property through an in-kind contribution. The balance will be reimbursed in FY11. The LCR MSCP continued to support SNWA's effort to establish native plants on the upland property and ensure compatibility with the goals of backwater protection.

NDOW coordinated with the Nevada Wildlife Commission for the installation of two buoys at the entrance of the backwater. Permits for the buoy placements will be completed by March and the buoys will be installed in April 2011. The buoys will provide a no wake restriction in the backwater to decrease disturbance to wildlife.

Monitoring: Marsh bird surveys were conducted during March, April and May utilizing the National Marsh Bird Monitoring Protocol. Four survey points were established within the boundaries of the conservation area. No LCR MSCP species were detected.

All fisheries surveys for 2010 were conducted during February through May as part of the ongoing flannelmouth sucker activities associated with work task C15. One LCR MSCP covered species was contacted, a single flannelmouth sucker adult (610mm total length) was captured during the February survey. Additional netting was conducted during the May sampling trip in an attempt to contact age 0 flannelmouth.

FY11 Activities:

Maintenance/Restoration/Management: The SNWA will be reimbursed the remaining balance, approximately ½ of the funding, used to secure the Boy Scout Camp property. The LCR MSCP will continue to support SNWA's effort to establish native plants on the upland property and ensure compatibility with the goals of backwater protection.

Two "No Wake" buoys will be placed at the entrance of the backwater in April 2011. Installation will be accomplished with coordination between the LCR MSCP, NDOW, and YAO.

Monitoring: Presence/absence marsh bird surveys will be conducted in March, April and May at previous established points. At each survey point a vegetation survey will be conducted once per year, during the same time as the marsh bird surveys.

Fisheries surveys will be conducted. Electro-fishing, larval light trapping, and trammel nets will be accomplished monthly from February through May at locations which are dictated by water level or at locations which have historically produced native fish. Water quality profiles will be performed during each monitoring event and quarterly outside of the monitoring period.

Proposed FY12 Activities:

Maintenance/Restoration/Management: The LCR MSCP will continue to support SNWA's effort to establish native plants on the upland property and ensure compatibility with the goals of backwater protection.

Monitoring: Presence/absence marsh bird surveys will be conducted in March, April and May at previous established points. At each survey point a vegetation survey will be conducted once per year, during the same time as the marsh bird surveys.

Fisheries surveys will be conducted. Electro-fishing, larval light trapping, and trammel nets will be accomplished monthly from February through May at locations which are dictated by water level or at locations which have historically produced native fish. Water quality profiles will be performed during each monitoring event and quarterly outside of the monitoring period.

Pertinent Reports: *Big Bend Conservation Area Restoration Development and Monitoring Plan, Overview, and Site Improvement Plan for the Boy Scout Property* are posted on the LCR MSCP website.

Work Task E27: Laguna Division Conservation Area

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$750,000	\$688,738.54	\$688,738.54	\$1,375,000	\$6,290,000	\$10,400,000	\$4,900,000

Contact: Bill Singleton, (702) 293-8159, wsingleton@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, SUTA1, PTBB2.

Location: Reach 6, Federal Lands, River Mile 43-49, California and Arizona.

Purpose: Create and manage a mosaic of native land cover types for LCR MSCP covered species.

Connections with Other Work Tasks (past and future): This is a new start for the LCR MSCP in FY10.

Project Description: The Laguna Division, river miles 43-49, has been identified as having potential for large scale riparian and marsh restoration and enhancement (approximately 1,200 acres). 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 Game
- Pacific Institute
- U.S. Fish and Wildlife Service
- Bureau of Land Management
- Bureau of Reclamation

The Laguna Division Conservation Area (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 would be maintained with a maximum base flow of 100 cubic feet per second (cfs) from the Gail Gravity Main Canal forebay. Open water areas could be 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 would follow the existing topography where feasible. Adjacent terraces would be graded to allow flooding and promote the establishment of native riparian species. Water control structures would be created to manage water levels. Upland vegetation would receive water by either by flooding or drip irrigation.

To support the concept described above, inlet modifications to the point of diversion at the Gila desilting basin would be made to allow for up to 100 cfs capacity, would be required. This diversion ditch/pipe systems would be engineered to allow for maximum management flexibility including diverting the entire flow to Mittry Lake, the Laguna Division Conservation Area, or the old river channel. The Laguna Division Conservation Area will be using the Water Accounting Agreement.

Previous Activities: In coordination with the Laguna Planning team, 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, as well as cost effectiveness will ultimately determine the project's implementation.

The project is a new initiative for the LCR MSCP in FY10. Three alternative designs for the Laguna Division were prepared with input from the Laguna Division Planning Group using non-LCR MSCP funds. 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.

FY10 Accomplishments: In January, members of the MSCP presented the LDCA concept to the Regulatory Division of the Corps of Engineers in advance of the actual permit application which is scheduled for FY11. Under the Clean Water Act, a U.S. Army Corps of Engineers Section 404 permit which regulates discharge of dredged, excavated, or fill material in wetlands, streams, rivers, and other U.S. waters, is required.

Further analysis/design refinement occurred between the Laguna Planning team, local stakeholders, state and federal agencies, and Reclamation. Updates and a marsh workshop were held as well as a briefing to the Steering Committee.

Compliance activities were initiated for the overall restoration plan in support of the creation of riparian and marsh land cover types. A wetlands delineation and cultural survey was completed. A draft Environmental Assessment (EA) was prepared in accordance with the National Environmental Policy Act (NEPA). Part of the NEPA

process requires notification of the public. Two open house meetings were hosted on March 18; one at Hidden Shores and the other in the City of Yuma. LDCA informational brochures were created and distributed. A website was created to allow the Planning Team, stakeholders, and the public access to LDCA information. The site is: <http://www.lcrmscp.gov/worktasks/conservationareas/E27/index.html>

To facilitate removal of non-native vegetation, Reclamation has been discussing with the Bureau of Land Management development of a burn plan. The burn plan would be used to plan and orchestrate a 2,000 acre prescribed fire to clear existing non-native tamarisk from the site. Alternative methods such as clearing with mechanized equipment and/or a combination of mechanical clearing and on-site treatments (incineration, chipping, mulching) are being evaluated. Clearing of the project area is scheduled for early FY12.

Meetings and discussions concerning land-use agreements, establishing rights-of-way, river operational requirements, and operations/maintenance requirements have been occurring and will continue.

Delivery of 30,000 tons of Aggregate Base Course (ABC) rock began and is being stockpiled in the project area for road surfacing and firebreak construction.

Existing habitat at the proposed LDCA consists mainly of patchy saltcedar, *Atriplex*, and other shrub species. Except for a strip along the east side of the site, most of the site is dry. The area on the eastern edge consists of a narrow wetland vegetated namely by cattail, *Phragmites* and/or *Arundo*. There are also a few large Goodding's willow and mesquite trees present along this edge.

A monitoring schedule was developed based on vegetation type, presence/absence of standing water or moist soils, and the presence/absence of LCR MSCP species in adjacent areas. The land adjacent to the LDCA has been surveyed for many years by AGFD for marshbirds 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 wetland/marsh area during the breeding season. Marshbirds will continue to be surveyed until the work begins at the site. The EA for the site has included provisions for protecting these species and the adjacent Mittry Lake area provides an alternative habitat for the species displaced by the construction at LDCA.

Proposed FY11 Activities: Continued analysis/design refinement will occur between the Laguna Planning team, local stakeholders, state and federal agencies, and Reclamation. Plans for clearing non-native vegetation, primarily salt cedar, are being finalized. At the direction of the US Army Corps of Engineers, several cross sections were cut using a bulldozer to allow access for soil sampling. The results of the sampling can be found in the *Laguna Division Conservation Area Wetland Restoration Project Site and Soil Salinity Analysis Report* dated April 1, 2011. The soil sampling confirmed expected conditions and therefore no changes to the draft planting and restoration activities are being made.

Resources necessary to begin construction of the water delivery system, such as procurement of pipe and water control structures, will be initiated. Services for planting as well as site maintenance will be arranged. This site maintenance will include post clearing and post planting removal of volunteer tamarisk.

Proposed FY12 Activities: Development of the 1,200-acre Conservation Area has been separated into 3 distinct phases. Clearing of saltcedar is expected to begin with the northern-most cell (Phase 1) in FY12 and progress to the south. Other activities scheduled for FY12 include installation of the water delivery pipeline and inlet structure. Clearing of Phase 2 is scheduled for FY13 and clearing of Phase 3 is scheduled for FY14. In general, clearing and grubbing operations will be initiated first. Once completed, earthwork to contour the site creating primary and secondary channels will begin. The construction of water control structures will also be completed. Planting and site maintenance is the final step in the restoration process. Clearing is expected to be completed in FY14 with final planting and initiation of site maintenance occurring in FY15-16. Monitoring activities will end once clearing and construction has begun and will commence when the site is finished in 2014.

Pertinent Reports: *Laguna Division Conservation Area Update*, and *Laguna Division Conservation Area Task 4: Final/Preferred Habitat Restoration Concept*, are available upon request.

Work Task E28: Yuma East Wetlands

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$250,000	\$257,890.16	\$257,890.16	\$250,000	\$400,000	\$400,000	\$400,000

Contact: Jed Blake, (702) 293-8165, jblake@usbr.gov

Start Date: FY10

Expected Duration: FY55

Long-term Goal: Habitat creation.

Conservation Measures: CLRA1, WIFL1, CRCR2, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, PTBB2.

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 F1-F4.

Project Description: The LCR MSCP is providing funding to maintain and enhance land cover types, primarily marsh, cottonwood-willow, and mesquite established at the Yuma East Wetlands (YEW). The funding will allow for invasive plant removal and management during this initial establishment period. A decision document summarizing past, present, and future actions was presented to the Steering Committee with the FY11 Work Plan at the April 2010 meeting.

In 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 non-native plant species, trash dumps, and make-shift hobo camps. Wildlife and wetlands delineations were conducted prior to clearing.

YEW is developing into an integrated mosaic of land cover types, including cottonwood-willow, honey mesquite, and marsh. The project is located in Yuma, Arizona, on City of Yuma, Quechan Tribal, and Arizona Game and Fish Commission lands. Existing habitat created by past revegetation efforts has resulted in land cover types used by LCR MSCP covered species. In partnership with the Yuma Crossing National Heritage Area (YCNHA), the lead agency establishing the wetlands, the LCR MSCP will maintain

existing habitat and support adaptive management activities to improve site conditions which will benefit the LCR MSCP covered species.

Approximately 350 acres have been restored to create a mosaic of marsh, mesquite, and cottonwood-willow. YEW has adopted wildlife monitoring standards consistent with the LCR MSCP and has observed numerous LCR MSCP covered species on-site. LCR MSCP covered species and land cover type data sharing between the YCNHA and Reclamation biologists is ongoing.

Previous Activities: Since 2000, Reclamation has participated in the development of the Yuma East Wetlands outside the LCR MSCP process. Past activities included attendance at workshops and planning meetings, use of heavy equipment, an irrigation system inventory analysis, and adoption of LCR MSCP species monitoring protocols that are being used on the site.

FY10 Activities: Funding was transferred to the YCNHA for maintenance and management activities on the site. Maintenance activities included: removal of non-native species, application of herbicides, re-planting of native species as required, maintenance of irrigation systems, fuel purchase and delivery, access road maintenance, fertilizer purchase and application, and working with local contractors.

Management activities included: LCR MSCP species monitoring, fertilizer regime development, irrigation analysis, signage posted throughout the project, fire and law plan development, safety plan development, installation of vehicle access gates, installation of water control structure gates, water accounting, and site visits with stakeholders.

FY11 Activities: Funding was transferred to the YCNHA for maintenance and management activities will continue as necessary to maintain the existing habitat.

The YCNHA is also the lead agency coordinating the land use agreement. An agreement will be drafted and signed by the City of Yuma, Quechan Tribe, YCNHA, Arizona Game and Fish Department Commission, and the Bureau of Reclamation. In the agreement, stakeholders will affirm their commitment to the project for the term of the LCR MSCP. Roles, responsibilities, funding percentages, and a clause of “no reimbursable costs for prior development” will be spelled out. It is envisioned that the Land Use Agreement will be ready for signature in calendar year 2011. However, due to the many organizations involved, oversight from governing bodies, solicitor review and addressing any comments may delay the signing until 2012.

Reclamation staff will also attend planning meetings, habitat and species monitoring activities, and maintenance activity meetings. Additionally, LCR MSCP staff will attend and contribute to the annual bi-national re-vegetation workshops held in the Yuma area, with a focus on the YEW.

Proposed FY12 Activities: Based upon the signing or planned signing of the land use agreement funds transferred to the YCNHA will be increased to \$350,000. The 2012

funding commitment was the original budget described in the federal cooperative agreement; however due to the site still developing the Steering Committee recommended a reduced level of funding for the first two years. On-site maintenance activities, such as invasive species removal, irrigation infrastructure upkeep, fertilizer application, equipment upkeep, and replanting when necessary will continue. Installation of flow meters will be incorporated on the site. This will allow for increased water accounting accuracy and reduce staff labor.

Pertinent Reports: N/A

Work Task E29: Desert Tortoise

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$195,000	\$173,512.57	\$173,512.57	\$50,000	\$0	\$0	\$0

Contact: Jed Blake, (702) 293-8165, jblake@usbr.gov

Start Date: FY10

Expected Duration: FY11

Long-term Goal: Acquisition and protection of unprotected occupied habitat.

Conservation Measures: DET01.

Location: The Chuckwalla Bench Area of Critical Environmental Concern (ACEC) is located in Riverside County, California, between the Chuckwalla Mountains and the Chocolate Mountains.

Purpose: Acquire 230 acres of unprotected occupied desert tortoise habitat for permanent protection of the species' habitat.

Connections with Other Work Tasks (past and future): The Chuckwalla Bench ACEC was identified in the FY07 RFP issued under Conservation Area Site Selection (E16).

Project Description: The HCP requires the LCR MSCP to acquire and protect 230 acres of existing unprotected occupied habitat.

In response to the LCR MSCP's FY07 Request for Projects, the Coachella Valley Mountains Conservancy proposed the acquisition of 230 acres of desert tortoise habitat, currently owned by private landowners within the Chuckwalla Bench ACEC, which is managed by the Bureau of Land Management (BLM). In 2007, the BLM's California Desert District Office was contacted to determine the transfer of ownership process. Several administrative procedures (i.e., letter writing, documentation, and solicitor review) will occur prior to the time of purchase. Private parcels acquired by the LCR MSCP will be transferred to the BLM for permanent protection.

Previous Activities: In 2007, the LCR MSCP solicited potential habitat areas for acquisition from Steering Committee members. Coachella Valley Water District, in conjunction with the Conservancy, proposed the acquisition of private in-holdings within the Chuckwalla Bench ACEC.

With the help of the Conservancy, twelve individual landowners within the ACEC were identified using county records and tax assessor information. Three landowners granted the Program access to survey and appraise their parcels. The appraisals, totaling 260 acres, were conducted in FY09 through the Federal Appraisal Service Directorate.

FY10 Accomplishments: Desert tortoise surveys were conducted on six parcels totaling 240 ac in June and one 20 ac parcel in September. Desert tortoise sign and/or live desert tortoises were detected on all seven parcels. Two live desert tortoises outside their burrows were detected on land adjacent to the parcels. Two live desert tortoises were detected inside their burrows on land inside the parcels. Land in all seven parcels was classified as occupied desert tortoise habitat.

The first acquisition, 200 acres of occupied desert tortoise habitat from one landowner, was completed. Approximate price per acre was \$408. In September 2010 the BLM-California Desert District office sent a letter to Reclamation confirming the acceptance of the property, the recorded grant deed in BLM's name and reference to the LCR MSCP Conservation Measure DET01. The remaining two acquisitions are scheduled to take place in FY11.

FY11 Activities: The second acquisition, a 40 acre parcel, was completed in December 2010. The remaining 20 acre parcel is in escrow and when complete will fulfill the conservation measure goal. Once Reclamation receives confirmation from the BLM and all grant deeds are recorded, the LCR MSCP Program Manager will contact the USFWS. A formal letter will be sent documenting the occupied, but unprotected habitat acquired and recorded grant deeds held with the BLM. This will fully satisfy the LCR MSCP's commitments under DET01 and close this Work Task.

Proposed FY12 Activities: Closed in FY11.

Pertinent Reports: *Desert Tortoise Surveys in the Chuckwalla Desert Wildlife Management Area on Private Land Parcels Proposed for Acquisition* will be posted on the LCR MSCP website.

Work Task E30: Flat-tailed Horned Lizard

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$0	\$0	\$0.00	\$195,000	\$50,000	\$0	\$0

Contact: Jed Blake, (702) 293-8165, jblake@usbr.gov

Start Date: FY11

Expected Duration: FY12

Long-term Goal: Acquisition and protection of unprotected occupied habitat.

Conservation Measures: FTHL1.

Location: The Yuma Desert Area of Critical Environmental Concern (ACEC) is located in southwestern Imperial County California.

Purpose: Acquire 230 acres of unprotected occupied flat-tailed horned lizard habitat for permanent protection of the species' habitat.

Connections with Other Work Tasks (past and future): Prior to Steering Committee approval all activities associated with this conservation measure were charges to Conservation Area Site Selection (E16).

Project Description: The HCP requires the LCR MSCP to acquire and protect 230 acres of existing unprotected occupied flat-tailed horned lizard habitat.

The Coachella Valley Mountains Conservancy proposed the acquisition of 230 acres of flat-tailed horned lizard habitat within the Dos Palmas Conservation Area, which is managed by the Bureau of Land Management (BLM). In 2007, the BLM's California Desert District Office was contacted to determine the transfer of ownership process. Discussions indicate that private parcels acquired by the program will be transferred to the BLM after purchase at no additional cost to the program.

After consulting with the local BLM office and reviewing suitable habitat within Dos Palmas Conservation Area, there is not enough private acreage available. Suitable habitat that is in private ownership consists of small parcels and is adjacent to unsuitable habitat for flat-tail horned lizards. It is anticipated that additional costs for multiple federal appraisals, title searches, and available willing sellers will disqualify the site for the LCR MSCP.

At the October 27, 2010 Steering Committee Meeting, Program Decision Document 10-001(r) was presented for approval. This Decision Document outlined the reasoning for not working in the Dos Palmas Conservation Area at this time and proposed three alternative areas. Yuma Desert ACEC, East Mesa ACEC and West Mesa ACEC are all suitable alternatives.

Previous Activities: N/A

FY10 Accomplishments: New start in FY11.

FY11 Activities: In November 2010 individual land owners within the Yuma Desert ACEC were identified using county records and assessor tax information. Thirteen land owners were targeted for a total of 2,313 acres. Identified private land contained suitable habitat, no previous disturbance and was surrounded by suitable habitat. Two landowners within the Yuma Desert ACEC have granted access to conduct species surveys and federal appraisals on their properties totaling 240 acres. Additional right of entries for lands within either East or West Mesa ACEC's may be required to meet the conservation measure.

Species surveys to determine occupied habitat are scheduled for Spring 2011. Federal appraisals will be initiated on lands with suitable habitat conditions for flat-tail horned lizards.

Once fair market value is established and a preliminary title is reviewed, offer letters from the LCR MSCP Program Manager will be mailed to land owners. The offer letter states the market value, possession of a clear title on the land and describes the federal acquisition process.

Proposed FY12 Activities: Acquisition is scheduled to commence in FY11. Acquisition will continue until the target of 230 acres of flat-tailed horned lizard habitat is acquired and transferred to the BLM.

Pertinent Reports: N/A

Work Task E31: Hunters Hole

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$0	\$0	\$0.00	\$20,000	\$30,000	\$30,000	\$30,000

Contact: Jed Blake, (702) 293-8165, jblake@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, PTBB2.

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 F1-F7.

Project Description: In 2010, the Yuma Crossing National Heritage Area (YCNHA), in cooperation with the Reclamation, has developed a restoration plan for the Hunters Hole located within the State of Arizona and within Reach 7 of the LCR MSCP planning area. The focus of the restoration has changed due to dropping groundwater levels. The open water was eliminated and replaced with wet, dense, cottonwood-willow (35 acres) and honey mesquite (15 acres). The result is anticipated to achieve 50 acres of cottonwood-willow land cover type, reduce future pumping costs, use less water, and maximize the credit for the LCR MSCP. A supplemental Environmental Assessment has been completed based on the revised restoration plan.

The YCNHA has secured funding from the Arizona Water Protection Fund to design, permit, clear, and restore the Hunters Hole area. At the October 27, 2010 LCR MSCP Steering Committee Meeting, Resolution 11-001 was approved. Once the Conservation Area is established, the LCR MSCP has agreed to provide long-term funding for the operation and maintenance of created land cover types.

Previous Activities: In 2007 The Walton Foundation met with the YCNHA regarding potential investment in the Limitrophe section of the Lower Colorado River. YCNHA proposed the Hunters Hole Restoration project in response. The 435 acre project provided for preservation of 30 acres of existing cottonwood/willow, establishment of 40 acres of

mesquite, development of 20 acres of surface water, creation of 15 acres of marsh and planting of local grasses on the remaining acres.

In 2008 YCNHA approached Reclamation with a request to complete the project which would be located on federal lands. In response, Yuma Area Office completed National Environmental Protection Act compliance after discussions with other federal agencies. The Environmental Assessment was completed in April 2009, and the Finding of No Significant Impact (FONSI) document was signed in June 2009.

YCNHA invited a number of stakeholders to participate in the project planning effort. These stakeholders include BLM, U.S. Border Patrol, USFWS, U.S. and Mexican Sections of the International Boundary and Water Commission, AGFD, the City of Yuma, Yuma County Sheriff's Office, Environmental Defense, National Wildlife Federation, ProNatura Noroeste, and private landowners in the area. ProNatura Noroeste has developed a complimentary restoration plan on the Mexico side heralding the project as a bi-national border restoration effort.

In 2008, the YCNHA identified the Hunters Hole area for restoration and asked the LCR MSCP to evaluate the project for inclusion into their program. In October 2008, a trip report was completed for the Hunters Hole which recommended the LCR MSCP remain involved in the planning, but not commit long-term funding until the roles and responsibilities of the LCR MSCP was defined.

FY10 Accomplishments: New start in FY11.

FY11 Activities: The YCNHA, as the lead agency for the Hunters Hole restoration and utilizing funding provided by the Arizona Water Protection Fund, will obtain permits, clear, level, and install infrastructure in preparation for planting in FY12. The LCR MSCP will provide technical support for the restoration activities and funding of on-site operations and maintenance activities such as payment of utilities and installation of totalizing flow meters. Restoration is anticipated to be completed by the end of FY12.

Proposed FY12 Activities: In Spring of FY12, the conservation area will be planted using funds provided by Arizona Water Protection Fund and habitat maintenance activities will begin. Activities include: scheduling of labor used for herbicide application and re-planting of native plants, paying for electrical costs, attendance of project coordination meetings, site safety plan development containing law and fire elements, upkeep of the irrigation infrastructure and submission of required documentation.

Pertinent Reports: N/A

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WORK TASKS SECTION F

POST-DEVELOPMENT MONITORING

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Work Task F1: Habitat Monitoring

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$350,000	\$394,781.36	\$1,722,924.62	\$350,000	\$425,000	\$425,000	\$425,000

Contact: Dianne Bangle, (702) 293-8220, dbangle@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Post-development monitoring.

Conservation Measures: MRM2 (CLRA, WIFL, WRBA, WYBA, CRCR, YHCR, LEBI, BLRA, YBCU, ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, SUTA, MNSW).

Location: Beal Lake, Havasu NWR, Arizona; Bill Williams River NWR, Arizona; PVER, California; CVCA, Arizona; Cibola Unit 1, Cibola NWR, Cibola, Arizona; Imperial Ponds, Imperial NWR, Arizona.

Purpose: Post-development monitoring is necessary to assess the effectiveness of each habitat creation and restoration sites plus management activities. Specifically, monitoring will include biotic components and abiotic components. Habitat monitoring data will guide management decisions throughout the life of the MSCP.

Connections with Other Work Tasks (past and future): Post-development habitat monitoring will be conducted at habitat creation sites detailed in Section E.

Project Description: Post-development monitoring will assess change in habitat characteristics over time and will attempt to determine the causes of said change. Monitoring data will be used to document progress towards achieving the biological goals and minimum habitat requirements for covered species, and document the number of acreage by land cover type (riparian, mesquite, marsh) each year.

Previous Activities: Five habitat creation sites were monitored in FY09 using pilot year monitoring protocols.

FY10 Accomplishments: Habitat monitoring was implemented at Beal Lake, Cibola National Wildlife Refuge Unit #1, Cibola Valley Conservation Area, and Palo Verde Ecological Reserve using newly developed monitoring protocols. Target tree species density was collected within 2,020 rapid plots (10 by 10 m) that were systematically placed throughout each phase (or field at Beal). Data including density, species richness, vegetation structure, ground cover, canopy closure, distance to nearest standing water,

and distance to nearest open space were collected at 450 intensive plots randomly selected from rapid plots.

Temperature and relative humidity data were collected at 90 locations across the four habitat creation sites. A rain gauge was installed at both PVER and Cibola Unit 1 sites. Data in FY10 will be used to establish a baseline for future habitat monitoring.

Proposed FY11 Activities: A reduced number of plots will be sampled based on data received in FY10 to optimize the sampling. New phases will be monitored annually for 3 years and then every other year in subsequent years. All existing phases/fields were monitored in 2010 and will also be monitored in 2011 followed by monitoring phases on a rotational basis every other year. Data collection occurs from September through November. Soil moisture and soils monitoring will be added to determine percent of stand with either standing water or moist soils throughout the breeding season.

Marsh monitoring will occur in 2011 at Hart Mine Marsh and Imperial NWR fields 16 and 18. Abiotic monitoring will continue in 2011 and will include temperature, relative humidity, soil moisture, and rainfall monitoring.

Proposed FY12 Activities: Habitat monitoring including vegetation and microclimate monitoring will continue in 2012 at habitat creation sites. Soil quality and moisture monitoring is targeted for implementation in 2012 and will include physical, chemical, and biological components.

Habitat monitoring plots will be conducted at the Bill Williams River NWR to assess habitats occupied by covered species, establish baseline conditions prior to potential creation efforts at Planet Ranch, and use as a reference site for direct comparisons of habitat parameters between habitat creation sites and existing habitat that supports LCR MSCP covered species.

Pertinent Reports: Monitoring methods are described in restoration annual reports and site development plans for CVCA, PVER, Beal Lake, and Cibola Unit #1 and will be posted on the LCR MSCP website. Vegetation monitoring protocols are available upon request.

Work Task F2: Avian Use of Conservation Areas

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$170,000	\$114,944.30	\$665,110.08	\$170,000	\$210,000	\$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, MRM2 (ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, SUTA).

Location: Beal Lake Havasu NWR, Arizona; ‘Ahakhav Tribal Preserve, Arizona; PVER, California; CVCA, Cibola Unit #1, Cibola NWR, Cibola, Arizona.

Purpose: Monitor avifauna use of habitat conservation areas to provide data for the adaptive management process and develop management guidelines for created habitat conservation areas.

Connections with Other Work Tasks (past and future): Post-development avian monitoring will be conducted at habitat conservation areas listed in section E. In addition, information obtained from this work task may be used to provide data to avian system monitoring by using the same protocols established in the system monitoring program (D1, D2, D5, D6, and D7).

Project Description: Creation of riparian habitat will benefit nine LCR MSCP covered avian neo-tropical migratory species. Conservation areas will be monitored for bird activity, using a variety of techniques including area searches and species-specific survey protocols. Data gathered will be used to 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 2005. Post-development monitoring for avian covered species has occurred at five habitat conservation areas: Cibola Unit #1, ‘Ahakhav Tribal Preserve, PVER, Beal Lake, and CVCA. Avian pre-development monitoring has been conducted at four habitat conservation areas: CVCA, Hart Mine Marsh, Cibola Unit #1, and PVER. Avian use has been summarized and evaluated for each conservation area and compared between conservation areas.

FY10 Accomplishments: Avian post-development monitoring was conducted at existing habitat conservation areas, including Beal Lake, Cibola Unit #1, CVCA and PVER in 2010. The following habitat conservation areas were surveyed: 1) Beal Lake, 2) Cibola NWR Unit #1, 3) CVCA and 4) PVER.

Avian post-development monitoring was conducted utilizing the intensive area search methodology. The methodology followed the same protocol developed as part of avian system-wide monitoring under D6. Each area or phase surveyed was divided into area search plots. Each area search plot was surveyed eight times during the breeding season. A complete census of breeding birds was obtained for each area search plot.

Area search surveys conducted at Beal Lake detected 143 pairs of breeding birds. This included 12 pairs of Sonoran yellow warblers, 20 pairs of Arizona Bell's vireos, and 2 summer tanager pairs.

Surveys conducted at Cibola Unit #1 detected 77 pairs of breeding birds. This included 5 pairs of Sonoran yellow warblers and one Arizona Bell's vireo pair. Surveys conducted at CVCA detected 356 pairs of breeding birds. This included 3 pairs of Sonoran yellow warblers. Surveys conducted at PVER detected 117 pairs of breeding birds. This included 4 pairs of Sonoran yellow warblers.

FY11 Activities: Avian post-development monitoring will be conducted at existing habitat conservation areas, including Beal Lake, Cibola Unit #1, CVCA, and PVER. Pre-development monitoring will occur at the Laguna Conservation area.

Instead of doing only intensive area searches on the habitat conservation area, a double sampling technique utilizing rapid and intensive area searches will be used in 2012 and subsequent years using the same protocol developed as part of the avian system-wide monitoring under D6. The change was made because as the total acreage of habitat conservation areas under the LCR MSCP increase annually, surveying all habitat using intensive area searches will no longer be feasible.

Proposed FY12 Activities: Avian post-development monitoring will be conducted at existing conservation areas, including Beal Lake, Cibola Unit #1, CVCA, PVER, Laguna Conservation Area, and pre-development surveys in additional areas where needed.

Pertinent Reports: *Final Summary of Monitoring Efforts at Pratt Agricultural Restoration Site, 1999-2006* is posted on the LCR MSCP website. *Summary Report on the Lower Colorado River Riparian Bird Surveys, 2008-2010* will be posted when available.

Work Task F3: Small Mammal Colonization of Conservation Areas

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$55,000	\$48,782.43	\$205,473.04	\$60,000	\$55,000	\$55,000	\$55,000

Contact: Chris Dodge, (702) 293-8115, cdodge@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, MRM2 (DPMO, CRCR, YHCR).

Location: Beal Lake, Havasu NWR; PVER, California; CVCA, Cibola Nature Trail, Hart Mine Marsh.

Purpose: 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 Section E. In addition, information obtained from this work task, in conjunction with C27 and D10, will be used to define habitat requirements for future habitat creation projects. Data from C27 and D10 will aid in design of population monitoring protocol.

Project Description: Presence/absence surveys will be conducted in restoration demonstration and habitat creation sites to determine small mammal occurrence. These efforts will be focused on detecting the presence of Yuma hispid cotton rats and Colorado River cotton rats at these sites. Once presence is established at a restoration site, population monitoring will be conducted with a protocol developed under C27 and data collected under D10.

Previous Activities: In previous years, small mammal surveys have been conducted at the Cibola NWR Unit #1 and at the Pratt Agricultural site. Several animals from the genus *Sigmodon* have been captured at each site. At the Pratt Agricultural site, Yuma hispid cotton rats were captured in dense *Baccharis* spp., and at the Cibola NWR Unit #1, Colorado River cotton rats were captured in dense Johnsongrass. No cotton rat species has been captured at Pratt Agricultural since 2005. 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 Beal Lake Riparian Restoration site. In 2007, cotton rats were found at the Cibola NWR Unit #1, 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 National Wildlife Refuge site. A new cotton rat population was found very close to the Palo Verde Ecological Reserve during a different study. In 2009 surveys only detected cotton rats at the Cibola NWR Unit #1 and the bench population near PVER.

FY10 Accomplishments: Cotton rats have been detected at 6 areas along the LCR that are either restoration sites or very near restoration efforts. Cibola NWR Unit #1 and Palo Verde Ecological Reserve site have relatively large populations of CRCR and a smaller population has been identified near Beal Lake. YHCR were documented near Pratt, Mittry Lake, and Imperial Ponds INWR.

FY11 Activities: Presence/absence live trapping surveys will continue as part of the post-development monitoring efforts at LCR MSCP habitat creation sites. At the Cibola Unit #1 and Palo Verde Ecological Restoration site we will conduct trapping in arrays designed to quantify habitat characteristics and demographic parameters of the local population (C27). A step-wise monitoring plan designed to document presence and monitor population demographics is being developed in conjunction with D10 and C27.

Proposed FY12 Activities: Post-development monitoring activities will continue for small mammals at habitat creation sites and adjacent areas.

Pertinent Reports: A summary of mammal trapping results at LCR MSCP restoration sites 2010 will be posted on the LCR MSCP website. The population monitoring protocol is available upon request.

Work Task F4: Post-Development Monitoring of Covered Bat Species

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$110,000	\$115,018.90	\$370,759.61	\$110,000	\$100,000	\$100,000	\$100,000

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, PTBB), WRBA1, WYBA1.

Location: Beal Lake, Havasu NWR; ‘Ahakhav Tribal Preserve, CRIT; PVER, California; CVCA, Cibola NWR Unit 1, Cibola, Arizona; Imperial Ponds, Imperial NWR, Arizona; Laguna Conservation Area, Arizona, Pratt Demonstration area.

Purpose: The principal goal of this monitoring is to assess seasonal use of the restoration sites by the two covered bat species (western red bat and western yellow bat), and the two evaluation species (pale Townsend’s big-eared bat and California leaf-nosed bat). Monitor bat use of habitat creation sites to provide data for the adaptive management process and develop management guidelines for created habitat sites. 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 D9, will help determine the distribution of these species.

Connections with Other Work Tasks (past and future): Post-development bat monitoring will be conducted at habitat creation sites listed in Section E. In addition, information obtained from this work task may be used to provide data to D9.

Project Description: Post-development monitoring will compare bat activity between four habitat types (agricultural fields, saltcedar stands, mesquite created habitat, and cottonwood-willow created habitat). Acoustic monitoring will be conducted at habitat creation and demonstration sites, including ‘Ahakhav, CVCA, PVER, Cibola NWR Unit #1, Beal Lake, and Imperial Ponds. These surveys will utilize either active or stationary Anabat systems to record bat echolocation calls for presence/absence surveys. A capture program will also be used in the above-mentioned sites to acquire reference acoustic calls and determine age, sex, and reproductive status of covered bat species. These surveys will provide data on foraging habitat and use by covered species. Bat surveys will be

conducted before and after habitat creation utilizing Anabat, Sonobat, infrared cameras, stationary detection equipment, and mist netting, where appropriate.

Previous Activities: Sites were monitored from FY07 to FY09 using acoustic and/or capture techniques.

FY10 Accomplishments: Quarterly post-development bat monitoring was conducted utilizing Anabat bat detectors in seven LCR MSCP habitat creation and demonstration areas, including Beal Lake Habitat Restoration, 'Ahakhav Tribal Preserve, Palo Verde Ecological Reserve, Cibola Valley Conservation Area, Cibola NWR Unit #1 Conservation Area, Pratt Restoration, and the Imperial Ponds Conservation Area.

A total of 2,935 minutes of bat activity were recorded at the Beal Restoration site, and all four LCR MSCP species were recorded, though in low numbers. A total of 1,406 minutes of bat activity were recorded at the 'Ahakhav Tribal Preserve and all four LCR MSCP species were recorded, though monitoring only occurred during 2 of the 4 seasons. A total of 12,128 minutes of bat activity were recorded at PVER, and all four LCR MSCP species were recorded, red and yellow bat activity increased dramatically in FY10. A total of 7,914 minutes of bat activity were recorded at CVCA, and all four LCR MSCP species were recorded, red and yellow bat activity increased dramatically in FY10. A total of 8,484 minutes of bat activity were recorded at Cibola NWR, all four LCR MSCP species were recorded, and red bats showed a dramatic increase in FY10. A total of 9,403 minutes of bat activity was recorded at Imperial NWR, all four LCR MSCP species were recorded, and yellow bat activity increased dramatically in FY10. A total of 1,279 minutes of bat activity were recorded at Pratt, all MSCP species except for the Townsend's big-eared bat were detected, though in very low numbers.

The Beal permanent Anabat acoustic station has continued operating until late July when the internal battery of the detector began to lose power; the unit was replaced after the start of FY11. The 'Ahakhav Tribal Preserve long-term station, which uses a full spectrum detector, was moved to PVER in January 2010.

A bat capture program utilizing mist nets was conducted between February and September. Four habitat creation and demonstration areas were sampled, including 'Ahakhav Tribal Preserve, CVCA, Cibola NWR Unit #1, and PVER. Surveys were also conducted at the Bill Williams River NWR to compare to the habitat creation areas. A total of 717 individual bats from 13 species were captured among the four sites. All four LCR MSCP target species were captured. The western red bat was captured in February at 'Ahakhav and CVCA during a single survey at each site (being the only survey conducted at 'Ahakhav in FY10). Red bats were also captured at PVER during the summer season. Yellow bats were captured at CVCA and PVER. California leaf-nosed bats were captured at all sites except for PVER. The Townsend's big-eared bat was only captured at the Bill Williams River NWR. Arizona myotis, a species not covered under the LCR MSCP, was captured at CVCA. This capture, along with a capture at 'Ahakhav Tribal Preserve, are the first detections of Arizona myotis since 1945.

FY11 Activities: Acoustic surveys will be modified this year to switch from the habitat comparison study to a more wide scale sampling using driving transects, in addition to adding long-term stations at CVCA and Cibola NWR. Pre-development acoustic surveys will begin at the Laguna Conservation Area. Capture surveys will resume at 'Ahakhav, and continue at CVCA, Cibola Unit #1, and PVER.

Proposed FY12 Activities: If the driving acoustic surveys are successful in FY11 they will continue in FY12. The two types of detectors being used in long term stations will be evaluated and if new software is available to automate species identification, all long term stations will be converted to the automated type. Capture surveys will also continue.

Pertinent Reports: *Post-Development Bat Monitoring of Habitat Creation Areas along the Lower Colorado River – 2010 Acoustic Surveys*, and *Post-Development Bat Monitoring of Habitat Creation Areas along the Lower Colorado River – 2010 Capture Surveys* will be posted on the LCR MSCP website.

Work Task F5: Post-Development Monitoring of Fish at Conservation Areas

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$150,000	\$156,279.56	\$511,260.63	\$175,000	\$175,000	\$200,000	\$200,000

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: Reaches 3-6 backwater habitats.

Purpose: Monitor fish use of habitat creation sites to provide data for the adaptive management process and develop management guidelines for created backwater habitats.

Connections with Other Work Tasks (past and future): All backwaters created in Section E. Work Task C23, C33, C34, and C41.

Project Description: This work will monitor the fish and fish habitat at conservation areas. It is anticipated that these sites will play various roles for 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, electro-fishing, 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 RASU and 2,000 BONY; a limited portion of each of these stockings were marked with PIT tags. Non-natives were identified shortly after the renovation efforts. Annual surveys have contacted subsets of each of these stockings, but long term survival has been low. Remote sensing techniques have proved valuable in contacting PIT-tagged

fish. Netting and electro-fishing have also been attempted with limited success. Water quality has been monitored routinely and all parameters have remained at sufficient levels for native fish. In FY09 closer order water sampling and remote sensing collection trips were accomplished through the summer at Beal Lake. Dissolved oxygen dropped below 3 mg/L on several occasions, which may have impacted fish survival. Remote sensing was unable to contact any fish during these trips. Multiple large impoundment nets were purchased to assess their ability to contact native fish, as well as assist in removing non-natives.

Since the completion of Imperial Ponds, in excess of 1,600 BONY and 800 RASU have been stocked. Monitoring of this site is being accomplished under C25. Water quality parameters at this site have remained within the assumed thresholds for native fish with the exception of pH, which has spiked above 9, but with no apparent harm to the fish.

FY10 Accomplishments: In 2010 Beal Lake was stocked with 610 PIT tagged RASU; these stockings were monitored at closer intervals using remote sensing to detect changes in the population. At the end of FY10, the current population estimate for Beal Lake was 130 RASU. The decline in population was steady for most of the year with exceptions in the spring and summer. The reasons for higher mortality rates for the spring and summer are unknown, but could possibly be attributed to post-stocking delayed mortality, avian predation, or water quality.

Current water management at Beal Lake is highly dependent on the management of Topock Marsh and this may have a detrimental impact on fish survival. Water quality loggers were purchased and deployed throughout the year to record and potentially identify problems with water management. Infrastructure improvements to the water management at Beal Lake will be developed based on our findings.

FY11 Activities: Monitoring activities from FY10 will continue in FY11. We will begin to assess the impacts from avian predation. Fish sampling will occur in the fall. All RASU greater than 425 mm TL will be harvested and released into the River near Needles, California, and these fish will be used as research subjects associated with C33. Searches for larval fish and other signs of reproduction and recruitment will be conducted in all developed habitats. Food resource assessments will be conducted and results compared with data from C34. Fish work or infrastructure improvements will be based on our findings from FY10 and FY11.

Monitoring of Big Bend Conservation Area will be accomplished through monthly monitoring from February through May. This monitoring will include electro-fishing, trammel netting, and larval light trapping in areas dictated by water level and based on historical contacts of native fish. Water quality profiles will be conducted during each monitoring trip and quarterly the remainder of the year.

Post-development monitoring activities for Imperial Ponds will be conducted under C25.

Proposed FY12 Activities: The activities from FY11 will continue into this year. Recommendations for future fish work or infrastructure improvements will be finalized and incorporated into work plans.

Pertinent Reports: A study plan is available upon request, and a summary report will be posted to the LCR MSCP website.

Work Task F6: Monitoring MacNeill's Sootywing in Habitat Creation Sites

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$50,000	\$41,207.42	\$58,283.91	\$70,000	\$70,000	\$70,000	\$70,000

Contact: Bill Wiesenborn, (702) 293-8229, wwiesenborn@usbr.gov

Start Date: FY09

Expected Duration: FY55

Long-term Goal: Post-development monitoring for MacNeill's sootywing.

Conservation Measures: MNSW2.

Location: Habitat-creation sites: Palo Verde Ecological Restoration Site, Cibola Valley Wildlife Conservation Area, Laguna Division Conservation Area, Hart Mine Marsh.

Purpose: The purpose of this work task is to monitor vegetation, plant-quality, and populations of MacNeill's sootywing in habitat created for the species.

Connections with Other Work Tasks (past and future): Habitat requirements were determined in Survey and Habitat Characterization for MacNeill's Sootywing (C7). Work task F6 was phased-in after C7 was completed during FY09-10.

Project Description: Preliminary results obtained from work accomplished under work task C7 have determined that sootywings require host plants (*Atriplex lentiformis*) that are larger than 1.6 m in height, greater than 64% in plant water content, and greater than 3.2% in leaf nitrogen content. Sootywings also require plants other than *A. lentiformis* for nectar (e.g., *Heliotropium curassavicum* [Boraginaceae] and *Sesuvium verrucosum* [Aizoaceae]). These attributes will be monitored in created habitat. Monitoring host-plant water content is especially critical, as it will be driven by the timing and amounts of irrigation. Utilization of new habitat by sootywings also will need to be surveyed. This work task will need to allow for additional determinations (i.e., adaptive management) of habitat needs if created habitat fails to become colonized.

Previous Activities: In spring 2009, we began monitoring populations of sootywings at one restoration plot at CVCA and at one restoration plot at PVER. Rapid growth of vegetation planted during March 2009 required monitoring three additional plots at CVCA and one additional plot at PVER beginning in summer. Restoration plots were monitored every two to three weeks during April-September. Sootywings were well established at Phase 4-west (58 acres), weakly established at Phase 2 (8 acres) and Phase

4-east (90 acres), and not detected at Phase 3 (6 acres). Sootywings were not detected at both plots at PVER.

FY10 Activities: We monitored populations of sootywings at five restoration plots at CVCA and three restoration plots at PVER. Restoration plots were monitored every two to three weeks during April-September. At CVCA, sootywings were well established at Phase 4-west (58 acres), and weakly established at Phase 4-east (90 acres) and Phase 5 (71 acres). They were absent or near-absent at the remaining two plots. Sootywings were near absent or absent at the three plots at PVER.

FY11 Activities: The following nine restoration plots, totaling 280 acres, will be monitored for sootywings every two to three weeks during April to September:

Activities during this fiscal year also will begin examining causes of different sootywing abundances among restoration sites. Potential causes include: 1) host-plant size and water content, 2) availabilities of nectar sources, and 3) plot size and isolation in relation to sootywing dispersal.

Proposed FY12 Activities: The plots listed above will continue to be monitored. Additional plots will be monitored as they are planted during FY10-12. This should include Hart Mine Marsh. Activities during this fiscal year also will continue examining causes of different sootywing abundances among restoration sites as delineated in FY11.

Pertinent Reports: The 2010 Annual Report for Monitoring MacNeill's Sootywing in Habitat Creation Sites will be posted to the LCR MSCP website.

Wiesenborn, W.D. 2010. Attraction of *Hesperopsis graciellae* (Lepidoptera: Hesperidae) skippers to *Heliotropium curassavicum* inflorescence models. Journal of the Kansas Entomological Society. *In Print*.

Wiesenborn, W.D., and G.F. Pratt. 2010. Visitation of heliotrope and western purslane flowers by *Hesperopsis graciellae* (Lepidoptera: Hesperidae). Florida Entomologist 93: 260-264. *In Print*.

Pratt, G.F. and W.D. Wiesenborn. 2009. MacNeill's sootywing (*Hesperopsis graciellae*) behaviors observed along transects. Proceedings of the Entomological Society of Washington 111: 698-707. *In Print*.

Work Task F7: Post-Development Monitoring of Marsh Birds

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$0	\$0	\$0.00	\$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 is to determine whether marsh land cover types created under the LCR MSCP are used by California black rails, Yuma clapper rails, and western least bitterns.

Conservation Measures: MRM1 AND MRM2 (CLRA, BLRA, LEBI), LEBI1, BLRA1, CLRA1.

Location: Presence/absence surveys will be conducted at newly developed marsh habitat sites.

Purpose: Monitor the use of created marsh habitat by covered marsh bird species.

Connections with Other Work Tasks (past and future): Hart Mine Marsh, Big Bend, and portions of Imperial NWR have been surveyed for marsh birds prior to development. System-wide marsh bird surveys have been conducted by Reclamation on existing marsh habitat since 1996. Previous surveys, both system-wide and those associated with pre-development, were conducted under D1.

Project Description: Surveys for Yuma clapper rail in existing habitat have been conducted in Topock Gorge by Reclamation since 1996 (D1). Since 2006, Reclamation has participated in the National Marsh Bird Monitoring Program, which involves surveying for several species, including the LCR MSCP covered marsh species, 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 analysis.

Previous Activities: N/A

FY10 Accomplishment: New start in FY11.

FY11 Activities: Marsh bird surveys will be conducted in cooperation with the USFWS on conservation areas once the marsh vegetation has developed in sufficient acreage, vegetation type, and suitability. These sites will include Beal Lake, Hart Mine Marsh (Cibola NWR), Field 16 and the Imperial Ponds (Imperial NWR), and Big Bend Conservation Area.

Proposed FY12 Activities: Marsh bird surveys will be conducted in cooperation with USFWS on conservation areas once the marsh vegetation has developed in sufficient acreage, vegetation type, and suitability. These sites will include Beal Lake, Hart Mine Marsh (Cibola NWR), Field 16 and the Imperial Ponds (Imperial NWR), Big Bend Conservation Area, and the Laguna Division Conservation Area.

Pertinent Reports: Results of surveys will be reported in the annual reports for each associated restoration site.

WORK TASKS SECTION G

ADAPTIVE MANAGEMENT PROGRAM

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Work Task G1: Data Management

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$650,000	\$484,297.71	\$1,443,767.49	\$700,000	\$700,000	\$950,000	\$950,000

Contact: Jeremy Dandron, (702) 293-8378, jdandron@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: System-wide.

Purpose: 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 in the successful completion of work tasks undertaken for Fish Augmentation (Section B), Species Research (Section C), System Monitoring (Section D), Habitat Creation (Section E), Post-Development Monitoring (Section F), Adaptive Management (Section G), and Habitat Maintenance (Section H).

Project Description: To fully implement the LCR MSCP, a database management system is being developed to manage 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 through this work task.

Previous Activities: All RASU and BONY tagging and stocking data have been included in the Lower Colorado River Native Fishes database. The LCR MSCP Database Management Framework Requirements Analysis was completed in FY06, and outlined several options for implementing an accessible, multi-disciplinary, spatially referenced, relational database to consolidate, organize, document, store, and distribute scientific information related to the LCR MSCP. This analysis will be used to develop the implementation strategy for the LCR MSCP database management system.

FY10 Accomplishments: Hardware was purchased to increase data storage for the implementation of the centralized database. The intranet/document/calendar management system was maintained and modified, for future needs of the LCR MSCP. Implementation of remote data collection from field data loggers began at Beal Lake. The automatic collection of remote data into a centralized database allows for the secure transmission of data with integrated quality control to support mission critical projects. The native fish database was maintained.

FY11 Activities: Database and software development will be conducted in FY11. Database design and implementation of a centralized Database Management System (DBMS) will continue in an annually phased approach for all project and species databases. The planning, acquisition, and data modules for the MSCP centralized database will begin development. All data modules will be phased in according to priority for the implementation of the HCP. Data modules consist of an application for input of data (data entry) within a centralized database, to include quality assurance and quality control. The intranet/document/calendar management system (SharePoint 2010) will be upgraded and modified to work with all data modules. The development of remote data collection from field data loggers will continue. Development of a new LCR MSCP website will begin. Development of a new internet web interface for the fish database will also begin and will be accessible through LCR MSCP's website. The LCR MSCP data management requirements document will be developed to provide standards in handling and processing data for input into the LCR MSCP DBMS.

Work will continue on the archiving the Minckley library; document processing will continue and additional requests for copyright clearances will be made until blanket copyright permissions have been secured with primary publishers. All digitized versions of library documents will continue to be organized using bibliographic software, and error checking will be performed to ensure consistency and accuracy. An online archive holding all digital versions of documents found within the library will be developed. An inventory of all reprint library holdings, and instructions on how to access, search, download, save, and print individual documents in the library will also be provided.

Proposed FY12 Activities: Database and software development will continue. Database design and implementation of a centralized Database Management System (DBMS) will continue in an annually phased approach for all project and species. The planning, acquisition, and data modules for the MSCP centralized database development will continue. The development of remote data collection from field data loggers will continue. Update and maintenance of a new LCR MSCP website will continue. Development of a new internet web interface for the fish database will also continue and will be accessible through LCR MSCP's website.

Pertinent Reports: *Draft LCR MSCP Database Management Framework Requirements Analysis* is available upon request.

Work Task G3: Adaptive Management Research Projects

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$300,000	\$241,728.79	\$1,669,604.15	\$300,000	\$200,000	\$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: MRM1, MRM2, MRM4, WIFL1, MRM5, BONY5, RASU6, CRCR1, YHCR1, MRM3, FLSU3, LLFR1, LLFR3.

Location: System-wide.

Purpose: 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), Habitat Creation (Section E), Post-Development Monitoring (Section F), or Habitat Maintenance (Section H).

Project Description: The Adaptive Management Program is an assurance that the conservation actions presented in the HCP are effectively accomplished. This work task develops and evaluates tools by which the conservation actions can be measured, and provides data to improve the efficacy of techniques to successfully create habitat.

This work task enables Reclamation 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) 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: An evaluation of monitoring techniques for assessing relative abundance of RASU in riverine reaches was conducted, providing population estimates for adult RASU spawning in the Colorado River near Needles, California. A telemetry

study was initiated in FY07 to determine range and habitat use by repatriated RASU in Reach 3.

Research was conducted to experimentally determine lethal salinity limits for RASU eggs and larvae. Results indicate that upper salinity tolerances are between 10-15,000 $\mu\text{S}/\text{cm}$ for eggs and 23-26,000 $\mu\text{S}/\text{cm}$ for larvae. Remote sensing applications for PIT tagged fish were evaluated. This was continued as Work Task C23.

FY10 Accomplishments: A genetics study was initiated to determine the population demographics and habitat use of the California leaf-nosed bat. This study will determine the population history of the California leaf-nosed bat along the LCR, determine the distribution of genetic variation in California leaf-nosed bat roost sites, and identify where individuals from different roosts are foraging. Genetic samples were taken and are currently being analyzed to determine if genetic markers are distinct between bat roost sites. Samples were also taken from bats captured at LCR MSCP restoration sites, and these will be analyzed in FY11. This work will continue in FY11 under C43.

A habitat analysis and development of a population monitoring protocol for *Sigmodon* was designed and is being implemented under C27. The purpose of this research is to define the physical structure of the microhabitat utilized by the Colorado River cotton rat at two sites along the LCR where they appear to have relatively high abundance (an indication of high quality habitat). Data from this research will then be utilized in conservation areas for the creation of cotton rat habitat.

A two year project was initiated in FY10 with the purpose of acquiring the expansive reprint library amassed by the late Professor W.L. Minckley during his professional lifetime and making this library available online in a searchable format for end users via a website. This library is populated by thousands of documents relevant to partners and participants of the LCR MSCP, and to fishery and aquatic professionals throughout the southwestern United States and beyond. During FY10 the reprint library was retrieved from storage at Arizona State University and moved to the project work area where its contents were readily accessible. A detailed and comprehensive flow diagram was developed to guide the digitization process from the time a physical document was pulled from the library through its permanent storage as a digital electronic file. All necessary equipment was purchased and routine processing of documents was initiated in early March. Currently over 3,900 documents have been successfully scanned and organized using bibliographic software.

During FY10, riparian restoration research was conducted and a series of tasks were accomplished: 1) a literature review on salinity issues and management strategies were completed and are summarized in the Year 1 Report; 2) pre-existing vegetation types were ground-truthed and soil texture and salinity data were reviewed for PVER, Cibola Unit #1, and Beal Riparian habitat creation sites to guide the sampling plan design; 3) soil and groundwater sampling plans were developed based on pre-existing data, ground-truthing existing vegetation, as well as identifying existing well locations and selecting locations for new wells; 4) the first year of soil sampling was completed, and results are

presented in the Year 1 Report; and 5) groundwater monitoring began during the fourth quarter of 2010.

Study designs were finalized for four new investigations. These include work tasks C44, Management of Fish Food Resources in Off-channel Native Fish Habitats; C45, Ecology and Habitat Use of Stocked RASU in Reach 3; C45, Physiological Response in BONY and RASU to Transport Stress; and C47, Genetic Monitoring and Management of Recruitment in BONY rearing ponds.

FY11 Activities: Analysis of the data collected for the Tamarisk Beetle Study (conducted under D2) will be conducted by Reclamation's Tamarisk Beetle expert at the Denver Technical Service Center. Analysis completed under this work task will be used to determine future potential conservation and management recommendations in the adaptive management portion of the program.

A demonstration project is being conducted at Topock Marsh to place additional water in a portion of the Tamarisk SWFL habitat to determine the effects this may have on increasing the number of nesting pairs and potentially increasing nest success.

Vegetation typing of new aerial photos is being cost-shared with Reclamation's Lower Colorado River Accounting Systems group. This opportunity allows for new vegetation type maps to be completed efficiently and at a lower expense to the program.

Proposed FY12 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 statement of work for the *Acquisition and Distribution of the W.L. Minckley Reprint Library* is available upon request.

Work Task G4: Science/Adaptive Management Strategy

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$50,000	\$33,414.42	\$218,737.81	\$125,000	\$125,000	\$150,000	\$200,000

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 dealing with habitat creation, species research, system monitoring, and fish augmentation.

Location: LCR MSCP planning area.

Purpose: Define the process 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 for 26 covered species and to benefit 5 evaluation species. A science strategy, developed in FY06, defines processes for ensuring LCR MSCP implementation using the best available science. This strategy describes 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 for covered species, establishes the monitoring and research priorities for that five-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. Highest priority for the next 5-year period will go to completion of any ongoing research and monitoring activities. Second priority will be given to new research and monitoring needs identified by ongoing work, and third priority will be given to refining and updating life history data sets. Additional work may be generated from evaluations of various research through 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 Lower Colorado River 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 program area.

An annual work plan report, which summarizes prior year accomplishments, describes current year ongoing activities, and outlines the proposed activities for the coming fiscal year will be developed and presented to the Steering Committee each year. 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-FY07. The first Colorado River Terrestrial and Riparian Ecosystem (CRITER) meeting was held in January 2006 (staff also attended the 2007 and 2008 CRITER meetings). Fishery staff from the LCR MSCP participated in the 2006, 2007, and 2008 annual Colorado River Aquatic Biologists (CRAB) meetings. The first *Five-Year Monitoring and Research Priorities* report was drafted in FY07. A Fish Culture Workshop, hosted by the LCR MSCP, was held in Mesa, Arizona.

CRITER and CRAB meetings were attended. Ongoing research and monitoring actions were reviewed through the annual work plan report. The Lake Mohave Native Fish Work Group meeting was hosted by LCR MSCP fishery staff. A new Lake Mead Native Fish Work Group was established to gain support for RASU conservation in Reach 1. A new LCR MSCP Fishery Coordination meeting was convened to discuss status of RASU and BONY and identify focus areas for future research and monitoring for these fishes.

FY10 Accomplishments: Research activities were reviewed in accordance with the priorities established in the current 5-year plan. The annual CRITER meeting was hosted and the CRAB and Lake Mohave Native Fish Work Group meetings were attended. Presentations were made to Upper Colorado River Recovery Implementation Program, Arizona/New Mexico Chapter of American Fisheries Society, and the San Juan River Recovery and Implementation Program. A procedure for tracking conservation measure accomplishment pertaining to habitat creation was drafted.

FY11 Activities: Research activities are being reviewed in accordance with the priorities established in the current 5-year plan. The 2013-2017 Research and Monitoring Accomplishment and Priorities Report, and the Big Bend and Beal Lake Conservation Area Management Plans are being initiated.

Proposed FY12 Activities: Research activities are being reviewed and evaluated in accordance with the priorities established in the current 5-year plan. Management plans for existing Conservation Areas will be initiated.

Pertinent Reports: *Final Science Strategy*, and *MSCP Five-Year Monitoring & Research Priorities -- 2008-2012*, are posted on the LCR MSCP website.

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WORK TASKS SECTION H

EXISTING HABITAT MAINTENANCE

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Work Task H1: Existing Habitat Maintenance

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate*	FY14 Proposed Estimate*
\$647,000	\$647,000.00	\$2,948,000.00	\$5,359,500	\$5,445,000	\$5,445,000	\$5,445,000

*Based on FY12 inflation estimates.

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, WIFL2, BLRA2, YBCU2, CRT02, LLFR2

Location: Lower Colorado River (reaches 1-7).

Purpose: 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): N/A

Project Description: A \$25 million fund 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 LCR MSCP was initiated. Funding during the initial five years of the program was established at \$500,000 per year. Funding in years 6-10 of the program was established at \$5,000,000 per year. Both values are indexed to 2003 dollars and adjusted annually for inflation. The degraded habitat condition targeted by this fund is that which occurs because of past LCR operations and maintenance actions that continue into the future. The habitat maintenance fund will be administered by the Program Manager. The process for determining degradation in habitat value as well as how funds are requested, disbursed, and tracked will be defined and refined with the assistance of the Steering Committee.

Previous Activities: Annual contributions were made through FY09.

FY10 Accomplishments: A total of \$647,000 was deposited into interest-bearing accounts among the Arizona, California, and Nevada partners. The total dollar value of the fund at the end of FY10, with interest, was \$3,346,682.94.

FY11 Activities: A total of \$5,359,500 will be deposited into interest-bearing accounts among Arizona, California, and Nevada partners. A process for requesting, reviewing, selecting, disbursing, and tracking of dollars from the Habitat Maintenance Fund will be drafted in consultation with the USFWS and distributed to the Technical Work Group of the Steering Committee.

Proposed FY12 Activities: A total of \$5,535,000 is expected to be deposited into the three non-Federal interest-bearing accounts. The process for requesting, reviewing, selecting, disbursing, and tracking of dollars from the Habitat Maintenance Fund is expected to be finalized.

Pertinent Reports: N/A

WORK TASKS SECTION I

PUBLIC OUTREACH

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Work Task I1: Public Outreach

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$50,000	\$18,946.39	\$96,435.27	\$70,000	\$70,000	\$70,000	\$70,000

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 implement outreach programs.

Connections with Other Work Tasks (past and future): All MSCP work tasks.

Project Description: To develop both short- and long-term outreach goals for LCR MSCP. To communicate, coordinate, and educate LCR MSCP Steering Committee members, internal and external stakeholders, and the general public about LCR MSCP implementation activities.

Previous Activities: A LCR MSCP website was established, and a Farmers Advisory Board was developed. The LCR MSCP logo was updated and a standardized program header was created along with a new tag line. A standard LCR MSCP report cover was developed to reflect the partnership aspect of the program. A new display unit for the LCR MSCP was created along with the acquisition of life-size cottonwood and willow trees, table runners, logo pens, and notepads. A revised general program fact sheet was also developed. Dedications have been held for construction completion of major projects.

FY10 Accomplishments: Public outreach continued with a focus on education. In October 2009, a dedication was held for the Big Bend Conservation Area. A tour of Planet Ranch and other potential conservation sites was conducted. A field trip to the Yuma East Wetlands was conducted for the Steering Committee in conjunction with the March 2010 work group meeting.

Reclamation hosted the fourth annual Colorado River Terrestrial and Riparian (CRITER) meeting and participated in the Colorado River Aquatic Biologists (CRAB) meeting, both

held in January 2010. These annual technical conferences provide a venue to present results from research and monitoring studies and coordinate activities with numerous federal, state, and non-government entities along the lower river.

Reclamation staff attended and presented oral presentations and posters at numerous science and technical conferences related to fisheries, wildlife, and restoration. Reclamation also staffed a booth at the Colorado River Water Users Association's annual meeting in Las Vegas, to interact with stakeholders.

The USGS published the *Proceedings of the Colorado River Basin Science and Resource Management Symposium (2008)*, which was co-sponsored by the LCR MSCP. Seven articles appear in this peer-reviewed publication, authored by program staff, contractors, or partners.

FY11 Activities: An FY11 Action Plan is being developed, based on the draft Public Outreach Strategy, to guide outreach efforts. An annual outreach accomplishment report will be prepared.

Outreach efforts in FY11 will focus on highlighting accomplishments for the first five years of the program. A 2005-2010 Program Highlights report was developed which documents those accomplishments. In March 2011, the LCR MSCP hosted a "First Five Years" river tour. The tour highlighted conservation areas developed to date and provided steering committee members with information on covered species and current research and monitoring efforts. To support the tour, updated fact sheets for the conservation areas and new fact sheets for covered species were developed.

To continue outreach efforts with local communities, the LCR MSCP participated in an event sponsored by the Blythe School District where over 60 students came and visited the Palo Verde Ecological Reserve. The district had received a grant and developed a day event for the students where they learned about the vegetation and the species, soil sampling, mapping of a watershed, and nature jewelry making. In addition, the LCR MSCP will be a sponsor this year of the "Yuma Birding and Nature Festival" scheduled in April 2011. The annual festival highlights wildlife and nature in the Yuma area, and is organized by numerous program partners.

LCR MSCP will continue working with local and regional stakeholders to implement projects. Some examples of these groups include the Imperial Dam Advisory Board, Yuma Growers Association, Lake Havasu Fisheries Improvement Program, and the Yuma County National Heritage Area.

Proposed FY12 Activities: Emphasis for outreach will continue to focus on program stakeholder education, with increased interaction in local communities. The LCR MSCP will continue to sponsor 1-3 events per year, such as the Colorado River Water Users Association and Yuma Birding and Nature Festival, or other activities which present opportunities to expand stakeholder knowledge of the program. Additional emphasis will be placed on public education through interpretive signage. A FY12 public outreach

action plan will be prepared and outreach efforts will be documented in an annual outreach accomplishment report.

Pertinent Reports: A public outreach strategy is available upon request.

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Appendices

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Appendix A. Letter from Central Arizona Water Conservation District



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May 04, 2011

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 Las Vegas, NV 89101

Gentlemen:

The Multi-Species Conservation Program (MSCP) Non-Federal share for the Federal Fiscal Year 2012, both annually and quarterly, are shown by state below. The inflation index used is 1.210.

Also, please note that Federal Fiscal Year 2012 is year 7 of the program and costs have increased for this five year category (years 6-10 or 2011-2015).

FY 2012 Non-Federal Share (2003 \$)	\$13,770,000
FY 2011 Inflation Index	1.210
FY 2011 Non-Federal Share (Escalated \$)	\$16,661,700

<u>FY 2012 Non-Federal Payments</u>	<u>Existing Habitat Maintenance</u>	<u>Remaining Balance</u>	<u>Total Payment Due</u>
Arizona (25%-Existing Habitat Maint) (15%-Total Non-Federal Share)	\$1,361,250.00	\$1,138,005.00	\$ 2,499,255.00
Nevada (25%-Existing Habitat Maint.) (30%-Total Non-Federal Share)	1,361,250.00	3,637,260.00	4,998,510.00
California (50%-Existing Habitat Maint.) (55%-Total Non-Federal Share.)	<u>2,722,500.00</u>	<u>6,441,435.00</u>	<u>9,163,935.00</u>
Totals	\$5,445,000.00	\$11,216,700.00	\$16,661,700.00

<u>FY 2012 Quarterly Payments</u>		<u>Existing Habitat Maintenance</u>	<u>Remaining Balance</u>	<u>Total Payment Due</u>
Arizona	Q1	\$ 340,312.50	\$ 284,501.25	\$ 624,813.75
	Q2	340,312.50	284,501.25	624,813.75
	Q3	340,312.50	284,501.25	624,813.75
	Q4	<u>340,312.50</u>	<u>284,501.25</u>	<u>624,813.75</u>
	FY Totals	\$1,361,250.00	\$1,138,005.00	\$2,499,255.00
Nevada	Q1	\$ 340,312.50	\$ 909,315.00	\$1,249,627.50
	Q2	340,312.50	909,315.00	1,249,627.50
	Q3	340,312.50	909,315.00	1,249,627.50
	Q4	<u>340,312.50</u>	<u>909,315.00</u>	<u>1,249,627.50</u>
	FY Totals	\$1,361,250.00	\$3,637,260.00	\$4,998,510.00
California	Q1	\$ 680,625.00	\$1,610,358.75	\$2,290,983.75
	Q2	680,625.00	1,610,358.75	2,290,983.75
	Q3	680,625.00	1,610,358.75	2,290,983.75
	Q4	<u>680,625.00</u>	<u>1,610,358.75</u>	<u>2,290,983.75</u>
	FY Totals	\$2,722,500.00	\$6,441,435.00	\$9,163,935.00

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
 Central Arizona Project
 Assistant General Manager
 Finance and Information Technologies

Attachments

Cc John Swett, MSCP Program Manager, Bureau of Reclamation
 Laura Vecerina, MSCP Program Deputy Manager, Bureau of Reclamation
 Douglas Dunlap, Financial Analysis and Planning Manager, CAP
 Dana Sedig, Senior Financial Analyst, CAP

**MSCP
Habitat Maintenance Account**

Per Table 7-1 of the HCP		
	Years 1-5	Years 6-10
Existing Habitat Maintenance Cost	2,500,000	22,500,000
Total Cost	66,070,000	137,700,000
Percent of Existing Habitat Cost to Total Cost	4.458712323880860%	16.339869281045800%

	FY 2006 - YR 1	FY 2007 - YR 2	FY 2008 - YR 3	FY 2008 - YR 4	FY 2008 - YR 5
Total Annual Funding Commitment	\$ 12,144,762.00	\$ 12,582,108.00	\$ 13,311,018.00	\$ 13,566,940.00	\$ 14,510,916.00
X Existing Habitat Percentage Above	4.458712323880860%	4.458712323880860%	4.458712323880860%	4.458712323880860%	4.458712323880860%
Existing Habitat Maintenance Cost	\$ 541,500.00	\$ 561,000.00	\$ 593,500.00	\$ 605,000.00	\$ 647,000.00
Arizona - 25%	\$ 135,375.00	\$ 140,250.00	\$ 148,375.00	\$ 151,250.00	\$ 161,750.00
Nevada - 25%	135,375.00	140,250.00	148,375.00	151,250.00	161,750.00
California - 50%	270,750.00	280,500.00	296,750.00	302,500.00	323,500.00
Total Existing Habitat Maintenance Cost	\$ 541,500.00	\$ 561,000.00	\$ 593,500.00	\$ 605,000.00	\$ 647,000.00

	FY 2011 - YR 6	FY 2012 - YR 7	FY 2013 - YR 8	FY 2014 - YR 9	FY 2015 - YR 10
Total Annual Funding Commitment	\$ 32,800,140.00	\$ 33,323,400.00			
X Existing Habitat Percentage Above	16.339869281045800%	16.339869281045800%	16.339869281045800%	16.339869281045800%	16.339869281045800%
Existing Habitat Maintenance Cost	\$ 5,359,500.00	\$ 5,445,000.00	\$ -	\$ -	\$ -
Arizona - 25%	\$ 1,339,875.00	\$ 1,361,250.00	\$ -	\$ -	\$ -
Nevada - 25%	1,339,875.00	1,361,250.00	-	-	-
California - 50%	2,679,750.00	2,722,500.00	-	-	-
Total Existing Habitat Maintenance Cost	\$ 5,359,500.00	\$ 5,445,000.00	\$ -	\$ -	\$ -

Fiscal Year 2012 Lower Colorado River Multi-Species Program Funding, Indexing and Inflation Adjusted Changes in Funding (Actual Indices through September 2010)

row	Sept/FY col (a)	Estimated Annual Inflation GDP col (b)	Estimated Annual Inflation PPI col (c)	Gross Domestic Product Index col (d)	GDP Inflation Index col (e)	Producer Price Index col (f)	PPI Inflation Index col (g)	Composite Inflation Index col (h)	Program in 9/2002 \$ (Table 7-1 of HCP)			Program in Indexed \$	
									Total col (i)	Federal col (j)	Non-Federal col (k)	Indexed Total col (l)	Indexed Federal col (m)
1					For 2010 d8/d2 =e8		For 2010 f8/f2 =g8	For 2010 (e8+g8)/2 =h8				For 2010 j10*h8 =m10	For 2010 k10*h8 =n10
2	2002	Actual	Actual	104,243	1.000	152,100	1.000	1.000					
3	2003	Actual	Actual	106,148	1.018	155,000	1.019	1.019					
4	2004	Actual	Actual	108,482	1.041	170,900	1.124	1.063					
5	2005	Actual	Actual	112,527	1.079	177,000	1.164	1.122					
6	2006	Actual	Actual	116,420	1.117	191,000	1.256	1.187	11,214	5,607	5,607	12,145	6,072
7	2007	Actual	Actual	119,826	1.149	193,200	1.270	1.210	11,214	5,607	5,607	12,582	6,291
8	2008	Actual	Actual	123,056	1.180	214,000	1.407	1.294	11,214	5,607	5,607	13,311	6,656
9	2009	Actual	Actual	109,783	1.053	202,000	1.328	1.191	11,214	5,607	5,607	13,569	6,784
10	2010	Actual	Actual	111,045	1.065	205,900	1.354	1.210	11,214	5,607	5,607	14,511	7,255
11	2011	3.0%	3.5%	114,376	1.097	213,107	1.401	1.249	27,540	13,770	13,770	32,800	16,400
12	2012	3.0%	3.5%	117,808	1.130	220,565	1.450	1.290	27,340	13,770	13,770	33,323	16,662
13	2013	3.0%	3.5%	121,342	1.164	228,285	1.501	1.333	27,540	13,770	13,770	34,397	17,199
14	2014	3.0%	3.5%	124,982	1.199	236,273	1.553	1.376	27,540	13,770	13,770	35,527	17,763
15	2015	3.0%	3.5%	128,732	1.235	244,545	1.608	1.422	27,540	13,770	13,770	36,711	18,355
16	2016	3.0%	3.5%	132,634	1.272	253,104	1.664	1.468	22,164	11,082	11,082	30,498	15,249
17	2017	3.0%	3.5%	136,571	1.310	261,962	1.722	1.516	22,164	11,082	11,082	31,517	15,759
18	2018	3.0%	3.5%	140,688	1.349	271,131	1.783	1.566	22,164	11,082	11,082	32,537	16,268
19	2019	3.0%	3.5%	144,889	1.390	280,621	1.845	1.618	22,164	11,082	11,082	33,601	16,800
20	2020	3.0%	3.5%	149,235	1.432	290,442	1.910	1.671	22,164	11,082	11,082	34,709	17,354
21	2021	3.0%	3.5%	153,712	1.475	300,608	1.976	1.726	19,982	9,991	9,991	32,331	16,165
22	2022	3.0%	3.5%	158,324	1.519	311,129	2.046	1.783	19,982	9,991	9,991	33,390	16,695
23	2023	3.0%	3.5%	163,073	1.564	322,019	2.117	1.841	19,982	9,991	9,991	34,489	17,244
24	2024	3.0%	3.5%	167,966	1.611	333,289	2.191	1.901	19,982	9,991	9,991	35,628	17,814
25	2025	3.0%	3.5%	173,004	1.660	344,954	2.268	1.964	19,982	9,991	9,991	36,787	18,393
26	2026	3.0%	3.5%	178,195	1.709	357,028	2.347	2.028	8,144	4,072	4,072	15,482	7,741
27	2027	3.0%	3.5%	183,540	1.761	369,524	2.429	2.095	8,144	4,072	4,072	15,995	7,997
28	2028	3.0%	3.5%	189,047	1.814	382,457	2.515	2.165	8,144	4,072	4,072	16,516	8,258
29	2029	3.0%	3.5%	194,718	1.868	395,843	2.603	2.236	8,144	4,072	4,072	17,062	8,531
30	2030	3.0%	3.5%	200,560	1.924	409,698	2.694	2.309	8,144	4,072	4,072	17,632	8,816
31	2031	3.0%	3.5%	206,576	1.982	424,037	2.788	2.385	7,500	3,750	3,750	16,770	8,385
32	2032	3.0%	3.5%	212,774	2.041	438,878	2.885	2.463	7,500	3,750	3,750	17,318	8,659

33	2033	3.0%	3.0%	219,457	2,102	454,239	2,986	2,544	7,500	3,750	3,750	17,888	8,944	8,944
34	2034	3.0%	3.0%	225,432	2,165	470,137	3,091	2,628	7,500	3,750	3,750	18,473	9,236	9,236
35	2035	3.0%	3.5%	232,504	2,230	486,592	3,199	2,715	7,500	3,750	3,750	19,080	9,540	9,540
36	2036	3.0%	3.5%	239,479	2,297	503,623	3,311	2,804	7,173	3,587	3,587	18,851	9,425	9,425
37	2037	3.0%	3.5%	246,663	2,366	521,250	3,427	2,897	7,173	3,587	3,587	19,475	9,737	9,737
38	2038	3.0%	3.5%	254,063	2,437	539,493	3,547	2,992	7,173	3,587	3,587	20,113	10,057	10,057
39	2039	3.0%	3.5%	261,685	2,510	558,376	3,671	3,091	7,173	3,587	3,587	20,780	10,390	10,390
40	2040	3.0%	3.5%	269,535	2,586	577,919	3,800	3,193	7,173	3,587	3,587	21,462	10,731	10,731
41	2041	3.0%	3.5%	277,621	2,663	598,146	3,933	3,298	7,173	3,587	3,587	22,172	11,086	11,086
42	2042	3.0%	3.5%	285,950	2,743	619,051	4,070	3,407	7,173	3,587	3,587	22,903	11,452	11,452
43	2043	3.0%	3.5%	294,529	2,825	640,749	4,213	3,519	7,173	3,587	3,587	23,657	11,828	11,828
44	2044	3.0%	3.5%	303,364	2,910	663,175	4,360	3,635	7,173	3,587	3,587	24,438	12,219	12,219
45	2045	3.0%	3.5%	312,465	2,997	686,386	4,513	3,755	7,173	3,587	3,587	25,242	12,621	12,621
46	2046	3.0%	3.5%	321,839	3,087	710,410	4,671	3,879	7,173	3,587	3,587	26,074	13,037	13,037
47	2047	3.0%	3.5%	331,494	3,180	735,274	4,834	4,007	7,173	3,587	3,587	26,935	13,467	13,467
48	2048	3.0%	3.5%	341,439	3,275	761,099	5,003	4,139	7,173	3,587	3,587	27,824	13,912	13,912
49	2049	3.0%	3.5%	351,683	3,374	787,644	5,178	4,276	7,173	3,587	3,587	28,742	14,371	14,371
50	2050	3.0%	3.5%	362,233	3,475	815,212	5,360	4,418	7,173	3,587	3,587	29,689	14,845	14,845
51	2051	3.0%	3.5%	373,100	3,579	843,744	5,547	4,563	7,173	3,587	3,587	30,672	15,336	15,336
52	2052	3.0%	3.5%	384,298	3,687	873,275	5,741	4,714	7,173	3,587	3,587	31,690	15,845	15,845
53	2053	3.0%	3.5%	395,822	3,797	903,840	5,942	4,870	7,173	3,587	3,587	32,730	16,365	16,365
54	2054	3.0%	3.5%	407,696	3,911	935,474	6,150	5,031	7,173	3,587	3,587	33,814	16,907	16,907
55	2055	3.0%	3.5%	419,927	4,028	968,216	6,366	5,197	7,173	3,587	3,587	34,933	17,466	17,466
Total										626,180	313,090	313,090	1,268,770	634,385

Appendix B. Description of Take

B-1. LCR MSCP Federal Flow-Related Covered Actions and Accomplishments, Calendar Year 2010

Federal Covered Actions <i>Biological Assessment</i> Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions ¹	2010 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)	<ul style="list-style-type: none"> • Prescribed flood control releases per Field Working Agreement and <i>Water Control Manual for Lake Mead/Hoover Dam</i> 	<ul style="list-style-type: none"> • 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 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) 	<ul style="list-style-type: none"> • None 	<p>No flood control releases were made from Lake Mead.</p> <p>The hourly elevation of Lake Mead provided for flood control space which was well above that required. In 2010, the Lake Mead elevation varied between 1081.85 and 1103.35 feet mean sea level.</p> <p>Elevations at Lake Mohave and Lake Havasu were managed to target elevations.</p>
2.2.1.2 State Apportionment and Water Contracts (page 2-5; Table 2-2, page 2-6)	<ul style="list-style-type: none"> • 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 <i>Arizona v. California</i>, 547 U.S. 150 (Decree) • Delivery of a state's unused entitlement to a junior entitlement holder within that state on an annual basis 	<ul style="list-style-type: none"> • Determinations and delivery of post-2016 unused apportionment water from one state to another within the Lower Basin on an annual basis 	<ul style="list-style-type: none"> • Delivery of water to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree 	<p>Water deliveries were made to water users in Arizona, California, and Nevada to satisfy the basic entitlements for delivery of Colorado River water. Unused entitlement water within a state's apportionment was delivered to junior priority holders in that state.</p>

<p>2.2.1.3 Annual Operations Normal, Surplus, Shortage, and Unused Apportionment (page 2-6; Table 2-3, page 2-9)</p>	<ul style="list-style-type: none"> • Issuance of an annual operating plan • 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 <i>Arizona v. California</i>, 547 U.S. 150 (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 	<ul style="list-style-type: none"> • Revision of annual operations through the <i>Annual Operating Plan (AOP)</i>, 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 and the Reclamation States Emergency Drought Relief Act • Periodic review of the LROC 	<ul style="list-style-type: none"> • Delivery of water to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree 	<p>The Annual Operating Plan for 2010, which governed releases, was issued.</p> <p>Annual operations were revised through the Annual Operating Plan, pursuant to the LROC, to reflect current hydrologic conditions.</p> <p>An Intentionally Created Surplus (ICS) Surplus condition was declared for 2010. ICS water was both taken and created in 2010.</p> <p>Water was delivered to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree.</p> <p>Water was delivered to Mexico pursuant to the 1944 Water Treaty. Flows to Mexico in excess of treaty requirements were 171,543 acre-feet. Minute 318 was signed, which allows Mexico to store water in Lake Mead through 2013 for later delivery.</p> <p>There has not been a review of the LROC.</p> <p>In 2010, Nevada did not use its entire apportionment.</p>
<p>2.2.1.4 Daily Hoover Dam Operations(Table 2-4, page 2-10)</p>	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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) 	<ul style="list-style-type: none"> • Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States and to generate hydropower with these water releases 	<p>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 to meet changing water demands and other constraints.</p>

<p>2.2.1.4 Daily Davis Dam Operations (Table 2-5, page 2-11)</p>	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States and generate hydropower with these water releases 	<p>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.</p> <p>The timing of releases was varied based on available downstream storage, operational constraints for Lakes Mohave and Havasu, downstream water requirements, and hydropower needs.</p>
<p>2.2.1.4 Daily Parker Dam Operations (Table 2-6, page 2-11)</p>	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Timing of releases, to a limited degree, may be varied by the hour based on hydropower needs, water requirements, or other operations constraints immediately downstream of the dam 	<ul style="list-style-type: none"> • Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States and generate hydropower with these water releases 	<p>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.</p> <p>The timing of releases was varied based on available downstream water requirements, hydropower needs, and other operational constraints immediately downstream of Parker Dam.</p>
<p>2.2.1.4 Daily Senator Wash, Imperial Dam, Laguna Dam, and Warren H. Brock Reservoir Operations (Table 2-7, page 2-11)</p>	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States 	<p>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, to deliver 1944 Water Treaty water to Mexico, and to generate hydropower with water releases from Senator Wash.</p> <p>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, to deliver a portion of the 1944 Water Treaty deliveries to Mexico, and for flood control purposes.</p>
<p>2.2.1.5 Electric Power Generation (page 2-11)</p> <p>43 CFR PART 431 (page 2-14)</p>	<ul style="list-style-type: none"> • Operational requirements to satisfy 43 CFR Part 431 requirements 	<p>---</p>	<p>---</p>	<p>Hydroelectric power generated:</p> <ul style="list-style-type: none"> • Hoover Dam: 3,705,574,280 kWh • Davis Dam: 1,130,209,000 kWh • Parker Dam: 458,594,527 kWh <p>Operations met the requirements to satisfy 43 CFR Part 431.</p>
<p>2.2.1.6 Lower Colorado Water Supply Project - California (page 2-15; Table 2-8, page 2-16)</p>	<ul style="list-style-type: none"> • Delivery of water under executed LCWSP contracts 	<ul style="list-style-type: none"> • Reclamation's execution and administration of individual LCWSP contracts 	<ul style="list-style-type: none"> • Participate in the development of and consult in the execution of individual contracts under the LCWSP. 	<p>In 2010, 5,104 acre-feet of use was offset by the pumpage of the LCWSP wellfield. This amount was not diverted by IID at Imperial Dam and therefore was made available for use to project contractors.</p>

<p>2.2.1.7 1944 Water Treaty Deliveries(page 2-17; Table 2-9, page 2-20)</p>	<ul style="list-style-type: none"> • Delivery of Mexico allotment (1.5 million acre-feet [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. 310 of the 1944 Water Treaty and contract 	<ul style="list-style-type: none"> • 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 afy • 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. 310 of the 1944 Water Treaty • Routing of water through the Yuma Division during flood control conditions 	<ul style="list-style-type: none"> • Delivery of emergency water to Tijuana pursuant to Minute No. 310 of the 1944 Water Treaty and contract • Retention of a portion of MWD's entitlement in Lake Mead to accommodate delivery of water pursuant to Minute No. 310 of the 1944 Water Treaty 	<p>Water delivery met the Mexico allotment (1.5 maf) pursuant to the 1944 Water Treaty and related Minutes.</p> <p>A total of 171,543 acre-feet of water passed to Mexico in excess of treaty requirements.</p> <p>Complied with the salinity requirements of Minute No. 242 of the 1944 Water Treaty.</p> <p>Delivery of emergency water to Tijuana pursuant to Minute No. 310 of the 1944 Water Treaty totaled 0 acre-feet.</p> <p>Water was routed through the Yuma Project Reservation Division for delivery to NIB. Water arriving at NIB is water that stays in the river below Imperial Dam, inflow from the Gila River, and water that enters the river from many returns, including Pilot Knob Wasteway.</p> <p>Delivery of water at SIB totaled 120,923 acre-feet.</p> <p>Drainage pumping and delivery of drainage return flows were made at NIB and SIB.</p>
<p>2.2.1.8 Decree Accounting (page 2-21; Table 2-10, page 2-22)</p>	<ul style="list-style-type: none"> • Annual preparation of official records of the diversion, return flow, and consumptive use of Colorado River water pursuant to Article V of the Supreme Court Consolidated Decree of 2006 in <i>Arizona v. California</i>, 547 U.S. 150 (Decree) 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Report data for Decree Accounting records 	<p>The <i>Colorado River Accounting and Water Use Report; Arizona, California, Nevada</i> for calendar year 2010 was published May 13, 2011 and is summarized below. The full report can be found at www.usbr.gov/lc under river operations.</p> <p>Final Data - Diversions from Mainstream Summary:</p> <ul style="list-style-type: none"> • Arizona: <ul style="list-style-type: none"> Diversions = 3,602,466 acre-feet Measured Returns = 617,672 acre-feet Unmeasured Returns = 204,427acre-feet Consumptive Use = 2,780,367 acre-feet • California: <ul style="list-style-type: none"> Diversions = 4,971, 889 acre-feet Measured Returns = 560,651 acre-feet Unmeasured Returns = 65,618 acre-feet Sub CU = 4,345,620 acre-feet Brock = 11,219 acre-feet Consumptive Use = 4,356,839 acre-feet

				<ul style="list-style-type: none"> • Nevada: Diversion = 451,792 acre-feet Measured Returns = 208,958 acre-feet Unmeasured Returns = 1,397 acre-feet Consumptive Use = 241,437 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)	<ul style="list-style-type: none"> • Delivery of surplus water pursuant to Article II(B)(2) of the Supreme Court Consolidated Decree of 2006 in Arizona v. California, 547 U.S. 150 (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 	<ul style="list-style-type: none"> • Adoption of specific post-2026 surplus guidelines • Adoption of specific post-2026 shortage guidelines 	<ul style="list-style-type: none"> • 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 Boulder Canyon Project Act and the Decree 	<p>No surplus water was delivered pursuant to Article II(B)(2) of the Decree.</p> <p>No water was delivered pursuant to Article II(B)(3) of the Decree.</p>
2.2.2.2 Flood Release Contracts (page 2-24; Table 2-12, page 2-25)	<ul style="list-style-type: none"> • Delivery of water under executed flood release contracts 	<ul style="list-style-type: none"> • Execution of contracts for water released during flood control operations 	<ul style="list-style-type: none"> • 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 <i>Biological Assessment</i> .
Flow Changes Below Hoover Dam to Davis Dam (Table 2-14, after page 2-26)	---	---	---	Repayment of IOPP overruns resulted in reduced diversions of 603 acre-feet in AZ. The Fort Mojave Indian Tribe repayment of IOPP overruns resulted in reduced diversions of 4,070 acre-feet in CA. System conservation in Yuma Mesa Irrigation and Drainage District resulted in reduced diversions and increased storage of 3,705 acre-feet. 121,802 acre-feet of ICS which was created and left in Lake Mead, decreasing the volume of water passing Hoover Dam. Excess flows to Mexico of 171,324 acre-feet resulted in increased releases from Hoover Dam.

<p>Flow Changes Below Davis Dam to Parker Dam (Table 2-15, after page 2-26)</p>	---	---	---	<p>Repayment of IOPP overruns resulted in reduced diversions of 603 acre-feet in AZ. The Fort Mojave Indian Tribe repayment of IOPP overruns resulted in reduced diversions of 4,070 acre-feet in CA. System conservation in Yuma Mesa Irrigation and Drainage District resulted in reduced diversions and increased storage of 3,705 acre-feet. 121,802 acre-feet of ICS which was created and remains in Lake Mead, decreasing the volume of water passing Davis Dam. Excess flows to Mexico of 171,324 acre-feet resulted in increased flows past Davis Dam.</p>
<p>Flow Changes Below Parker Dam to Imperial Dam (Table 2-16, after page 2-26)</p>	---	---	---	<p>IID reduced diversions by 5,104 acre-feet to make water available to diverters above Parker Dam under the LCWSP. In addition, IID conserved the following amounts which were diverted by MWD and SDCWA above Parker Dam: 105,000 acre-feet under the 1988 IID/MWD Conservation Agreement. 20,931 acre-feet of System Efficiency ICS was created by the Yuma Desalting Plant during the Pilot run. IID underconserved water for the Intra-priority 3 Transfer with CVWD, resulting in 6,050 acre-feet of extra water being released from Lake Mead to satisfy MWD requirements. IID and CVWD used 265,585 acre-feet less water than scheduled, making that water available to MWD and reducing flows below Parker Dam. Excess to Mexico of 171,324 acre-feet resulted in increased flows past Parker Dam.</p>
<p>Water Conservation Field Services Program (page 2-27; Table 2-17, page 2-28)</p>	<ul style="list-style-type: none"> • Develop water conservation program pursuant to Reclamation Reform Act (RRA) section 210(a) 	<ul style="list-style-type: none"> • Implementation of the Field Services Program 	<ul style="list-style-type: none"> • Consult in the development of conservation plans pursuant to RRA section 210(a) 	<p>All water conservation plans for the Lower Colorado Region are complete.</p>
<p>Unlawful Use(page 2-28; Table 2-18, page 2-30)</p>	<ul style="list-style-type: none"> • Boulder Canyon Project Act requires all Colorado River water users to have a contract with the Secretary of the Interior 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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. 	<p>Proposed rule was published July 16, 2008, in the <u>Federal Register</u> (73 FR 40916). For 2010, reviewing additional information.</p>

<p>Unallocated Colorado River Water in Arizona, Exclusive of CAP (page 2-30; Table 2-19, page 2-31) Note: changed title from "Unallocated or Noncontract Water in Arizona, Exclusive of CAP"</p>	<ul style="list-style-type: none"> • Delivery of water pursuant to executed contracts for unallocated water in Arizona (non-CAP) 	<ul style="list-style-type: none"> • Execution of water delivery contracts for unallocated water in Arizona (non-CAP) 	<ul style="list-style-type: none"> • Review of water delivery contracts and consultation with Arizona on contract recommendations 	<p>Unallocated (non-CAP) Arizona water was delivered to Central Arizona Water Conservation District as allowed under that agency's contract with the United States. This water remains unallocated and is not yet placed under permanent contract. Arizona Department of Water Resources is waiting for the well inventory to be completed before it recommends to the Secretary of the Interior the entities to enter into contracts for the unallocated Arizona water.</p>
<p>Central Arizona Project Contract Actions (page 2-31; Table 2-20, page 2-31)</p>	<ul style="list-style-type: none"> • Delivery of water pursuant to executed contracts 	<ul style="list-style-type: none"> • Completion of allocation and execution of contracts for delivery of CAP water subject to Congressional direction 	<ul style="list-style-type: none"> • Review of contracts and consultation on proposed allocation 	<p>Water was delivered to the CAP for use by CAP subcontractors and Indian tribes in satisfaction of water delivery contracts. Water Utility of Greater Buckeye assigned 43 acre-feet of CAP water to Valencia Water Company, Inc. executed on May 24, 2010. Tonto Hills Utility Company assigned 71 acre-feet to Tonto Hills Domestic Water Improvement District, executed June 22, 2010.</p>
<p>Changes in Delivery Related to Water Transfers (page 2-32; Table 2-21, page 2-32)</p>	<ul style="list-style-type: none"> • Delivery of water under executed off-stream storage agreements, pursuant to 43 CFR Part 414 	<ul style="list-style-type: none"> • Execution of Storage and Interstate Release Agreements, pursuant to 43 CFR Part 414 	<ul style="list-style-type: none"> • Delivery of water under executed off-stream storage agreements, pursuant to 43 CFR Part 414 	<p>Conservation by IID and delivery to MWD of 70,000 acre-feet of water for transfer to SDCWA, made available under the Colorado River Water Delivery Agreement that reflects changes in points of diversion and is used to implement the Quantification Settlement Agreement water transfers. In addition, MWD diverted the full 105,000 acre-feet of water made available by IID under the 1988 IID/MWD Conservation Agreement. IID and CVWD made 97,507 acre-feet of water available for MWD and SDCWA through the All-American and Coachella Canal lining projects. IID also made 12,000 acre-feet available to CVWD under the CRWDA Intra-priority 3 Transfer.</p>
<p>Changes in Delivery Related to Off-Stream Storage (page 2-32; Table 2-22, page 2-33)</p>	<ul style="list-style-type: none"> • Delivery of water under executed off-stream storage agreements, pursuant to 43 CFR Part 414 	<ul style="list-style-type: none"> • Execution of Storage and Interstate Release Agreements, pursuant to 43 CFR Part 414 	<ul style="list-style-type: none"> • Delivery of water under executed off-stream storage agreements, pursuant to 43 CFR Part 414 	<p>Water was stored off-stream by SNWA and CAP. However, each state used its own apportionment; no changes in delivery or points of delivery resulted from off-stream storage in 2010.</p>
<p>Changes in Amount of Delivery (page 2-33; Table 2-23, page 2-34)</p>	<ul style="list-style-type: none"> • Delivery of water pursuant to executed contracts or amendments to recognize changes in amounts of delivery or changes in points of diversion 	<ul style="list-style-type: none"> • Execution of contract amendments or amendments to recognize changes in amounts of delivery or changes in points of diversion 	<ul style="list-style-type: none"> • Review of contracts and consultation on new or amended contracts 	<p>Amendment No. 1 to Reclamation Recreation Purpose License Agreement with Clark County provided for a diversion by Clark County of up to 50 acre-feet per year of Reclamation's entitlement and was executed on November 5, 2010. Unit B and the City of Yuma contract for use of a portion of Unit B's capacity in the Gila Gravity Main Canal and a point of diversion change for the City of Yuma executed on August 11, 2010. Arizona American Water Company approval of a new point of delivery for an emergency interconnection executed on May 8, 2010. Yucca Power Plant approval of a new point of diversion executed on September 17, 2010.</p>

Changes in Type of Water Use (page 2-34; Table 2-24, page 2-34)	<ul style="list-style-type: none"> • Delivery of water pursuant to executed contracts or contract amendments that recognize changed water use types 	<ul style="list-style-type: none"> • Execution of contracts or contract amendments that recognize changed water use types 	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • Delivery of water pursuant to executed contract amendments or new contracts that includes or excludes lands in service areas 	<ul style="list-style-type: none"> • Execution of contract amendments or new contracts that includes or excludes lands in service areas 	<ul style="list-style-type: none"> • Review of contracts and consultation on new or amended contracts 	No changes.
Contract Terminations (page 2-35; Table 2-26, page 2-36)	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Termination of water contract due to abandonment • Execution of contract amendments when entitlement holder has relinquished water 	<ul style="list-style-type: none"> • Consultation on the disposition of any water allocated for use but not consumptively used within a state 	No contracts were terminated.
2.3 WESTERN AREA POWER ADMINISTRATION	---	---	---	See section 2.2.1.5 accomplishments in this table.
2.4 NATIONAL PARK SERVICE	---	---	<ul style="list-style-type: none"> • 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)	---	<ul style="list-style-type: none"> • Conduct conservation measures for efficient water use 	---	Existing practices were continued.
2.5.2.6 Flow-Related Actions (page 2-82)	---	---	<ul style="list-style-type: none"> • Water entitlement holder 	See section 2.2.1.8 accomplishments in this table.
2.5.3.2 Future Water Conservation Practices (page 2-77)	---	<ul style="list-style-type: none"> • Institute new conservation measures for efficient water use 	---	No implementation in 2010.
2.5.3.5 Headgate Rock Dam Operation and Maintenance (page 2-88)	---	<ul style="list-style-type: none"> • Water releases and generate hydropower with these water releases 	---	Existing practices were continued.
2.6 FISH AND WILDLIFE SERVICE	---	---	<ul style="list-style-type: none"> • Water entitlement holder 	See section 2.2.1.8 accomplishments in this table.
2.7 BUREAU OF LAND MANAGEMENT	---	---	<ul style="list-style-type: none"> • Water entitlement holder 	See section 2.2.1.8 accomplishments in this table.
NOTES:				
1. See <i>LCR MSCP Habitat Conservation Plan</i> , section 2.1.1, Relationship of Non-Federal Covered Activities to Federal Nondiscretionary Actions. This can be accessed at http://www.lcrmscp.gov/publications/Volumell.pdf .				
2. Reporting for the Non-Federal Flow-Related Covered Activities (Appendix 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 2010.				

B-2. LCR MSCP Federal Non-Flow-Related Covered Actions and Incidental Take Summary, Fiscal Year 2010

Federal Covered Actions <i>Biological Assessment Chapter 2</i>	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)	<ul style="list-style-type: none"> • Operate, maintain, and control river in Arizona, California, and Nevada • Construct, maintain, and improve drainage works for water projects • Maintain floodway to accommodate flood flows for 100-year event or 40,000 cubic feet per second, whichever is greater • Measure diversions and return flows to and from the mainstem of the Colorado River 	---	<ul style="list-style-type: none"> • 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	No Activities in FY10							No implementation in FY10.
Protected Bankline Maintenance and Care of Unprotected Banklines (page 2-43)	---	• Protected bankline location and maintenance	No Activities in FY10							No implementation in FY10.
Levee Maintenance (page 2-44)	---	• Levee location and maintenance	---							No implementation in FY10.
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	Maintenance Dredging above Imperial Dam was conducted. A total of 1.1 million cubic yards of material was dredged.	5	LCR - Imperial Division - Imperial Reservoir	49.2	Arrowweed	1/2 acre	1, 3, and 6.	Imperial Dam reservoir dredging - impacted 1/2 acre of arrowweed along the pipeline route.
Jetties and Training Structures (page 2-47; Tables 2-33 – 2-34, page 2-48)	---	• Jetty and training structure location and maintenance	No Activities in FY10							No implementation in FY10.
Stockpiles (page 2-49; Table 2-37, page 2-49)	---	• Location of three future stock piles	Replenishing of existing stockpile sites - 7 sites (all in reach 4).	4	LCR	c100, c104, a116.3, a120.8, a144.2, a149.7, a174.3	None	None	1,3, and 6.	Replenished 7 existing stockpile sites located at various sites along the LCR.
Riprap Placement and Haul Roads (page 2-50)	---	• Haul roads and riprap storage location and maintenance	Conducted road maintenance along the various haul roads of the LCR. Activities consisted of grading, graveling road surface, watering to minimize dust.	7 6	Limitrophe Yuma	0 -24 24 -43	None None	0 0	1, 3, and 6 1, 3, and 6	Road Maintenance: Limitrophe Division Miles 99. Yuma Division - Miles 230. (Gila River Area - Miles 58.4.)

				6	Laguna	43 - 49	None	0	1, 3, and 6	Laguna Division - Miles 22.2.
				4	Cibola	87-107	None	0	1, 3, and 6	Cibola Division - Miles 66.4.
				4	Palo Verde	107-134	None	0	1, 3, and 6	Palo Verde Division - Miles 96.4
				4	Parker	134-178	None	0	1, 3, and 6	Parker Division - Miles 100.3.
				3	Mohave	234- 276	None	0	1,3, and 6	Mohave Division - Miles 87.5.
2.2.3.2 Major Federal Facilities and Miscellaneous Operation, Maintenance, and Replacement (page 2-50; Table 2-36, after page 2-50)	---	<ul style="list-style-type: none"> Maintenance of Yuma area drainage wells and conveyance facilities including maintenance and access roads Maintenance of open channel drains and outfall channels Maintenance and replacement of gauging stations, survey line markers, and boat ramps 	<p>Gauging Stations - Also, replaced the Taylors Ferry Gauge. New Taylors Ferry gauging station was installed on the AZ side of the river, directly across from the old site (CA site).</p> <p>Conveyance facilities - Completed replacement activities (new lining) of the DPOC-1 and DPOC-2 drainage channels and maintenance activities of the Yuma Mesa Conduit (YMC).</p> <p>Yuma Area drainage wells - Conducted activities at the Yuma Valley well field: Redrilled Yuma Valley well Nos. 27, and 28. Conducted activities at the Yuma Mesa wells: Redrilled Yuma Mesa wells Nos. 7 and 11. Conducted activities at the South Gila wells: Redrilled South Gila wells Nos. 5, 10, 713, and 714.</p>	4	LCR	106.6	AW and Saltcedar	.10 of an acre	1, 3, and 6	<p>Impacted 1/10 of an acre of arrowweed and saltcedar during the installation of the new gauging station. DPOC I - Concrete repairs, 1/2 mile DPOC II - Concrete repairs, 1/2 mile.</p> <p>YMC - misc maintenance activities.</p> <p>Wells (Yuma Valley) - Redrilled YV-27 and YV-28 wells. Wells (Yuma Mesa) - Redrilled YM-7 and YM-11. Wells (South Gila) - Redrilled SG-5, SG-10, SG-713, and SG-714.</p>
				7	Yuma Mesa Conduit	27.0	None	0	1, 3, and 6	
				7	Yuma Mesa, Yuma Valley, & South Gila wells	31.0-34.0	None	0	1, 3, and 6	

Maintenance Activities at the SIB (page 2-52)	---	• Maintenance of facilities to provide flood flow capacity	Conducted general maintenance activities of the 242 well field (i.e. electrical equipment repairs, and grading existing access roads).	7	SIB	---	None	0	1, 3, and 6	242 well field - Also including 40.9 miles of road maintenance (blading and gravel) of the 242 well field roads.
2.2.3.3 Backwater Maintenance (page 2-53; Table 2-37, page 2-54)	---	• Backwater maintenance	---							No implementation in FY10.
Mohave Division (page 2-55; Table 2-38, page 2-56)	---	• Backwater maintenance	No Backwater Activities in FY10 in the Mohave Division							No implementation in FY10.
Parker Division (page 2-57; Table 2-39, page 2-57)	---	• Backwater maintenance	No Backwater Activities in FY10 in the Parker Division							No implementation in FY10.
Palo Verde Division (page 2-58; Table 2-40, page 2-58)	---	• Backwater maintenance	No Backwater activities in FY10 in the Palo Verde Division.							No implementation in FY10.
Cibola Division (page 2-58; Table 2-41, page 2-59)	---	• Backwater maintenance	No Backwater activities in FY10 in the Cibola Division							No implementation in FY10.
Imperial Division (page 2-59; Table 2-42, page 2-59)	---	• Backwater maintenance	No Backwater activities in FY2010 in the Imperial Division.							No implementation in FY10.
Laguna Division (page 2-60; Table 2-43, page 2-60)	---	• Backwater maintenance	No Backwater activities in FY10 in the Laguna Division.							No implementation in FY10.
Yuma Division (page 2-60; Table 2-44, page 2-61)	---	• Backwater maintenance	No backwater activities in FY10 in the Yuma Division.							No implementation in FY10.
Limitrophe Division Mitigation Obligations (page 2-61; Table 2-45, page 2-62)	---	---	Fortuna pond - Conducted general maintenance of the pond, cleaning out vegetation growth along the ponds bankline in order to allow continued fishing access to public.	7	Gila River		Mixed Saltcedar, Phragmites, and cattail.	2	1, 3, and 6.	Fortuna Pond maintenance activities - at the request of AZGF the pond was cleaned to continue maintaining pond as a recreational fishing site.

2.2.3.4 Limitrophe Division Maintenance (page 2-62)	---	---	Conducted general maintenance activities of the 242 well field (i.e. electrical equipment repairs, and grading existing access roads).	7	242 well field	None		0		242 Well field maintenance.
2.2.4 Future Non-Flow-Related Actions (page 2-63)	---	---	---							
2.2.4.1 Topock Marsh (page 2-63)	---	---	No maintenance activities conducted in FY10 at Topock Marsh.							No implementation in FY10.
2.2.4.2 Laguna Reservoir (page 2-63)	---	---	No maintenance activities conducted in FY10 at the Laguna Reservoir.							No implementation in FY10.
2.2.4.3 Bankline Maintenance - Unprotected Banklines (page 2-65; Table 2-46, page 2-66)	---	---	No unprotected bankline work conducted in FY10.							No implementation in FY10.
2.2.4.4 Proposed Jetties (page 2-67; Table 2-48, page 2-67)	---		No jetty work conducted in FY10.							No implementation in FY10.
2.3 WESTERN AREA POWER ADMINISTRATION			Maintenance for Davis - Mead 230K Transmission line							No implementation in FY09.
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			50 acres 35 acres 24 acres 223 acres 14 acres 3 acres		Habitat restoration through removal of exotic plants (gross infested acres)

2.4.3 Fishery Management (page 2-71)		<ul style="list-style-type: none"> Habitat modifications on L. Mead and L. Mohave, including development and enhancement of grow-out ponds, construction of docks, and creation of angler enhancement structures 			Lake Mohave			0.5 acres		Creation of fish habitat at Princess Cove and Carp Cove, Lake Mohave. Partnership with NDOW
2.4.4 Boating Access (page 2-72)		<ul style="list-style-type: none"> Maintenance and enhancement of boating access on Lake Mead and Lake Mohave 			Lake Mead			2,310 yd ² 10,000 yd ² 4,191 yd ² 3,174 yd ² 1,890 yd ² 2,660 yd ²		Existing launch ramps extended: Echo Bay Callville Bay Boulder Harbor Hemenway Harbor Temple Bar South Cover New low water launch ramp constructed at Callville Bay
2.5 BUREAU OF INDIAN AFFAIRS										
2.5.2.1 Ongoing Irrigation System Operation and Maintenance (page 2-74)		<ul style="list-style-type: none"> Irrigation system operation and maintenance for existing Irrigation Projects 		3 3 4 6 7	Fort Mohave Chemehuevi CRIT Fort Yuma Cocopah	--- --- --- --- ---	None None None None None	0 0 0 0 0	1 and 3 1 and 3 1 and 3 1 and 3 1 and 3	Continued existing practices. Continued existing practices. Continued existing practices. Continued existing practices. Continued existing practices.

2.5.2.2 Ongoing Water Conservation Practices (page 2-77)		• Operation and maintenance of existing equipment								Continued existing practices.
2.5.2.4 Ongoing Wildland Fire Management (page 2-88)		•Implementation of fuels management projects								No implementation in FY09.
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 FY09.
2.5.3.2 Future Water Conservation Practices (page 2-85)		• Installation, operation, and maintenance of new equipment								No implementation in FY09.
2.5.3.3 Future Farmland Development (page 2-85)		• Develop additional agricultural acreage, including construction of irrigation systems								No implementation in FY09.
2.5.3.6 Future Wildland Fire Management (page 2-88)		•Implementation of new fuels management projects								No implementation in FY09.
2.6 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 2010

Non-Federal Covered Activities <i>Habitat Conservation Plan</i> Chapter 2	Covered Activities Summary	Covered Activities Implemented						Complied with Avoidance and Minimization Measures	Notes
		Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted			
2.2 ARIZONA									
2.2.1 Ongoing Flow-Related Covered Activities¹ (page 2-4)	<ul style="list-style-type: none"> • Diversion of up to 2.8 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 Appendix B, Table B-1).
2.2.2 Future Flow-Related Covered Activities¹ (page 2-6)	<p>Future Arizona water contract holder activities may include:</p> <ul style="list-style-type: none"> • 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) <p>Future Arizona hydroelectric power contract holder activities may include:</p> <ul style="list-style-type: none"> • Execution, administration, and operation of extended, renewed, new, or additional contracts for 								Non-Federal Flow-Related Covered Activities are included in the Federal Flow-Related Covered Actions and Accomplishments (see Appendix B, Table B-1).

	hydroelectric power from hydroelectric facilities at Hoover Dam, Davis Dam, Parker Dam, Headgate Rock Dam, Siphon Drop Power Plant, and Pilot Knob Power Plant							
2.2.3 Ongoing Non-Flow-Related Covered Activities (page 2-7)	<p>Operation, maintenance, and replacement of:</p> <ul style="list-style-type: none"> • 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 FY10.
Fish Surveys (page 2-8)	• Surveys for Federally listed and nonnative fish species							10 days of electrofishing, 14 nights of electrofishing, and 7 nights of trammel netting for sports fish. One day of SCUBA diving and 5 days of habitat evaluation on Lake Mohave.
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							No maintenance activities.
Law Enforcement Patrol Activities (page 2-9)	• Administer law enforcement and boating safety program using watercraft patrols							4763 hours of watercraft law enforcement. Includes all of AGFD regions III and IV watercraft law enforcement patrols.

2.3 CALIFORNIA								
2.3.1 Ongoing Flow-Related Covered Activities ¹ (page 2-11)	<ul style="list-style-type: none"> • 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 Appendix B, Table B-1).
2.3.2 Future Flow-Related Covered Activities ¹ (page 2-13)	<p>Future California water contract holder activities may include:</p> <ul style="list-style-type: none"> • 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) <p>Future California hydroelectric power contract holder activities may include:</p> <ul style="list-style-type: none"> • 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 Appendix B, Table B-1).
2.3.3 Ongoing Non-Flow-Related Activities	<p>Operation, maintenance, and replacement of:</p> <ul style="list-style-type: none"> • The facilities and equipment through which water is diverted and conveyed 	4	Palo Verde Irrigation District	---	---	---	1 and 3	

	<ul style="list-style-type: none"> • 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 	6	Bard Water District				1 and 3	
2.4 NEVADA								
2.4.1 Ongoing Flow-Related Covered Activities¹ (page 2-15)	<ul style="list-style-type: none"> • 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 Appendix B, Table B-1).
2.4.2 Future Flow-Related Covered Activities¹ (page 2-17)	<p>Future Nevada water contract holder activities may include:</p> <ul style="list-style-type: none"> • 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) <p>Future Nevada hydroelectric power contract holder activities may include:</p> <ul style="list-style-type: none"> • Execution, administration, and operation of 							Non-Federal Flow-Related Covered Activities are included in the Federal Flow-Related Covered Actions and Accomplishments (see Appendix B, Table B-1).

	extended, renewed, new, or additional contracts for hydroelectric power from hydroelectric facilities at Hoover Dam, Davis Dam, Parker Dam, and Headgate Rock Dam							
2.4.3 Ongoing Non-Flow-Related Activities (page 2-18)	<p>Operation, maintenance, and replacement of:</p> <ul style="list-style-type: none"> • 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 FY10.
2.4.3.1 Nevada Department of Wildlife Programs and Activities (page 2-18)	<p>Implementation of select Federally funded:</p> <ul style="list-style-type: none"> • Aquatic, wetland, and riparian habitat maintenance and restoration activities • Aquatic, wetland, and riparian revegetation enhancement activities • Place and maintain aids to navigation and boating access • Administer law enforcement and boating safety program using watercraft patrols 	---	---	---	---	---	---	<p>A total of 54 habitat modules were placed on approximately 10.0 acres at Carp, Box, and Shoshone Coves on Lake Mohave. Cooperative project with NPS and AGFD.</p> <p>No implementation in FY10.</p> <p>Performed routine maintenance and inspection of aids to navigation.</p> <p>Conducted routine law enforcement patrols on Lake Mead, Lake Mohave, mainstem of LCR below Davis Dam, and limited patrol activities in Laughlin Lagoon.</p>
¹ See <i>LCR MSCP Habitat Conservation Plan</i> , section 2.1.1, Relationship of Non-Federal Covered Activities to Federal Nondiscretionary Actions. This can be accessed at http://www.lcrmscp.gov/publications/Volumell.pdf .								

Appendix 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



SEARCHED	INDEXED	SERIALIZED	FILED
JUL 23 2010			
FBI - PHOENIX			
7/24/10 A 8000			

In reply refer to:

AESO/SE
22410-2004-F-0161

July 23, 2010

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 2009 Accomplishment Report and Consistency Review of Fiscal Year 2011 Work Plan and Budget

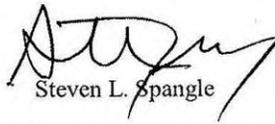
This responds to your memorandum of July 6, 2010, requesting review by the Fish and Wildlife Service (FWS) of the combined document containing the Fiscal Year 2009 Accomplishment Report and the Fiscal Year 2011 Work Plan and Budget for the Lower Colorado River Multi-Species Conservation Program (LCR 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 2009 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 2009 covered by the LCR MSCP (October 1, 2008-September 31, 2009), 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.

Also contained in the Accomplishment Report is an accounting of funds expended by Reclamation and project proponents during Fiscal Year 2009 that would be credited to the cost of LCR MSCP implementation. The FWS concurs with the amounts included on page 4, Table 1-1b, for a credit to Reclamation of \$1,170,697.00, against future expenditures.

The Fiscal Year 2011 Work Plan and Budget contains the work tasks and estimated costs for LCR MSCP implementation during Fiscal Year 2011 beginning on October 1, 2010. We have reviewed the Work Plan and determined that its implementation is directly applicable to meet the conservation requirements and are consistent with the LCR MSCP section 10(a)(1)(A) permit and biological opinion.

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: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES: Marty Tuegel)
Lower Colorado River Coordinator, Fish and Wildlife Service, Phoenix, AZ

W:\Lesley Fitzpatrick\LCR MSCP 09-11 Concurrence.docx:egg



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

August 23, 2010

SEARCHED	INDEXED
SERIALIZED	FILED
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FBI - PHOENIX	
08/25/10	
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Memorandum

To: Project Manager, Lower Colorado River Multi-Species Conservation Program,
 Bureau of Reclamation, Boulder City, Nevada

From: Field Supervisor

Subject: Protection of Water Levels at Topock Marsh, Havasu National Wildlife Refuge,
 Mohave County, Arizona

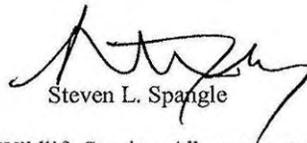
The Fish and Wildlife Service (FWS) Regional Office's National Wildlife Refuge Division and Arizona Ecological Services Office (AESO) have initiated a project to improve the water delivery system to Topock Marsh in the Havasu National Wildlife Refuge, and has invited the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) to participate. The LCR MSCP has, through *Avoidance and Minimization Measure 2 (AMM2)* a conservation responsibility for Topock Marsh to ensure that future water deliveries to the marsh are not compromised by the covered actions. In AMM2, options suggested to achieve this include improvements to intake structures and the purchase, installation, and operation of electric pumps to physically move water from the river into the marsh. In addition to the physical improvements, funding for operations and maintenance of the improvements for the life of the MSCP was envisioned to complete the requirements of AMM2

The FWS proposes to create a new primary intake structure associated with a new, concrete lined delivery canal. Other features of the proposed action are a new intake structure at the existing Farm Ditch and a new gate spanning the existing Topock Inlet Canal, sited to allow water deliveries to the Mohave Valley Irrigation District and Fort Mohave Indian Reservation while closing off the remainder of the canal to the Refuge except when inflows are desired. In discussions between FWS and the LCR MSCP, a preliminary agreement that the LCR MSCP would provide one million dollars for the construction of the new Fire Break Inlet Canal as its construction contribution under AMM2 has been reached. Provision for long-term operation and maintenance of the structure, identified as 2.5 million dollars, will be provided to the FWS by the LCR MSCP to complete their requirements under AMM2.

The AESO has coordinated this response with the National Wildlife Refuge System (NWRS) management in our regional office. AESO and NWRS believe that funding for the construction, operations, and maintenance of new Fire Break Inlet Canal by the LCR MSCP is consistent with the terms under AMM2, and if constructed with funding for operations and maintenance provided as agreed, will meet the LCR MSCP's full requirement for implementation of AMM2.

The FWS proposed action to improve water deliveries to Topock Marsh is a comprehensive solution to the existing problems, and addresses the future issues of reduced water flows in the river that necessitated the inclusion of AMM2 in the LCR MSCP. Both AESO and NWRS agree that the LCR MSCP is not required to provide additional resources under AMM2 to address water deliveries to Topock Marsh during the term of the LCR MSCP.

We appreciate the cooperative working relationship between us, Mr. Terry Murphy of the LCR MSCP, Mr. Andrew Hautzinger of the Regional Office, and Ms. Linda Miller of the Refuge to address this comprehensive plan. We look forward to continuing the planning and subsequent implementation of this project. If you have any questions concerning this project or its applicability to AMM2, please contact Lesley Fitzpatrick (x236) or me (x244).



Steven L. Spangle

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM
(NWRS: Tom Harvey, Andrew Hautzinger)
Complex Manager, Havasu-Bill Williams River National Wildlife Refuge Complex, Parker, AZ
Lower Colorado River Coordinator, Fish and Wildlife Service, Phoenix, AZ

W:\Lesley Fitzpatrick\04-261 Topock Marsh AMM2 final.docx:egg

Appendix D. LCR MSCP Closed Work Tasks

Work Task		FY Closed	Total Accomplishment
A	Pre FY10		
G2	Annual Report Writing and Production (transferred from G2)	FY07	\$165,789.34
B	Pre FY10		
B9	Boulder City Wetland Ponds	FY05	\$4,370.00
B	FY10		
B10	Uvalde National Fish Hatchery	FY10	\$551,323.68
	Cumulative Total Closed B Work Tasks		\$555,693.68
C	Pre FY10		
C1	Brown-Headed Cowbird Trap Assessment	FY06	\$125,989.00
C17	Senator Wash Razorback Sucker Stock Assessment	FY05	\$45,000.00
C18	Point Count Design and Sample Size Evaluation	FY05	\$49,920.00
C19	Southwestern Willow Flycatcher Feather Colorimetry	FY05	\$20,970.00
C20	Southwestern Willow Flycatcher Prey Base Study	FY05	\$104,981.00
C21	Yellow Billed Cuckoo Demographics Study	FY05	\$112,964.00
C22	Yellow Billed Cuckoo Survey's Demographic Study and Survey Protocol Evaluation	FY05	\$50,971.00
C6	Insect Population Biology in Riparian Restoration	FY07	\$101,441.00
C9	Razorback Sucker and Bonytail Pen Rearing Tests	FY07	\$111,040.00
C16	Evaluation of Past Bonytail Stockings	FY07	\$55,333.00
C8	Razorback Sucker Survival Studies	FY09	\$820,609.25
C23	Evaluation of Remote Sensing Techniques for PIT-Tagged Fish	FY09	\$358,138.21
	Pre FY10 Total		\$1,957,356.46
C	FY10		
C7	Survey and Habitat Characterization for MacNeill's Sootywing	FY10	\$546,963.96
C28	Nest Predation Effects on Riparian Bird Species	FY10	\$157,132.04
C29	Age . . . of Reach 3 RASU Population	FY10	\$206,526.28
C8	Razorback Sucker Survival Studies - Adjustment	FY10	-\$4,417.26
C38	Stable Isotope and Microchemistry Analyses of Fin Rays. . .	FY10	\$6,250.70
	Cumulative Total Closed C Work Tasks		\$2,869,812.18

Work Task		FY Closed	Total Accomplishment
D	Pre FY10		
D11	Vegetation Type Mapping	FY05	\$725,873.00
D4	Southwestern Willow Flycatcher Habitat Monitoring	FY08	\$277,822.03
	Cumulative Total Closed D Work Tasks		\$1,003,695.03
E	Pre FY10		
E10	Walker Lake	FY05	\$0.00
E11	Draper Lake	FY05	\$0.00
E19	Needles-Topock (AZ RM 240) Stabilization	FY05	\$0.00
E20	Pintail Slough	FY05	\$95,000.00
E22	Pratt Agricultural Lease	FY05	\$5,088.00
E23	Mittry Lake Fire Rehabilitation Project	FY05	\$0.00
E12	Butler Lake	FY07	\$121,350.00
E13	McAllister Lake	FY07	\$172,474.00
E-6	Cottonwood Genetics Study	FY07	\$259,405.00
E-7	Mass Transplanting Demonstration	FY07	\$329,235.55
E8	Seed Feasibility Study	FY09	\$859,825.69
E26	Headquarters Lake	FY08	\$147.62
	Pre FY10 Total		\$1,842,525.86
E	FY10		
E3	'Ahakhav Tribal Preserve	FY10	\$1,410,099.62
	Cumulative Total Closed E Work Tasks		\$3,252,625.48

Appendix E. Financial Statement

E-1. Required Contributions

	FY06	FY07	FY08	FY09	FY10	Total
Reclamation						
<i>Cash</i>	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						
<i>Cash</i>	471,863.10	488,855.40	517,175.90	866,420.50	926,568.70	3,270,883.60
<i>Habitat Maintenance</i>	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	1,088,308.70	4,007,873.60
Nevada						
<i>Cash</i>	1,838,148.82	1,904,342.55	2,014,665.43	1,884,091.00	1,578,887.40	9,220,135.20
<i>Habitat Maintenance</i>	135,375.00	140,250.00	148,375.00	151,250.00	161,750.00	737,000.00
<i>In-Kind Credit</i>	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	3,220,869.10	3,336,856.05	3,530,167.67	3,266,131.22	3,492,870.91	16,846,894.95
<i>MWD</i>	1,887,361.54	1,955,327.46	2,068,604.00	1,939,074.72	2,073,688.19	9,924,055.93
<i>IID</i>	500,971.43	519,011.96	549,079.48	559,718.78	598,575.29	2,727,356.94
<i>CVWD</i>	273,257.15	283,097.43	299,497.92	305,301.15	326,495.61	1,487,649.26
<i>LADWP</i>	154,845.72	160,421.88	169,715.48	173,003.99	185,014.18	843,001.25
<i>SDCWA</i>	145,737.14	150,985.30	159,732.19	0	0	456,454.63
<i>PVID</i>	122,067.53	126,463.31	133,789.60	136,382.00	145,849.84	664,552.28
<i>SCPPA</i>	63,760.00	66,056.07	69,882.84	71,236.94	76,182.31	347,118.16
<i>SCE</i>	54,651.43	56,619.49	59,899.60	61,060.23	65,299.11	297,529.86
<i>Bard</i>	6,072.38	6,291.05	6,655.52	6,784.47	7,255.46	33,058.88
<i>CRBC</i>	6,072.38	6,291.05	6,655.52	6,784.47	7,255.46	33,058.88
<i>Needles</i>	6,072.38	6,291.05	6,655.52	6,784.47	7,255.46	33,058.88
Funding Credit						
<i>SDCWA</i>	0	0	0	162,827.28	174,130.99	336,958.27
<i>Habitat Maintenance</i>	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	18,657,853.22
TOTAL	12,144,762.02	12,582,108.00	13,311,018.00	13,568,940.00	14,510,916.00	66,117,744.02

E-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			

The Metropolitan Water District:

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

Bureau of Reclamation:

Credits Earned

FY	Credits Earned	Composite i	2003 Dollars	Total 2003 Dollars
2004	3,381,440.00	1.000	3,381,440.00	3,381,440.00
2005	5,980,712.00	1.019	5,869,197.20	9,250,637.20
2006	506,149.00	1.083	467,358.26	9,717,995.40
2007	3,869,537.00	1.122	3,448,785.20	13,166,780.60
2008	876,677.00	1.187	738,565.29	13,905,345.89
2009	1,170,697.00	1.210	967,518.18	14,872,864.10
2010*	8,121,670.47	1.294	6,276,406.85	

*Based on expenditures.

Appendix F. Reports Published in FY10

These reports are available on the LCR MSCP website at:

<http://www.lcrmscp.gov/technicalrepts.html>

Work Task	Report Title
C4:	Relict Leopard Frog Monitoring and Management 2008 Annual Report
C4:	Annual 2007 Report on Relict Leopard Frog Monitoring and Management
C5:	Effects of Abiotic Factors on Insect Populations in Riparian Restoration Sites, 2008 Annual Report
C5:	Effects of Abiotic Factors on Insect Populations in Riparian Restoration Sites, 2007 Annual Report
C7:	Survey and Habitat Characterization for MacNeill's Sootywing, 2008 Annual Report
C7:	Survey and Habitat Characterization for MacNeill's Sootywing, 2007 Annual Report
C10:	The Effects of Capture by Trammel Nets on Native Arizona Fishes
C15:	Investigations in Flannelmouth Sucker Habitat Use, Preference, and Recruitment Downstream of Davis Dam in the Lower Colorado River—2008 Annual Report
C23:	Techniques for Monitoring Razorback Sucker in the Lower Colorado River, Hoover to Parker Dams, 2006–2007, Final Report
C27:	Diagnosis, Distribution, and Habitat Attributes of Two LCR MSCP Covered Species: The Colorado River Cotton Rat (<i>Sigmodon arizonae plenus</i>) and the Yuma Hispid Cotton Rat (<i>Sigmodon hispidus eremicus</i>)
C31:	Razorback Sucker Genetic Diversity Assessment — Interim Report
D1:	Marsh Bird Surveys 2008
D2:	Southwestern Willow Flycatcher Surveys, Demography, and Ecology along the Lower Colorado River and Tributaries, 2009. Annual Report

- D6: System-wide Surveys of the Elf Owl (*Micrathene whitneyi*) Along the Lower Colorado River, 2009
- D6: System-wide Surveys of the Elf Owl (*Micrathene whitneyi*) Along the Lower Colorado River, 2008
- D6: Annual Report on the Lower Colorado River Riparian Bird Surveys, 2009
- D6: Nevada Bird Count: Intensive Area Searches and Spot-Mapping
- D6: A Sampling Plan for Riparian Birds of the Lower Colorado River—Final Report
- D7: Yellow-billed Cuckoo Distribution, Abundance and Habitat Use on the Lower Colorado River and Tributaries, 2009 Annual Report
- D8: Movements of Sonic Tagged Razorback Suckers Between Davis and Parker Dams (Lake Havasu)
- D9: Monitoring of Covered and Evaluation Bat Species for the Lower Colorado River Multi-Species Conservation Program — 2009 Annual Report
- D9: Monitoring of Covered and Evaluation Bat Species for the LCR MSCP: 2008 Annual Report
- E1: Beal Riparian and Marsh Restoration Development & Monitoring Plan: Overview
- E1: Beal Riparian and Marsh Restoration, 2007 Annual Report
- E3: ‘Ahakhav Tribal Preserve Restoration Development & Monitoring Plan: CRIT 9
- E3: ‘Ahakhav Tribal Preserve: Annual Report 2008
- E3: ‘Ahakhav Tribal Preserve: Annual Report 2007
- E4: Palo Verde Ecological Reserve Annual Report 2008
- E4: Palo Verde Ecological Reserve Annual Report 2007

- E4: Palo Verde Ecological Reserve Restoration Development and Monitoring Plan: Phase 6
- E5: Cibola Valley Conservation Area 2008 Annual Report
- E5: Cibola Valley Conservation Area 2007 Annual Report
- E5: Cibola Valley Conservation and Wildlife Area (CVCA) Restoration Development and Monitoring Plan: Phase 5
- E8: Feasibility Study Using Native Seeds in Restoration, California – Arizona – Nevada 2008 Annual Report
- E9: Comprehensive Conceptual Restoration Plan for the Cibola National Wildlife Refuge’s Hart Mine Marsh September 2007
- E14: Evaluation of the Cylindrical Wedge-Wire Screen System at the Imperial National Wildlife Refuge, Arizona 2009
- E18: Lower Colorado River Multi-Species Conservation Program Fire Management & Law Enforcement Strategy
- E18: ‘Ahakhav Tribal Preserve LCR MSCP Conservation Area Specific Fire Management and Law Enforcement Strategy
- E18: Beal Lake Restoration Area LCR MSCP Conservation Area Specific Fire Management and Law Enforcement Strategy
- E18: Big Bend Conservation Area LCR MSCP Conservation Area Specific Fire Management and Law Enforcement Strategy
- E18: Cibola National Wildlife Refuge Unit 1 LCR MSCP Conservation Area Specific Fire Management and Law Enforcement Strategy
- E18: Cibola Valley Conservation and Wildlife Area LCR MSCP Conservation Area Specific Fire Management and Law Enforcement Strategy
- E18: Imperial Ponds Conservation Area LCR MSCP Conservation Area Specific Fire Management and Law Enforcement Strategy

- E18: Palo Verde Ecological Reserve LCR MSCP Conservation Area Specific Fire Management and Law Enforcement Strategy
- E24: Cibola NWR Unit 1 Conservation Area 2008 Annual Report
- F2: Final Summary of Monitoring Efforts at Pratt Agricultural Restoration Site, 1999-2006
- F3: Small Mammal Colonization at Habitat Creation Areas Along the Lower Colorado River: 2009
- F3: Small Mammal Colonization at Habitat Creation Areas Along the Lower Colorado River: 2008
- F4: Post-Development Bat Monitoring 2008 Acoustic Surveys
- F4: Post-Development Bat Monitoring of Habitat Creation Areas along the Lower Colorado River — 2009 Capture Surveys
- F4: Post-Development Bat Monitoring of Habitat Creation Areas along the Lower Colorado River — 2008 Capture Surveys