Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Final Implementation Report, Fiscal Year 2013 Work Plan and Budget, Fiscal Year 2011 Accomplishment Report

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

June 2012

Lower Colorado River Multi-Species Conservation Program Steering Committee Members

Federal Participant Group

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

Arizona Participant Group

Arizona Department of Water Resources
Arizona Electric Power Cooperative, Inc.
Arizona Game and Fish Department
Arizona Power Authority
Central Arizona Water Conservation District
Cibola Valley Irrigation and Drainage District
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
Chemehuevi Indian Tribe

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

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Program Overview

The Lower Colorado River Multi-Species Conservation Program (LCR MSCP) is a partnership of Federal and non-Federal stakeholders, 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 57 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 FY11, Chris Harris, Colorado River Board of California, 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 FY11, a summary of work underway during FY12, and proposed work to be performed during FY13. It also documents research and monitoring activities undertaken in support of the LCR MSCP. Incidental Take for covered actions implemented during FY11 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 $626,180,000 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 two years prior as outlined in the FMA. A summary of required contributions received to date is provided in Appendix D-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
2013	$27,540,000	1.251	2011	$34,452,540	$17,226,270	$17,226,270

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 funds provided by either a Federal Party or a State Permittee will be treated as a deficit to future funding obligations. Appendix D-2 provides a summary of funding credits earned and funding credits used.

FY13 Contributions and Adjustments

As outlined in Table 1-1, the annual funding commitment for FY13 is $27,540,000, based on the 2003 estimate, and $34,452,540 after the Composite Inflation Index of 1.251 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 FY13 are shown below. Section 8.3 of the FMA allows for adjusted non-Federal funding during the first 10 years of the program. The

FY13 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. FY13 Contribution Schedule

Funding Entity	FY13 Contributions	FY13 Adjusted Contributions
Federal:	$17,226,270.00	$17,226,270.00
Non-Federal:	$17,226,270.00	$17,226,270.00
California	*$8,613,135.00*	*$9,474,448.50*
Arizona	*$4,306,567.50*	*$2,583,940.50*
Nevada	*$4,306,567.50*	*$5,167,881.00*
Total:	**$34,452,540.00**	**$34,452,540.00**

2001 Biological Opinion Account

A total of $6 million, plus interest, was available to Reclamation through the 2001 BO Funding Agreement. This funding is part of LCR MSCP contributions from the San Diego County Water Authority (SDCWA) and The Metropolitan Water District of Southern California (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. Metropolitan will use their credits over a three-year period starting in FY11.

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 FY11 with interest, FY12 contributions, and FY13 projected contributions. Minimum required funding in FY13 for the Habitat Maintenance Fund is $5,629,500. Reclamation is proposing that an additional $1,830,900 be contributed to the

fund in FY13. This will reduce required contributions in future years. No funds have been withdrawn from any of the accounts to date.

Table 1-3. Existing Habitat Maintenance Fund

Funding Partner	FY11 Contribution	Cumulative through FY11*	FY12 Contribution	F13 Projected Contribution
California:	$2,679,750	$5,047,284.48	$2,722,500	$3,730,200
Arizona:	$1,339,875	$2,097,622.45	$1,361,250	$1,865,100
Nevada:	$1,339,875	$2,329,121.61	$1,361,250	$1,865,100
Total:	**$5,359,500**	**$9,474,028.54**	**$5,445,000**	**$7,460,400**

*Includes interest earned.

Remedial Measures Fund

The HCP requires the set aside of contingency funds to pay for implementing remedial measures in the event that changed circumstances affect program conservation measures (HCP, Section 5.12.13). The amount of funding is set forth in Table 7-1 of the HCP, totaling $13,270,000 (2003 dollars) to be paid from year 6 through year 25 of the program. On April 25, 2012, the Steering Committee passed Program Decision Document 12-001, which approved establishment of state interest bearing Remedial Measures Funds. Reclamation will enter into agreements with each of the states for management of those funds. Table 1-4 provides total funds contributed through FY11 with interest, FY12 contributions, and FY13 projected contributions. No funds have been withdrawn from any of the accounts to date.

Table 1-4. Remedial Measures Fund

Funding Partner	FY11 Contribution	Cumulative through FY11	FY12 Contribution	F13 Projected Contribution*
California:	$0	$0	$0	$499,149.00
Arizona:	$0	$0	$0	$249,574.50
Nevada:	$0	$0	$0	$249,574.50
Total:	**$0**	**$0**	**$0**	**$998,298.00**

*Includes FY11 & FY12 Contributions

Land and Water Fund

A Land and Water Fund has been established by Reclamation to set aside funds for acquisition of land and water resources to implement conservation measures described in the HCP. Through guidelines developed under Conservation Area Site Selection (E16), Reclamation works with interested parties to secure land and water resources. Once potential sites have been evaluated, including determining financial value through the Federal appraisal process using the Department of Interior designated appraisal services office, land and water resources nominated by Reclamation for acquisition must be approved by the Steering Committee through a Land and Water Resolution. The entire site-selection process may extend over multiple years; therefore, this fund has been established to ensure funding will be available to complete these acquisitions. The Land and Water Fund will be limited to the amount of funding identified in Table 7-1 in the HCP, indexed for inflation. Once land and water resources have been approved for acquisition, funds will be withdrawn from the Land and Water Fund and a work task developed. If funds set aside in the Land and Water Fund are no longer required for land or water acquisition, they may be used to implement other actions necessary for conservation measures accomplishment. Table 1-5 lists the funds set aside in the Land and Water Account for FY11 and FY12.

Table 1-5. Land and Water Fund

Funding Partner	FY11 Contribution	Cumulative through FY11	FY12 Contribution	F13 Projected Contribution
Reclamation	$8,900,000	$8,900,000	$4,600,000	$0

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 FY11, 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 FY13 Program and FY11 Accomplishment

The minimum funding required in the LCR MSCP program documents for FY13 is $34,452,540. Reclamation is proposing an annual program budget totaling $34,620,216 as shown in Table 1-6. Table 1-7 shows the following by work task: FY11 estimates and actual accomplishment, cumulative program expenditures (FY04-FY11), FY12 approved program, FY13 proposed program, and out-year funding for FY14 and FY15. Out-year funding estimates are not adjusted for future inflation. In Table 1-7, current year accomplishment is shown as obligations (money that is set aside during the year for program expenses). Cumulative accomplishment is shown as expenditures (actual funding expended).

Table 1-6. FY13 Proposed Program Funding

Program Area	FY13 Funding
Program Administration	$1,273,518
Fish Augmentation	$1,959,000
Species Research	$5,129,000
System Monitoring	$2,965,000
Conservation Area Development and Management	$11,825,000
Post-Development Monitoring	$1,410,000
Adaptive Management Program	$1,500,000
Funding Account-Existing Habitat Maintenance	$7,460,400
Funding Account-Remedial Measures	$998,298
Public Involvement	$100,000
Total:	**$34,620,216**

Reclamation will ensure the minimum program accomplishment occurs that meets the Indexed Annual Contribution outlined in Table 1-1 of $34,452,540; however, Reclamation is presenting work tasks totaling $34,620,216 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 FY13, 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 FY14 or FY15, 3) providing more than the minimum funding required to the Habitat Maintenance Fund or Remedial Measures Fund, or 4) beginning activities associated with any changed circumstances as defined in Section 5.12.3 of the HCP, should any occur.

In FY11, Reclamation estimated work tasks totaling $33,674,938.00. Actual LCR MSCP accomplishments for FY11 were $23,969,176.43. Actual accomplishment was less than the minimum accomplishment due to the delay is securing land and water for Planet Ranch budgeted in Work Task E21. These funds were contributed to the Land and Water Fund. In accordance with the FMA, Reclamation received a funding credit of $796,149.37 for FY11 (Appendix D-2). Cumulative program accomplishment through FY11 is $105,020,674.53 (Appendix D-3).

Table 1-7. Annual Funding Matrix

Work Task	Name	FY11 Approved Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Projected Estimate[1]	FY15 Projected Estimate[1]
A	**Program Administration**							
A1	Program Administration	$1,212,438.00	$1,138,509.80	$7,017,771.28	$1,273,518.00	$1,273,518.00	$1,273,518.00	$1,273,518.00
Closed[2]	Work Tasks Pre-FY11			$130,535.22				
		$1,212,438.00	**$1,138,509.80**	**$7,148,306.50**	**$1,273,518.00**	**$1,273,518.00**	**$1,273,518.00**	**$1,273,518.00**
B	**Fish Augmentation**							
B1	Lake Mohave Razorback Sucker Larvae Collections	$200,000.00	$206,468.97	$1,433,640.83	$200,000.00	$200,000.00	$200,000.00	$200,000.00
B2	Willow Beach National Fish Hatchery	$250,000.00	$230,585.84	$2,021,047.79	$250,000.00	$609,000.00	$300,000.00	$300,000.00
B3	Achii Hanyo Rearing Station	$150,000.00	$136,901.52	$573,688.09	$150,000.00	$150,000.00	$150,000.00	$150,000.00
B4	Dexter National Fish Hatchery	$180,000.00	$150,310.56	$966,984.84	$200,000.00	$250,000.00	$250,000.00	$250,000.00
B5	Bubbling Ponds Fish Hatchery	$250,000.00	$270,542.88	$1,673,211.86	$250,000.00	$300,000.00	$300,000.00	$300,000.00
B6	Lake Mead Fish Hatchery	$50,000.00	$17,692.75	$283,468.47	$50,000.00	$100,000.00	$125,000.00	$125,000.00
B7	Lake-Side Rearing Ponds	$250,000.00	$246,148.11	$1,291,745.10	$175,000.00	$200,000.00	$200,000.00	$200,000.00
B8	Fish Tagging Equipment	$85,000.00	$83,094.77	$504,523.15	$90,000.00	$100,000.00	$100,000.00	$100,000.00
B11	Overton Wildlife Management Area	$50,000.00	$25,979.31	$322,905.57	$75,000.00	$50,000.00	$50,000.00	$50,000.00

Work Task	Name	FY11 Approved Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Projected Estimate[1]	FY15 Projected Estimate[1]
Closed[2]	Work Tasks Pre-FY11		$3,498.01	$558,428.94	$0.00	$0.00	$0.00	$0.00
		$1,465,000.00	**$1,371,222.72**	**$9,629,644.64**	**$1,440,000.00**	**$1,959,000.00**	**$1,675,000.00**	**$1,675,000.00**
C	**Species Research**							
C2	Sticky Buckwheat and Threecorner Milkvetch Conservation	$11,000.00	$11,293.33	$51,293.33	$11,000.00	$11,000.00	$11,000.00	$11,000.00
C3	Multi-Species Conservation Program Covered Species Profile Development	$15,000.00	$10,270.70	$236,034.68	$15,000.00	$30,000.00	$15,000.00	$15,000.00
C4	Relict Leopard Frog	$11,000.00	$11,705.91	$73,662.08	$11,000.00	$11,000.00	$11,000.00	$11,000.00
C5	Effects of Abiotic Factors on Insect Populations in Riparian Restoration Sites	$90,000.00	$95,482.79	$415,081.35	$90,000.00	$95,000.00	$95,000.00	$0.00
C6	Insectivore Prey Base Abundance and Diversity in Riparian Restoration Sites	$0.00	$0.00	$101,441.68	$0.00	$150,000.00	$175,000.00	$175,000.00
C10	Razorback Sucker Rearing Studies	$125,000.00	$132,922.93	$693,462.54	$125,000.00	$125,000.00	$125,000.00	$125,000.00
C11	Bonytail Rearing Studies	$150,000.00	$57,589.11	$713,586.43	$150,000.00	$150,000.00	$150,000.00	$150,000.00

Work Task	Name	FY11 Approved Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Projected Estimate[1]	FY15 Projected Estimate[1]
C12	Demographics and Post-Stocking Survival of Repatriated Razorback Suckers in Lake Mohave	$200,000.00	$196,158.23	$1,044,536.89	$0.00	$0.00	$0.00	$0.00
C13	Lake Mead Razorback Sucker Study	$125,000.00	$80,324.83	$1,386,783.91	$125,000.00	$135,000.00	$135,000.00	$135,000.00
C14	Humpback Chub Program Support	$75,000.00	$71,883.70	$202,501.52	$11,000.00	$57,000.00	$57,000.00	$57,000.00
C15	Flannelmouth Sucker Habitat Use, Preference, and Recruitment Downstream of Davis Dam	$25,000.00	$23,239.78	$495,740.45	$0.00	$0.00	$0.00	$0.00
C24	Avian Species Habitat Requirements	$175,000.00	$183,056.69	$643,095.14	$200,000.00	$200,000.00	$250,000.00	$250,000.00
C25	Imperial Ponds Native Fish Research	$235,000.00	$252,351.95	$835,475.48	$250,000.00	$250,000.00	$250,000.00	$250,000.00
C26	Evaluation of Raceway Rearing of Razorback Sucker at Lake Mead Fish Hatchery	$70,000.00	$4,795.46	$162,522.23	$0.00	$0.00	$0.00	$0.00
C27	Small Mammal Population Studies	$70,000.00	$42,984.20	$301,028.84	$50,000.00	$50,000.00	$0.00	$0.00

Work Task	Name	FY11 Approved Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Projected Estimate[1]	FY15 Projected Estimate[1]
C30	Development and Evaluation of Measures to Reduce Transport of Quagga Mussel During Fish Transport and Stocking Activities	$150,000.00	$91,603.18	$237,588.46	$150,000.00	$160,000.00	$0.00	$0.00
C31	Razorback Sucker Genetic Diversity Assessment	$125,000.00	$111,372.84	$315,969.69	$125,000.00	$130,000.00	$130,000.00	$130,000.00
C32	Determination of Salinity, Temperature, and Oxygen Limits for Bonytail and Razorback Sucker	$100,000.00	$92,560.49	$265,682.30	$125,000.00	$115,000.00	$115,000.00	$115,000.00
C33	Comparative Survival of 500-mm Razorback Sucker Released in Reach 3	$100,000.00	$50,844.82	$326,891.97	$100,000.00	$100,000.00	$0.00	$0.00
C34	Characterization of Zooplankton Communities in Off-Channel Native Fish Habitats	$10,000.00	$12,304.81	$124,019.12	$0.00	$0.00	$0.00	$0.00
C35	Western Red Bat and Western Yellow Bat Roosting Characteristics Study	$150,000.00	$146,076.28	$21,849.74	$175,000.00	$150,000.00	$0.00	$0.00

Work Task	Name	FY11 Approved Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Projected Estimate[1]	FY15 Projected Estimate[1]
C36	Elf Owl Detectability Study	$50,000.00	$50,440.81	$231,212.25	$20,000.00	$0.00	$0.00	$0.00
C37	Hydrology Studies for Avian Riparian Obligate Species	$50,000.00	$53,704.86	$264,811.55	$10,000.00	$0.00	$0.00	$0.00
C39	Post-Stocking Distribution and Survival of Bonytail in Reach 3	$250,000.00	$174,690.00	$371,856.17	$250,000.00	$250,000.00	$250,000.00	$250,000.00
C40	Genetic and Demographic Studies to Guide Conservation Mgmt. of RASU and BONY in Off-Channel Habitats	$100,000.00	$125,751.99	$127,214.52	$180,000.00	$180,000.00	$180,000.00	$180,000.00
C41	Role of Artificial Habitat in Survival of RASU and BONY	$25,000.00	$31,150.14	$37,035.81	$25,000.00	$65,000.00	$65,000.00	$0.00
C42	Experiments and Demonstration of Soil Amendments for Use in Restoration Sites	$100,000.00	$103,142.42	$81,526.65	$200,000.00	$200,000.00	$200,000.00	$200,000.00
C43	Population Demographics and Habitat Use of the California Leaf-Nosed Bat	$20,000.00	$1,099.56	$1,099.56	$40,000.00	$60,000.00	$50,000.00	$0.00
C44	Management of Fish Food Resources …	$60,000.00	$33,542.26	$33,542.26	$100,000.00	$100,000.00	$0.00	$0.00

Work Task	Name	FY11 Approved Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Projected Estimate[1]	FY15 Projected Estimate[1]
C45	Ecology and Habitat Use of Stocked RASU in Reach 3	$170,000.00	$175,342.41	$125,969.16	$200,000.00	$200,000.00	$200,000.00	$200,000.00
C46	Physiological Response in BONY and RASU to Transport Stress	$120,000.00	$103,992.63	$56,680.51	$120,000.00	$70,000.00	$0.00	$0.00
C47	Genetic Monitoring and Management of Recruitment in BONY Rearing Ponds	$220,000.00	$1,147.88	$1,147.88	$250,000.00	$250,000.00	$250,000.00	$0.00
C48	Genetic Characterization of RASU Broodstock at Dexter NFH	$60,000.00	$50,572.34	$50,502.41	$60,000.00	$0.00	$0.00	$0.00
C49	Investigations of RASU and BONY Movements and Habitat Use Downstream of Parker Dam	$125,000.00	$0.00	$0.00	$150,000.00	$150,000.00	$150,000.00	$0.00
C50	Food Habits of Adult RASU Below Hoover Dam	$60,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C51	Vermilion Flycatcher Detectability and Distribution Study	$0.00	$0.00	$0.00	$20,000.00	$150,000.00	$150,000.00	$150,000.00
C52	Gilded Flicker Detectability and Distribution Study	$0.00	$0.00	$0.00	$20,000.00	$150,000.00	$150,000.00	$150,000.00

Work Task	Name	FY11 Approved Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Projected Estimate[1]	FY15 Projected Estimate[1]
C53	Sonic Telemetry of Juvenile Flannelmouth Suckers in Reach 3	$0.00	$0.00	$0.00	$120,000.00	$120,000.00	$120,000.00	$120,000.00
C54	Techniques to Establish Native Grasses and Forbs	$0.00	$0.00	$0.00	$0.00	$200,000.00	$200,000.00	$200,000.00
C55	Techniques to Increase Leaf Litter Decomposition	$0.00	$0.00	$0.00	$0.00	$125,000.00	$75,000.00	$75,000.00
C56	Characterization of Lake Mohave Backwaters to Evaluate Factors Influencing Spawning Success	$0.00	$0.00	$0.00	$0.00	$265,000.00	$265,000.00	$265,000.00
C57	Sonic Telemetry of Lake Mead Juvenile Razorback Suckers	$0.00	$0.00	$0.00	$0.00	$250,000.00	$250,000.00	$250,000.00
C58	Investigating Shoreline Habitat Cover for BONY	$0.00	$0.00	$0.00	$0.00	$75,000.00	$60,000.00	$60,000.00
C59	Selenium Monitoring in Created Backwater and Marsh Habitats	$0.00	$0.00	$0.00	$0.00	$250,000.00	$250,000.00	$250,000.00

Work Task	Name	FY11 Approved Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Projected Estimate[1]	FY15 Projected Estimate[1]
C60	Habitat Manipulation	$0.00	$0.00	$0.00	$0.00	$100,000.00	$100,000.00	$100,000.00
Closed[2]	Work Tasks Pre-FY11		$6,576.38	$2,337,799.76				
		$3,422,000.00	**$2,576,822.95**	**$12,368,646.32**	**$3,478,000.00**	**$5,129,000.00**	**$4,484,000.00**	**$3,874,000.00**
D	**System Monitoring**							
D1	Marsh Bird Surveys	$25,000.00	$18,725.89	$178,401.23	$35,000.00	$25,000.00	$25,000.00	$25,000.00
D2	Southwestern Willow Flycatcher Presence/Absence Surveys	$675,000.00	$655,142.92	$4,823,204.20	$675,000.00	$600,000.00	$575,000.00	$575,000.00
D3	Southwestern Willow Flycatcher Habitat Monitoring	$90,000.00	$120,009.76	$523,988.23	$90,000.00	$90,000.00	$90,000.00	$90,000.00
D5	Monitoring Avian Productivity and Survivorship	$275,000.00	$289,547.70	$1,782,355.83	$250,000.00	$250,000.00	$250,000.00	$250,000.00
D6	System Monitoring for Riparian Obligate Avian Species	$210,000.00	$237,749.92	$1,056,575.11	$280,000.00	$400,000.00	$400,000.00	$400,000.00
D7	Yellow-Billed Cuckoo Presence/Absence Surveys	$550,000.00	$543,056.20	$2,909,512.33	$550,000.00	$550,000.00	$550,000.00	$550,000.00
D8	Razorback Sucker and Bonytail Stock Assessment	$575,000.00	$614,086.24	$2,816,169.85	$575,000.00	$675,000.00	$675,000.00	$675,000.00

Work Task	Name	FY11 Approved Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Projected Estimate[1]	FY15 Projected Estimate[1]
D9	System Monitoring and Research of Covered Bat Species	$150,000.00	$147,131.56	$694,529.69	$150,000.00	$150,000.00	$150,000.00	$150,000.00
D10	System Monitoring of Rodent Populations	$65,000.00	$33,659.04	$85,489.71	$40,000.00	$40,000.00	$40,000.00	$40,000.00
D12	Lowland Leopard Frog and Colorado River Toad Surveys	$120,000.00	$117,017.13	$52,885.88	$150,000.00	$125,000.00	$0.00	$0.00
D13	Elf Owl System-Wide Surveys	$0.00	$0.00	$0.00	$0.00	$60,000.00	$60,000.00	$60,000.00
Closed[2]	Work Tasks Pre-FY11			$530,188.50				
		$2,735,000.00	**$2,776,126.36**	**$15,453,300.56**	**$2,795,000.00**	**$2,965,000.00**	**$2,815,000.00**	**$2,815,000.00**
E	**Conservation Area Development and Management**							
E1	Beal Lake Conservation Area	$200,000.00	$267,986.63	$2,394,494.97	$950,000.00	$300,000.00	$300,000.00	$300,000.00
E2[3]	Beal Lake Native Fish	$120,000.00	$132,989.92	$795,823.62	$0.00	$0.00	$0.00	$0.00
E4	Palo Verde Ecological Reserve	$1,950,000.00	$1,483,727.80	$5,471,988.26	$1,950,000.00	$990,000.00	$830,000.00	$900,000.00
E5	Cibola Valley Conservation Area	$1,100,000.00	$451,820.04	$9,817,043.22	$650,000.00	$650,000.00	$700,000.00	$1,100,000.00
E9	Hart Mine Marsh	$500,000.00	$738,284.20	$5,241,049.31	$300,000.00	$750,000.00	$250,000.00	$200,000.00
E14	Imperial Ponds Conservation Area	$610,000.00	$508,610.43	$7,939,916.59	$525,000.00	$395,000.00	$395,000.00	$950,000.00

Work Task	Name	FY11 Approved Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Projected Estimate[1]	FY15 Projected Estimate[1]
E15	Backwater Site Selection	$20,000.00	$17,255.29	$1,282,479.86	$20,000.00	$550,000.00	$100,000.00	$100,000.00
E16	Conservation Area Site Selection	$375,000.00	$259,346.35	$1,184,867.65	$375,000.00	$375,000.00	$375,000.00	$375,000.00
E17	Topock Marsh Pumping	$270,000.00	$41,359.94	$768,490.29	$2,550,000.00	$70,000.00	$70,000.00	$70,000.00
E18	Law Enforcement and Fire Suppression	$250,000.00	$205,944.26	$577,817.38	$325,000.00	$325,000.00	$325,000.00	$325,000.00
E21	Planet Ranch, Bill Williams River	$8,900,000.00	$34,019.70	$162,956.07	$1,500,000.00	$40,000.00	$40,000.00	$40,000.00
E24	Cibola NWR Unit #1	$636,000.00	$639,675.70	$2,737,024.70	$1,000,000.00	$1,100,000.00	$1,200,000.00	$1,200,000.00
E25	Big Bend Conservation Area	$500,000.00	$446,293.25	$1,083,687.69	$30,000.00	$30,000.00	$30,000.00	$30,000.00
E27	Laguna Division Conservation Area	$1,375,000.00	$3,060,556.46	$1,106,462.55	$6,290,000.00	$5,000,000.00	$3,000,000.00	$2,000,000.00
E28	Yuma East Wetlands	$250,000.00	$258,521.17	$487,194.94	$400,000.00	$450,000.00	$450,000.00	$450,000.00
E29	Desert Tortoise	$50,000.00	$59,667.12	$233,179.69	$0.00	$0.00	$0.00	$0.00
E30	Flat-tailed Horned Lizard	$195,000.00	$88,884.93	$88,884.93	$50,000.00	$0.00	$0.00	$0.00
E31[4]	Hunters Hole	$20,000.00	$21,979.16	$16,115.11	$30,000.00	$150,000.00	$50,000.00	$50,000.00
E32	Bureau Bay	$0.00	$0.00	$0.00	$0.00	$200,000.00	$30,000.00	$30,000.00
E33	Shark's Tooth Conservation Area	$0.00	$0.00	$0.00	$0.00	$200,000.00	$600,000.00	$700,000.00
E34	Groundwater and Soil Salinity Monitoring Network	$0.00	$0.00	$0.00	$0.00	$250,000.00	$400,000.00	$400,000.00
Closed[2]	Work Tasks Pre-FY11			$2,423,818.52				
		$17,321,000.00	**$8,716,922.35**	**$43,813,295.35**	**$16,945,000.00**	**$11,825,000.00**	**$9,145,000.00**	**$9,220,000.00**

Work Task	Name	FY11 Approved Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Projected Estimate[1]	FY15 Projected Estimate[1]
F	**Post-Development Monitoring**							
F1	Habitat Monitoring	$350,000.00	$480,326.82	$2,035,578.55	$425,000.00	$650,000.00	$650,000.00	$650,000.00
F2	Avian Use of Habitat Cons. Areas	$170,000.00	$185,177.77	$782,538.87	$210,000.00	$220,000.00	$220,000.00	$220,000.00
F3	Small Mammal Colonization of Restoration Sites	$60,000.00	$53,952.06	$255,071.98	$55,000.00	$55,000.00	$55,000.00	$55,000.00
F4	Post-Development Monitoring of Covered Bat Species	$110,000.00	$119,649.91	$489,153.16	$100,000.00	$125,000.00	$125,000.00	$125,000.00
F5	Post-Development Monitoring of Fish Restoration Sites	$175,000.00	$153,930.06	$662,159.60	$175,000.00	$250,000.00	$250,000.00	$250,000.00
F6	Post-Development Monitoring of MacNeill's Sootywing in Habitat Creation Sites	$70,000.00	$88,758.78	$147,042.69	$70,000.00	$80,000.00	$80,000.00	$80,000.00
F7	Post-Development Monitoring of Marsh Birds	$30,000.00	$1,403.06	$1,403.06	$30,000.00	$30,000.00	$30,000.00	$30,000.00
		$965,000.00	**$1,083,198.46**	**$4,372,947.91**	**$1,065,000.00**	**$1,410,000.00**	**$1,410,000.00**	**$1,410,000.00**
G	**Adaptive Management Program**							
G1	Data Management	$700,000.00	$678,848.47	$1,749,315.36	$700,000.00	$950,000.00	$950,000.00	$950,000.00

Work Task	Name	FY11 Approved Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Projected Estimate[1]	FY15 Projected Estimate[1]
G3	Adaptive Management Research Projects	$300,000.00	$54,339.42	$1,649,688.10	$200,000.00	$300,000.00	$300,000.00	$300,000.00
G4	Science/Adaptive Management Strategy	$125,000.00	$137,434.07	$355,342.14	$125,000.00	$250,000.00	$250,000.00	$250,000.00
		$1,125,000.00	**$870,621.96**	**$3,754,345.60**	**$1,025,000.00**	**$1,500,000.00**	**$1,500,000.00**	**$1,500,000.00**
H	**Funding Accounts**							
H1[5]	Existing Habitat Maintenance	$5,359,500.00	$5,359,500.00	$8,307,500.00	$5,445,000.00	$7,460,400.00	$5,629,500.00	$3,798,600.00
H2	Remedial Measures Fund	$0.00	$0.00	$0.00	$0.00	$998,298.00	$332,766.00	$332,766.00
		$5,359,500.00	**$5,359,500.00**	**$8,307,500.00**	**$5,445,000.00**	**$8,458,698.00**	**$5,962,266.00**	**$4,131,366.00**
I	**Public Outreach**							
I1	Public Outreach	$70,000.00	$76,251.83	$111,627.97	$70,000.00	$100,000.00	$100,000.00	$100,000.00
Closed[2]	Work Tasks Pre-FY11			$61,059.68				
		$70,000.00	**$76,251.83**	**$172,687.65**	**$70,000.00**	**$100,000.00**	**$100,000.00**	**$100,000.00**
	Program Total:	**$33,674,938.00**	**$23,969,176.43**	**$105,020,674.53**	**$33,494,780.00**	**$34,620,216.00**	**$28,364,784.00**	**$25,998,884.00**

[1]FY14 and FY15 numbers are not adjusted for inflation.

[2]Closed work tasks are shown in Appendix D-3.

[3]See Work Task E1 for FY11 Accomplishments.

[4]E31—Steering Committee approved FY11 funding at the 10/27/10 Steering Committee Meeting.

[5]H1—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.*

   To meet species habitat creation requirements, the HCP provides goals for habitat creation based on land cover types. These land cover types are described using the Anderson and Ohmart vegetation classification system. In total, the LCR MSCP is directed to design and create 8,132 acres of cottonwood-willow, mesquite, marsh, and backwater land cover types. This is the minimum amount of land cover type to be created to meet species habitat requirements. Table 1-8 shows how much land cover by type has been created at each conservation area. In FY11, 300 acres of land cover were established. Total land cover established through FY11 is 1,942 acres.

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

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 1-10 provides a summary of fish repatriation. Table 1-11 provides a matrix showing those work tasks that work toward the completion of the Conservation Measures. Appendix E lists technical reports that were completed in FY11.

   The Conservation Measure DETO1 was completed in FY11. The creditable acres established exceed species habitat creation conservation measures requirements for WRBA2 and SUTA1.

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 FY11 is reported in Appendix B. The USFWS Section 10 Permit and the 2005 BO authorize incidental take resulting from conduct of Federal Covered Actions and non-Federal Covered Activities, and Reclamation's implementation of the 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 FY11. 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 2012 Work Plan and Budget, Fiscal Year 2010 Accomplishment Report* and the August 18, 2011 letter from the USFWS acknowledging completion of DETO1 are included in Appendix C.

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

   On October 27, 2011, the Steering Committee approved minor modifications to five conservation measures (RASU3, BONY3, BLRA1, STBU1, and THMI1). The USFWS, in a letter dated January 4, 2011 approved the five minor modifications. The USFWS letter is included in Appendix C.

Table 1-8. Conservation Area Land Cover Type

Land Cover Type	Management Unit	Established Acres FY11	Established Acres Total*
Cottonwood-willow	E1 Beal Lake		107
	E4 PVER	211	710
	E5 CVCA		265
	E24 CWR Unit 1		270
TOTAL			**1,352**
Mesquite	E4 PVER		10
	E5 CVCA	89	405
TOTAL			**415**
Marsh	E9 Hart Mine Marsh		255
	E14 Imperial Ponds		12
TOTAL			**267**
Backwater	E14 Imperial Ponds		80
	E25 Big Bend		15
TOTAL			**95**
TOTAL		**300**	**2,129**

*Does not include upland buffer.

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

Species Habitat Creation Conservation Measures	Management Unit	Creditable Acres FY11	Creditable Acres Total
CLRA1 (512 acres)	E9 Hart Mine Marsh	113	113
	E14 Imperial Ponds	12	12
Total		**125**	**125**
WIFL1(4,050 acres)	E1 Beal Lake	0	0
	E4 PVER	0	0
	E5 CVCA	0	0
	E24 Cibola Unit 1	0	0
Total		**0**[1]	**0**
BONY2 (360 acres)	E14 Imperial Ponds	0[2]	0
	E25 Big Bend	15	15
Total		**15**	**15**
RASU2 (360 acres)	E14 Imperial Ponds	0[2]	0
	E25 Big Bend	15	15
Total		**15**	**15**
WRBA2 (765 acres)	E1 Beal Lake	107	107
	E4 PVER	283	283
	E5 CVCA	265	265
	E24 Cibola Unit 1	154	154
Total		**809**	**809**[6]
WYBA3 (765 acres)	E1 Beal Lake	0	0
	E4 PVER	0	0
	E5 CVCA	0	0
	E24 Cibola Unit 1	0	0
Total		**0**[3]	**0**
CRCR2 (125 acres)	E9 Hart Mine Marsh	0	0
Total		**0**[4]	**0**
YHCR2 (76 acres)		0	0
Total		**0**	**0**
LEBI1 (512 acres)	E9 Hart Mine Marsh	113	113
	E14 Imperial Ponds	12	12
Total		**125**	**125**

Species Habitat Creation Conservation Measures	Management Unit	Creditable Acres FY11	Creditable Acres Total
BLRA1 (130 acres)	E9 Hart Mine Marsh	0[5]	0
	E14 Imperial	12	12
Total		**12**	**12**
YBCU1(4,050 acres)	E1 Beal Lake	107	107
	E4 PVER	283	283
	E5 CVCA	265	265
	E24 Cibola Unit 1	154	154
Total		**809**	**809**
ELOW1(1,784 acres)	E1 Beal Lake	107	107
	E4 PVER	283	283
	E5 CVCA	256	256
	E24 Cibola Unit 1	154	154
Total		**800**	**800**
GIFL1 (4,050 acres)	E1 Beal Lake	107	107
	E4 PVER	283	283
	E5 CVCA	265	265
	E24 Cibola Unit 1	154	154
Total		**809**	**809**
GIWO1(1,702 acres)	E1 Beal Lake	107	107
	E4 PVER	499	499
	E5 CVCA	265	265
	E24 Cibola Unit 1	270	270
Total		**1,141**	**1,141**
VEFL1 (5,208 acres)	E1 Beal Lake	107	107
	E4 PVER	499	499
	E5 CVCA	265	265
	E24 Cibola Unit 1	270	270
Total		**1,141**	**1,141**
BEVI1 (2,983 acres)	E4 PVER	216	216
	E24 Cibola	116	116
Total		**332**	**332**
YWAR1(4,050 acres)	E1 Beal Lake	107	107
	E4 PVER	499	499

Species Habitat Creation Conservation Measures	Management Unit	Creditable Acres FY11	Creditable Acres Total
	E5 CVCA	265	265
	E24 Cibola Unit 1	270	270
Total		**1,141**	**1,141**
SUTA1 (602 acres)	E1 Beal Lake	107	107
	E4 PVER	283	283
	E5 CVCA	265	265
	E24 Cibola Unit 1	154	154
Total		**809**	**809**[6]
FLSU1 (85 acres)	E25 Big Bend	15	15
Total		**15**	**15**
MNSW2 (222 acres)		0	0
Total		**0**	**0**

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

[2]BONY 2 and RASU 2—At this time Imperial Ponds is not suitable for establishment and maintenance of healthy fish. Reclamation is beginning a five-year management strategy to determine the criteria and management actions required to maintain healthy fish at Imperial Ponds.

[3]WYBA 3—Reclamation is in the process of determining the foraging and roosting habitat for the Western Yellow bat. Once this has been determined, each conservation area that provides foraging or roosting habitat will be evaluated.

[4]CRCR2—Reclamation is in the process of evaluating data collected to determine marsh and cottonwood-willow habitat uses by the Colorado River cotton rat. The preliminary data suggest the Colorado River cotton rat uses both cottonwood-willow and fringe marsh habitats.

[5]BLRA 1—Reclamation is in the process of determining the land and water interface and the method for delineating BLRA marsh habitat at <1 inch. Once this has been determined, Hart Mine Marsh and Big Bend will be evaluated.

[6]Total for creditable acres established exceeds species habitat creation conservation measures requirement.

Table 1-10. Summary of Fish Augmentation

REACH	RASU FY11	RASU PROGRAM	BONY FY11	BONY PROGRAM
2	7,687*	54,986*	0	6,998
3	10,551	46,459	4,380	26,304
4/5	7,360	57,553	2,742	14,770
Subtotal	25,598	158,998*	7,122	48,072
Grand Total Both Species				**207,070**

*Reach 2 RASU meet Conservation Measure RASU5; Reach 3, 415 RASU meet Conservation Measure RASU3.

Table 1-11. Status of Conservation Measures

Species/Habitat/Action	Code	Description	FY11 Approved	FY12 Approved	FY13 Proposed
Yuma Clapper Rail	CLRA1	Create habitat, 512 acres	C3 E9 E14 E16 E21 E26 E27 E28 F2 F7 G1 G4	C3 E9 E14 E16 E21 E26 E27 E28 F2 F7 G1 G4	C3 E9 E14 E16 E21 E26 E27 E28 E34 F2 F7 G1 G4
	CLRA2	Maintain existing important habitat	C3 G1 G4 H1	C3 G1 G4 H1	C3 G1 G4 H1
	MRM1	Define habitat characteristics	C3 C24 D1 E21 F2 F7 G1 G4	C3 C24 D1 E21 F2 F7 G1 G4	C3 C24 D1 E21 F2 F7 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 D1 F1 F2 F7 G1 G4	C3 C24 D1 F1 F2 F7 G1 G4	C3 C24 C59 D1 F1 F2 F7 G1 G4
	MRM5	Monitor selenium levels in backwater			C59
	CMM1	Reduce risk of loss to wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4
Southwestern Willow Flycatcher	WIFL1	Create habitat, 4,050 acres	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 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 E34 G1 G4
	WIFL2	Maintain existing important habitat	C3 D2 D3 D4 E21 F1 G1 G4 H1	C3 D2 D3 D4 E21 F1 G1 G4 H1	C3 D2 D3 D4 E21 F1 G1 G4 H1
	MRM1	Define habitat characteristics	C3 C5 C24 C37 C42 D2 D3 D4 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 D2 D3 D4 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 D2 D3 D4 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C24 D2 D3 D4 D5 D6 F1 F2 G1 G4	C24 D2 D3 D4 D5 D6 F1 F2 G1 G4	C24 C55 C60 D2 D3 D4 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation	D2 G1 G4	D2 G1 G4	D2 G1 G4
	CMM1	Reduce risk of loss to wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4 C55
	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4
Desert Tortoise	**DETO1**	**Acquire, protect 230 acres - Completed**	**E29**	**E29**	**E29**
	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	A1	A1	A1
	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 E32 E34 G1 G4

Species/Habitat/Action	Code	Description	FY11 Approved	FY12 Approved	FY13 Proposed
	BONY3	Rear/stock 620,000: 5,000 sub-adult/year for 40 years Lake Mohave 4,000 sub-adult/year for 50 years Lake Havasu 4,000 experimental augmentation at Parker-Imperial for 10 consecutive years 4,500 sub-adults/year Parker-Imperial for 40 years	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 C56 G1 G4
	BONY4	Develop (if necessary) additional rearing capacity	B2 B3 B4 B7 B8 C11 C30 C46 C47 C49 G1 G4	B2 B3 B4 B7 B8 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 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	B7 B8 C11 C23 C30 C32 C34 C39 C40 C41 C44 C46 C47 C49 C56 C58 C59 D8 F5 G1 G4
	MRM5	Monitor selenium levels in backwater	G1 G4	G1 G4	G1 G4 C59
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	A1	A1	A1
	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 E32 E34 G1 G4
	RASU3	Rear/stock 660,000: 12,000 sub-adult/year for 10 years (Parker, Mohave — see plan) 6,750 sub-adult/year for 40 years Lake Havasu 6,750 sub-adult/year for 40 years Parker Dam	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	B1 B2 B3 B4 B5 B6 B7 B8 B11 C10 C26 C30 C31 C32 C33 C41 C46 C48 C49 C 56G1 G4
	RASU4	Develop (if necessary) additional rearing capacity	B2 B3 B4 B5 B6 B7 B8 B11 C10 C26 C30 C46 C48 C49 G1 G4	B2 B3 B4 B5 B6 B7 B8 B11 C10 C26 C30 C46 C48 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

Species/Habitat/Action	Code	Description	FY11 Approved	FY12 Approved	FY13 Proposed
	RASU6	Monitor and research, adaptive management populations and backwater habitat	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	B2 B7 B8 B11 C8 C10 C23 C30 C31 C32 C33 C34 C40 C41 C44 C45 C46 C49 C50 C56 C57 C59 D8 F5 G1 G4
	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 C59
Western Red Bat	WRBA1	Status/habitat surveys	C3 D9 F4 G1 G4	C3 D9 F4 G1 G4	C3 D9 F4 G1 G4
	WRBA2	**Create 765 acres – Creditable acres established exceed requirement**	**C3 D9 E1 E3 E4 E5 E8 E16 E21 E24 G1 G4**	**C3 D9 E1 E3 E4 E5 E8 E16 E21 E24 G1 G4**	**C3 D9 E1 E3 E4 E5 E8 E16 E21 E24 E33 E34 G1 G4**
	MRM1	Define habitat characteristics	C3 C5 C35 D9 E21 F4 G1 G4	C3 C5 C35 D9 E21 F4 G1 G4	C3 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 E33 E34 F4 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C35 D9 E21 F4 G1 G4	C3 C5 C35 D9 E21 F4 G1 G4	C3 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

Species/Habitat/Action	Code	Description	FY11 Approved	FY12 Approved	FY13 Proposed
	CRCR2	Create 125 acres	C3 E9 E16 E21 G1 G4	C3 E9 E16 E21 G1 G4	C3 C54 E9 E16 E21 E34 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 F1 F3 G1 G4	C3 F1 F3 G1 G4	C3 C54 C60 F1 F3 G1 G4
	CMM1	Reduce risk of loss of habitat to wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4 C54
	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 C54 E16 E27 E28 E34 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 F1 F3 G1 G4	C3 F1 F3 G1 G4	C3 C54 C60 F1 F3 G1 G4
	CMM1	Reduce risk of loss of habitat to wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4 C54
	CMM2	Replace created habitat affected by wildfire			
Western Least Bittern	LEBI1	Create 512 acres	C3 E9 E14 E16 E21 E26 E27 E28 F7 G1 G4	C3 E9 E14 E16 E21 E26 E27 E28 F7 G1 G4	C3 E9 E14 E16 E21 E26 E27 E28 E34 F7 G1 G4
	MRM1	Define habitat characteristics	C3 C24 D1 E21 F2 F7 G1 G4	C3 C24 D1 E21 F2 F7 G1 G4	C3 C24 D1 E21 F2 F7 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 D1 F1 F2 F7 G1 G4	C3 C24 D1 F1 F2 F7 G1 G4	C3 C24 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 F7 G1 G4	C3 E14 E16 E26 E27 E28 F7 G1 G4	C3 E14 E16 E26 E27 E28 E34 F7 G1 G4
	BLRA2	Maintain existing occupied habitat	C3 G1 G4 H1	C3 G1 G4 H1	C3 G1 G4 H1
	MRM1	Define habitat characteristics	C3 C24 D1 F2 G1 G4	C3 C24 D1 F2 G1 G4	C3 C24 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 C59 D1 F1 F2 G1 G4
	MRM5	Monitor selenium levels			C59
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4

Species/Habitat/Action	Code	Description	FY11 Approved	FY12 Approved	FY13 Proposed
Yellow-billed Cuckoo	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 E34 G1 G4
	YBCU2	Maintain existing habitat	C3 D7 E21 G1 G4 H1	C3 D7 E21 G1 G4 H1	C3 D7 E21 G1 G4 H1
	MRM1	Define habitat characteristics	C3 C5 C24 C37 C42 D5 D6 D7 E21 F2 G1 G4	C3 C5 C24 C37 C42 D5 D6 D7 E21 F2 G1 G4	C3 C5 C24 C37 C42 D5 D6 D7 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 D5 D6 D7 F1 F2 G1 G4	C3 C24 D5 D6 D7 F1 F2 G1 G4	C3 C24 C55 C60 D5 D6 D7 F1 F2 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4 C55
	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4
Elf Owl	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 E33 E34 G1 G4
	ELOW2	Install elf owl boxes before Gila woodpeckers established	C3 G1 G4	C3 G1 G4	C3 G1 G4
	MRM1	Define habitat characteristics	C3 C24 C36 C37 C42 D5 D6 E21 F2 G1 G4	C3 C24 C36 C37 C42 D5 D6 E21 F2 G1 G4	C3 C24 C36 C37 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 D5 D6 F1 F2	C3 C24 D5 D6 F1 F2	C3 C24 C55 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 C55
	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 C52 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 C52 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 E34 G1 G4
	GIFL2	Install artificial snags until vegetation has matured			
	MRM1	Define habitat characteristics	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 C52 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 C55 D5 D6 F1 F2 G1 G4

Species/Habitat/Action	Code	Description	FY11 Approved	FY12 Approved	FY13 Proposed
	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 C55
	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 E34 G1 G4
	GIWO2	Install artificial snags			
	MRM1	Define habitat characteristics	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 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 C55 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 C55
	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 E33 E34 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 C51 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 D5 D6 F1 F2 G1 G4	C3 C24 C51 D5 D6 F1 F2 G1 G4	C3 C24 C51 C55 C60 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation			
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4 C55
	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4
Arizona Bell's Vireo	BEVI1	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 E33 E34 G1 G4
	MRM1	Define habitat characteristics	C3 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 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 D5 D6 F1 F2 G1 G4	C3 C24 D5 D6 F1 F2 G1 G4	C3 C24 C55 D5 D6 F1 F2 G1 G4

Species/Habitat/Action	Code	Description	FY11 Approved	FY12 Approved	FY13 Proposed
	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 E34 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 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 C55 C60 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 C55
	CMM2	Replace created habitat affected by wildfire	F2 G1 G4	F2 G1 G4	F2 G1 G4
Summer Tanager	**SUTA1**	**Create 602 acres – Creditable acres established exceed requirement**	**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 E34 G1 G4**
	MRM1	Define habitat characteristics	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4	C3 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 C 55D5 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 C55
	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 E30 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
Flannelmouth Sucker	FLSU1	85 acres Reach 3	C3 E15 E16 E25 G1 G4	C3 C53 E15 E16 E25 G1 G4	C3 C53 E15 E16 E25 E32 E34 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 C 53 G1 G4	C15 C 53 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 G1 G4	C3 G1 G4	C3 G1 G4 C59
	MRM5	Monitor selenium levels in backwater	G1 G4	G1 G4	G1 G4 C59

Species/Habitat/Action	Code	Description	FY11 Approved	FY12 Approved	FY13 Proposed
MacNeill's Sootywing Skipper	MNSW1	Status surveys/habitat — define habitat first 5 years	C3 F6 G1 G4	C3 F6 G1 G4	C3 F6 G1 G4
	MNSW2	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 E34 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 F1 F6 G1 G4	C3 F1 F6 G1 G4	C3 F1 F6 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18 G1 G4	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			
Sticky Buckwheat	STBU1	10,000/year until 2030 to conservation prog.	C2 G1	C2 G1	C2 G1
Threecorner Milkvetch	THMI1	10,000/year until 2030 to conservation prog.	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 C34	C3 E1 E3 E4 E5 E8 E16 E21 E24 G1 G4 C34	C3 E1 E3 E4 E5 E8 E16 E21 E24 E34 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 E34 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			
Colorado River Toad	CRTO1	Distribution surveys, habitat affinity, limiting factors	C3 D12 G1 G4	C3 D12 G1 G4	C3 D12 G1 G4
	CRTO2	Protect existing occupied habitat	C3 G1 G4 H1	C3 G1 G4 H1	C3 G1 G4 H1

Species/Habitat/Action	Code	Description	FY11 Approved	FY12 Approved	FY13 Proposed
	CRTO3	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 decease 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 2011; 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 and a determination made in FY12.

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. Both the Lake Mead SFH and Overton Wildlife Management Area are used for rearing (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 FY11, CESA program requirements were also met for FY11. 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 FY11, 104,012 RASU and 41,074 BONY have been stocked into reaches 3, 4, and 5. Since the start of the LCR MSCP, 145,086 native fish have been stocked into the lower river in California.

In FY11, 211 acres of cottonwood-willow land cover were established at the Palo Verde Ecological Reserve (PVER). Total land cover, not including upland, established to date is 710 acres of cottonwood-willow and 10 acres of mesquite.

Through FY11, 469 acres of cottonwood-willow land cover meet the structural type required for Riparian Replacement Habitat. Reclamation is in the process of gathering the appropriate hydrologic data to determine saturated soils, moist soils, or slow-moving water. Once this has been determined, Riparian Replacement Habitat at PVER will be evaluated.

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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. Between 2005 and the end of calendar year 2011, the program has stocked 207,070 native fish (Table 1-10).

To obtain sufficient numbers of young fish for grow-out and eventual stocking, 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. Additional fish rearing capacity is located at the Bubbling Ponds State Fish Hatchery in Arizona. 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.

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

FY11 Accomplishments

In 2010 the Fish Augmentation Plan was revised based on information collected during 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. Since that time, continued disease testing at has not found any presence of LMBV. In 2011, state resource agencies, particularly CDFG, requested that fish from Dexter NFH not be stocked into the LCR. Through an accelerated series of disease testing and discussions between the USFWS and the States of California, Nevada, and Arizona, a one-time dispensation was granted which allowed stockings of specific RASU and Bonytail lots in 2011. Water delivery infrastructure improvements were accomplished at the Willow Beach NFH.

Fish Augmentation work tasks are presented in Section B. Key accomplishments for FY11 include:

- successful capture of over 25,018 wild RASU larvae from Lake Mohave (B1)
- tagging and stocking of 5,778 RASU from Willow Beach NFH (B2)
- tagging and stocking of 3,215 BONY and 2,002 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 17,077 RASU from Bubbling Ponds SFH (B5)
- tagging and stocking 500 RASU and 3,907 BONY from Dexter NFH (B4)
- rearing and transfer of RASU from Lake Mead SFH (B6) to Overton WMA (B11)
- tagging and stocking 606 large RASU from lake-side ponds (B7)
- stocking 1,280 RASU into lake-side ponds (B7)

FY12 Activities

Fish augmentation actions currently underway in FY12 are similar to those conducted in FY11, with similar results expected. Dexter NFH is expected to fully regain a Level A certificate of fish health in September of 2012 and full fish augmentation from the Dexter stocks will resume at that time. Lake-side rearing ponds have undergone routine maintenance for vegetation and debris removal.

Proposed FY13 Activities

Similar to FY12, routine fish augmentation program plans for FY13 look to repeat the successful activities conducted over the first seven years of the program and described in work tasks B1 through B11.

Stocking targets for FY13 are as follows:

- RASU larvae will continue to be collected from Lake Mojave with a tentative target of 25,000 to 30,000 larvae.
- 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.

FY11 Accomplishments

Fish research work tasks presented in Section C detail accomplishments for FY11. Some of the more significant findings from FY11 are:

- A five-year study investigating factors that affect RASU growth and improve growth in captivity is complete (C10).
- Stocking simulations based on size-survival relationships and growth and release data from the Lake Mohave Native Fish Work Group database reveal that post-stocking survival for RASU is between four and eight times higher when the target release size is 45 cm compared to a target size of 30 cm (C12).
- The first adult female RASU in spawning condition ever collected from the Colorado River inflow area of Lake Mead were confirmed with the capture of six wild adult fish (C13).
- BONY and RASU were removed from ponds 2, 4 and 6, and placed in Pond 1 pending water quality monitoring of the other ponds at the Imperial Ponds Conservation Area (C25).
- Results from the FY11 trials helped to validate the findings from the previous study year. Post-trial analysis showed that growth, food conversion efficiency, and swimming

performance were highest among RASU that had been exposed to flowing conditions (C26).
- Standard operating procedures with KCl/formalin were not found to be effective under water conditions present at Willow Beach NFH, studies with KCl only continued. (C30).
- Twenty-seven Submersible Ultrasonic Receivers (SURs) were deployed throughout the study area. Survival to three months post stocking was 45% (C39).
- Results from both BONY and RASU trials indicate that the threshold levels for survival are likely near pH 10 at both 20 and 30°C. for fingerlings (C32).
- Site location was moved from Beal Lake to Davis pond due to poor fish survival. Davis pond was stocked with 376 PIT tagged RASU (<300 mm) (C41).

FY12 Activities

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

Proposed FY13 Activities

In addition to continuing previously initiated research, new investigations will be implemented to examine differences between lakeside rearing ponds in an effort to guide development of future disconnected backwaters (C56). Juvenile FLSU habitat preference in Reach 3 will be evaluated via sonic tags (C53), juvenile RASU movement and habitat preference in Lake Mead will be monitored (C57), shoreline habitat cover for BONY (C58) will be evaluated, and a long-term monitoring plan for selenium (C59) will be developed.

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.

FY11 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 560-1600 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 2,979 repatriated RASU. Repatriated BONY were present in low numbers. Reach 3 also had a strong RASU population, with an estimate of 1,400, which is substantially lower than the FY 2009 estimate of 4,376 fish. However, this decrease in population estimate is the result of population model refinements rather than a drastic

decrease in the actual population. Active spawning was observed and larvae were occasionally found, but no juvenile fish were located.

A total of 68 BONY were contacted in Reach 3; no more than 10 individuals had been contacted in any previous year. All BONY contacts except one were near the mouth of the Bill Williams River.

Fish surveys in Reach 4/5 were limited; however, a permit from the Colorado River Indian Tribes (CRIT) was obtained by the USFWS. Field sampling of fish within Reach 4 was limited due to the one-year delay associated with the start of Work Task C49. However, the USFWS was able to conduct some cursory investigations that included parts of the CRIT. These investigations resulted in the collection of numerous BONY shortly following their release, as well as a small population of RASU that are assumed to be spawning downstream of Parker Dam. All fisheries surveys in Reach 5 were restricted to Imperial Ponds. These ponds are discussed under C25.

FY12 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.

Proposed FY13 Activities

Monitoring will continue in all reaches as previously outlined, and LCR MSCP staff will continue to participate in multi-agency field surveys.

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.

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.

Nest Predation on Avian Covered Species (C28) has been completed and a final report with management recommendations was received 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.

Also in FY11, under Avian Species Habitat Requirements, the restoration of managed marsh study was completed. Results indicated that a marsh can be created and managed for both black rail and clapper rail species. Management recommendations were included for this type of marsh creation. Another work task, Elf Owl Detectability study (C36) was completed except for the final report. A new survey protocol is being developed based on the results of this study, and will be implemented in FY13 under System-wide Elf Owl surveys (D13). Finally, the field work for Hydrology studies for Avian Riparian Obligate Species (C37) was also completed. This study showed different hydrological needs for the southwestern willow flycatcher and the yellow-billed cuckoo that can be formed into management recommendations for conservation areas. The final report will be available in FY12.

In FY12, two new work tasks 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.

Several new work tasks are planned for FY13. Techniques to Establish Native Grasses and Forbs (C54) will develop techniques to establish native grasses and herbaceous perennial forbs. Techniques to Increase Leaf Litter Decomposition Rates (C55) will evaluate methods to reduce litter biomass at habitat creation sites, which contributes to fuel load build up. Habitat Manipulation (C60) will develop cost-effective management techniques for maintaining multi-successional riparian habitats. Finally, one work task, Insect Population Biology in Riparian Restoration Sites (C6), will be resurrected to determine presence of insect and arachnid species at LCR MSCP habitat creation sites and the Bill Williams River NWR, and estimate abundances by species in order to determine prey base at the sites.

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. 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.

An additional investigation, Study of Interactions between the Tamarisk Leaf Beetle and Nesting Southwestern Willow Flycatcher, has been conducted under D2. This study determined 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 all SWFL sites monitored by the LCR MSCP in the Virgin River and Muddy River including one site near Littlefield, Mesquite, Mormon Mesa, and Muddy River in Nevada. The beetles have now reached the confluence of the Virgin and Muddy rivers with Lake Mead. The data for this study are being analyzed and will hopefully show the potential effects of

the leaf beetle on nesting habitat, determine potential effects on SWFL source populations along the Virgin River and the 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 FY11 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.

System monitoring is also continuing 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.

A new work task, Elf Owl System-wide Surveys (D13) will begin in FY13. A protocol was developed under Elf Owl Detectability Study (C36) and will be implemented to determine presence/absence of owls along the LCR, and population and distribution trends.

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 FY11, 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 1-12). 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), insects (F6), and marsh birds (F7).

Table 1-12. LCR MSCP Covered Species Post-Development Monitoring in FY11

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							X
Imperial NWR		X			X	X	X

In FY11, pre-development monitoring occurred at Laguna Division Conservation Area. Surveys included 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. A new five-year monitoring and research priorities will be completed at the end of 2012 for the term 2013-2017.

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 FY11 with the completion of the renovated LCR MSCP website and beginning implementation of the in-house database. In FY12 and FY13, 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. In FY11, data analysis has been completed by the Denver Technical Service Center for the Tamarisk Beetle Study. The report is expected to be completed during FY12. Also in FY11, vegetation typing of new aerial photos has been cost-shared with Reclamation's Lower Colorado River Accounting Systems group. This product will provide Reclamation with additional tools for determining vegetation changes over time. This project will be completed in FY12.

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 species-specific habitat for covered species.

Cottonwood-willow, honey mesquite, marsh, and backwater are the predominant land cover types to be created under the LCR MSCP. For terrestrial and marsh land cover types, trees, shrubs, and 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
   8,132 total acres

To the extent practicable based on site conditions, cottonwood-willow, honey mesquite, marsh, and backwaters will each be restored in proximity to other land cover types to create integrated mosaics of habitat that approximate the relationships among aquatic and terrestrial communities historically present along the LCR 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), ʻAhakhav 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.

FY11 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. We also conduct quarterly meetings with the USFWS representatives from all four 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 USFWS.

Two development plans were drafted and sent to the California Department of Fish and Game for evaluation and approval. The first was the establishment of honey mesquite on lands adjacent to the Palo Verde Ecological Reserve and owned by the Palo Verde Irrigation District. The second included 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.

A site visit to the Bard Irrigation District/Yuma Island area was conducted and concepts for potential habitat creation were identified.

Backwater Site Selection

Discussions were held with representatives from the USFWS, CDFG, AGFD, NDOW, and Reclamation to clarify the goals of the backwater creation conservation measures and allow the program to continue to select and implement additional backwaters. As discussed with our Steering Committee, the focus of the new backwaters is on development in California.

The key discussion items and decisions addressed both the type of backwater to be created (disconnected and connected) and the location of these backwaters (Reach and State). First, although disconnected backwaters are the preference for the program, a mix of connected and disconnected is expected to provide benefit to native fishes and therefore is acceptable. Second, backwaters within Reach 3 should be open to the river to allow flannelmouth sucker access to the slackwater.

FY12 Activities

Conservation Areas

Coordination with resource agencies and attendance at planning meetings is expected to be similar to efforts in FY11. Two development plans were drafted and sent to the California Department of Fish and Game for evaluation and approval. The first is for the establishment of honey mesquite on lands within Cibola National Wildlife Refuge owned by the USFWS. This plan, titled *Shark's Tooth Conservation Area Restoration, Development and Monitoring Plan*, includes the development of over 500 acres of honey mesquite. The plan has been reviewed and

approved by CDFG. The property, when developed, would satisfy over one-half of the program's honey mesquite goals for the state of California. The second plan is titled *Horse's Head Conservation Area Development and Monitoring* Plan, and is for a site adjacent to the Palo Verde Ecological Reserve, which is owned by the Palo Verde Irrigation District. Based on discussions with PVID and approval of the much larger honey mesquite project at Cibola Refuge, the development of the Horse's Head site will not be moving forward at this time.

Additional discussions with CDFG, USFWS, and Reclamation have centered on the development of PVER-South, for which the majority of lands are owned by CDFG. As discussed, the restoration would include both connected and disconnected backwater as well as cottonwood-willow and honey mesquite. Upon completion and comment on a development plan for the property any development would be tracked under a new work task. Because development of marsh and backwater projects require the collection of significantly more site-specific data than projects targeting honey mesquite, these development plans will take longer to be drafted.

Backwater Site Selection

With all parties in agreement that backwaters in Reach 3 should be open to the river, we have begun the evaluation of potential backwater sites within California. An opportunity to partner with the City of Needles to maintain an open backwater at Bureau Bay has arisen and is being evaluated. Design and implementation of a plan to maintain the connection to the river, which would include excavation of material, is being developed. The actual implementation would follow the normal work task process and is included as a new start in FY13 under Work Task E32: Bureau Bay. Five other potential areas, within Reach 3 and the state of California, are also being investigated.

Another potential backwater project within Reach 4, located on an area referred to as PVER-South, is being evaluated with CDFG and would consist of both connected and disconnected backwaters. The actual implementation would follow the normal work task process and be tracked under a new work task.

Figure 1 depicts the geographical distribution of nine established conservation areas, as well as two potential conservation areas (Planet Ranch and Yuma East Wetlands) that are being evaluated for inclusion into the program.

Figure 1.

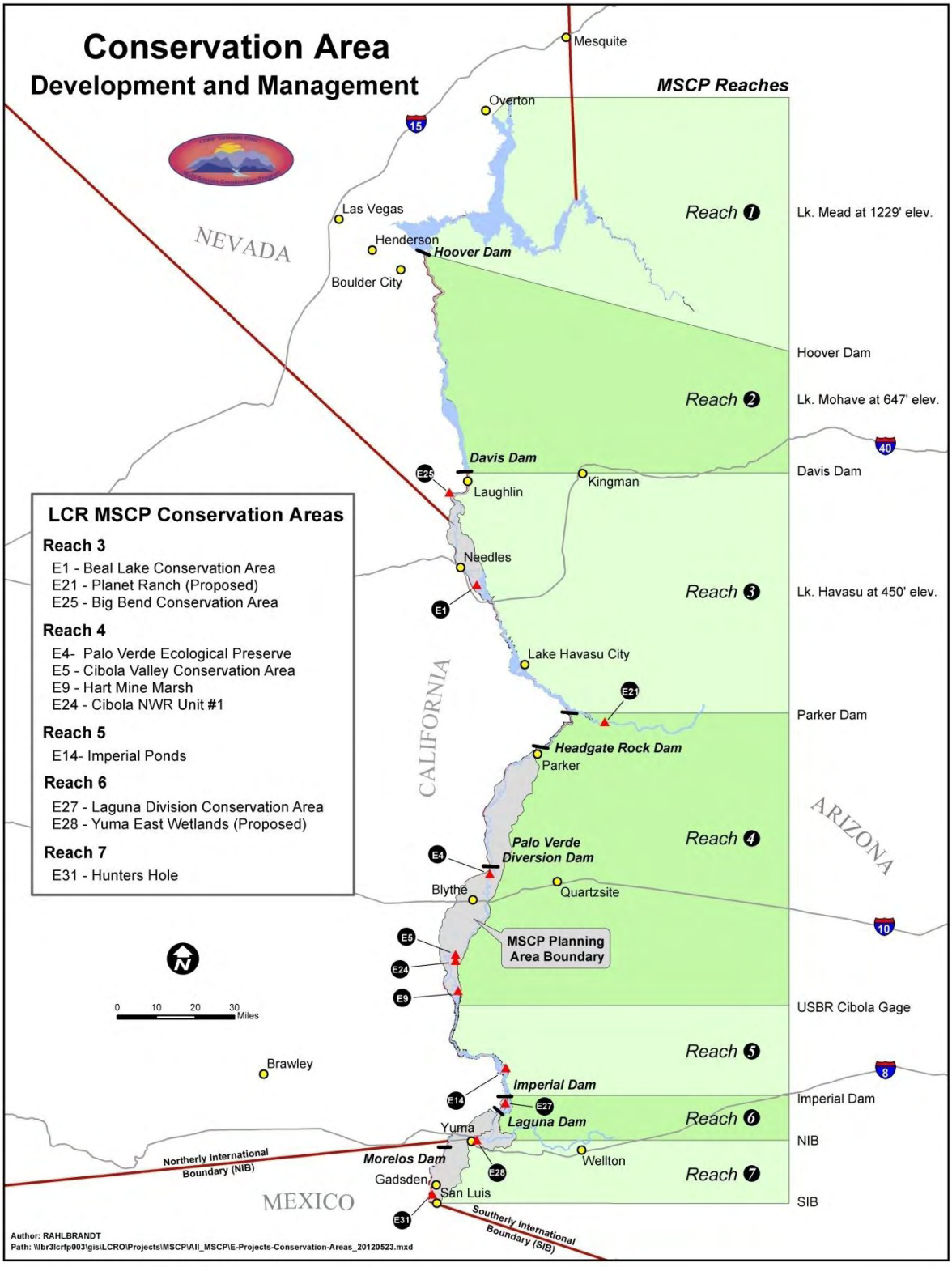
Conservation Area
Development and Management
MSCP Reaches
Mesquite
Overton
Las Vegas
Henderson
Hoover Dam
Boulder City
NEVADA
Reach 1
Lk. Mead at 1229' elev.
Hoover Dam
Reach 2
Lk. Mohave at 647' elev.
Davis Dam
Kingman
Laughlin
Needles
Reach 3
Lk. Havasu at 450' elev.
Lake Havasu City
CALIFORNIA
Parker Dam
Headgate Rock Dam
Parker
ARIZONA
Reach 4
Palo Verde Diversion Dam
Blythe
Quartzsite
MSCP Planning Area Boundary
USBR Cibola Gage
Reach 5
Brawley
Imperial Dam
Imperial Dam
Laguna Dam
Reach 6
Yuma
NIB
Morelos Dam
Wellton
Northerly International Boundary (NIB)
Gadsden
San Luis
Reach 7
SIB
MEXICO
Southerly International Boundary (SIB)
LCR MSCP Conservation Areas
Reach 3
E1 - Beal Lake Conservation Area
E21 - Planet Ranch (Proposed)
E25 - Big Bend Conservation Area
Reach 4
E4- Palo Verde Ecological Preserve
E5 - Cibola Valley Conservation Area
E9 - Hart Mine Marsh
E24 - Cibola NWR Unit #1
Reach 5
E14- Imperial Ponds
Reach 6
E27 - Laguna Division Conservation Area
E28 - Yuma East Wetlands (Proposed)
Reach 7
E31 - Hunters Hole
0 10 20 30 Miles
Author: RAHLBRANDT
Path: \\lbr3lcrfp003\gis\LCRO\Projects\MSCP\All_MSCP\E-Projects-Conservation-Areas_20120523.mxd

Figure 2.

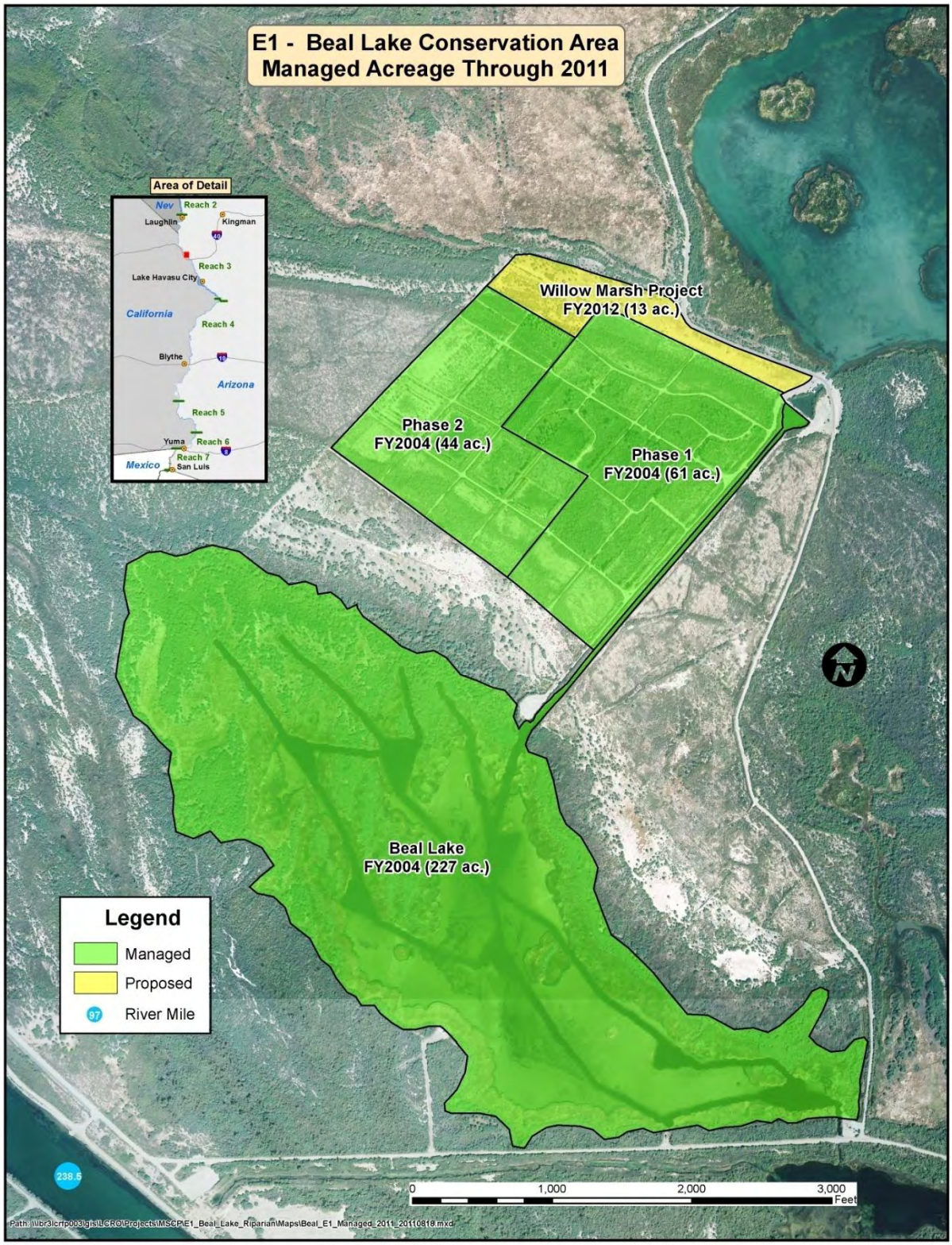
E1 - Beal Lake Conservation Area
Managed Acreage Through 2011
Area of Detail
Nev
Reach 2
Laughlin
Kingman
Reach 3
Lake Havasu City
California
Reach 4
Blythe
Arizona
Reach 5
Yuma
Reach 6
Reach 7
Mexico
San Luis
Willow Marsh Project
FY2012 (13 ac.)
Phase 2
FY2004 (44 ac.)
Phase 1
FY2004 (61 ac.)
Beal Lake
FY2004 (227 ac.)
Legend
Managed
Proposed
River Mile
97
238.5
0
1,000
2,000
3,000
Feet
Path: \\br3lcrfp003\gis\LCRO\Projects\MSCP\E1_Beal_Lake_Riparian\Maps\Beal_E1_Managed_2011_20110818.mxd

Figure 3.

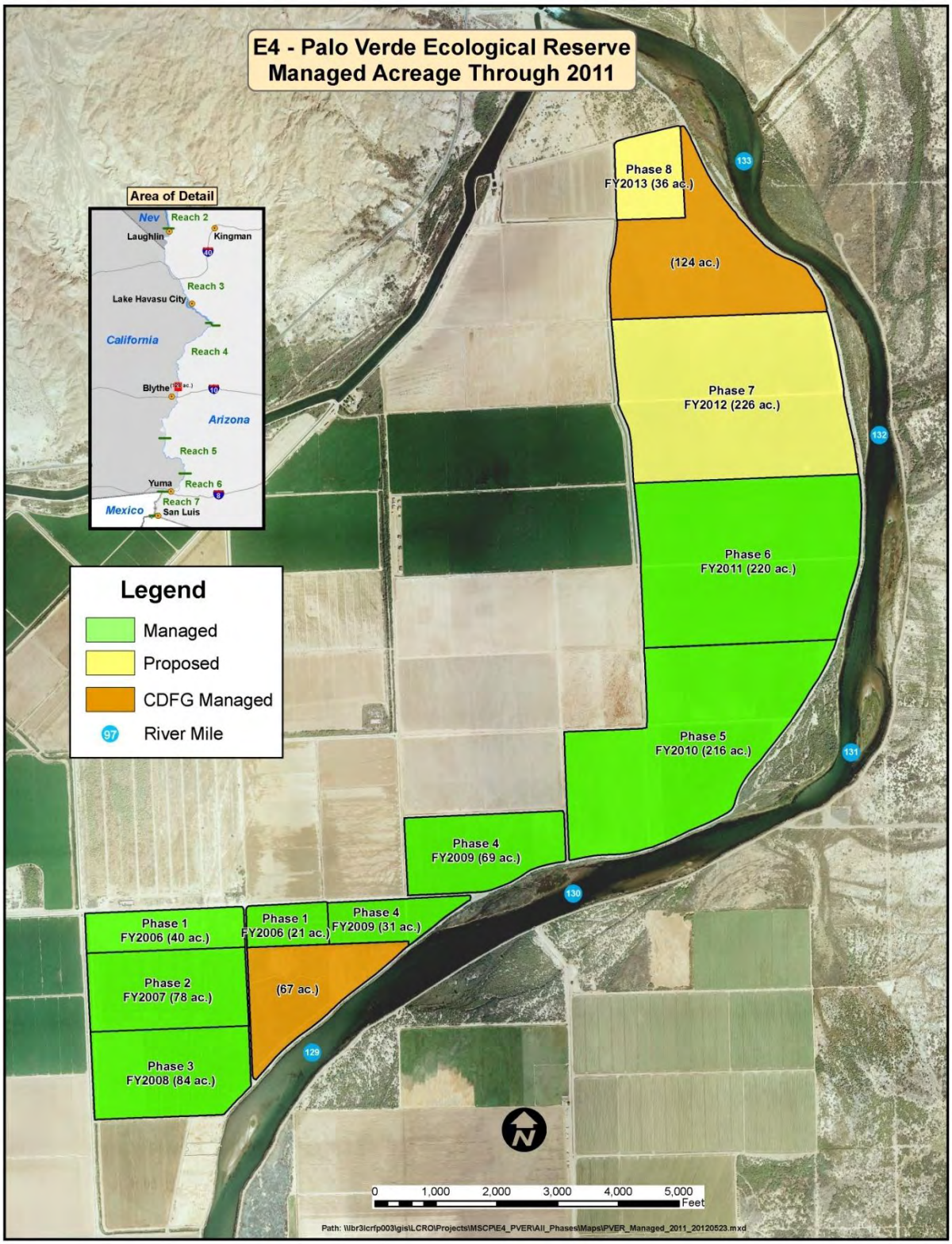
E4 - Palo Verde Ecological Reserve
Managed Acreage Through 2011
Area of Detail
Nev
Reach 2
Laughlin
Kingman
Reach 3
Lake Havasu City
California
Reach 4
Blythe
Arizona
Reach 5
Yuma
Reach 6
Reach 7
Mexico
San Luis
Legend
Managed
Proposed
CDFG Managed
River Mile
Phase 8
FY2013 (36 ac.)
(124 ac.)
Phase 7
FY2012 (226 ac.)
Phase 6
FY2011 (220 ac.)
Phase 5
FY2010 (216 ac.)
Phase 4
FY2009 (69 ac.)
Phase 1
FY2006 (40 ac.)
Phase 1
FY2006 (21 ac.)
Phase 4
FY2009 (31 ac.)
Phase 2
FY2007 (78 ac.)
(67 ac.)
Phase 3
FY2008 (84 ac.)
133
132
131
130
129
0 1,000 2,000 3,000 4,000 5,000
Feet
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Figure 4.

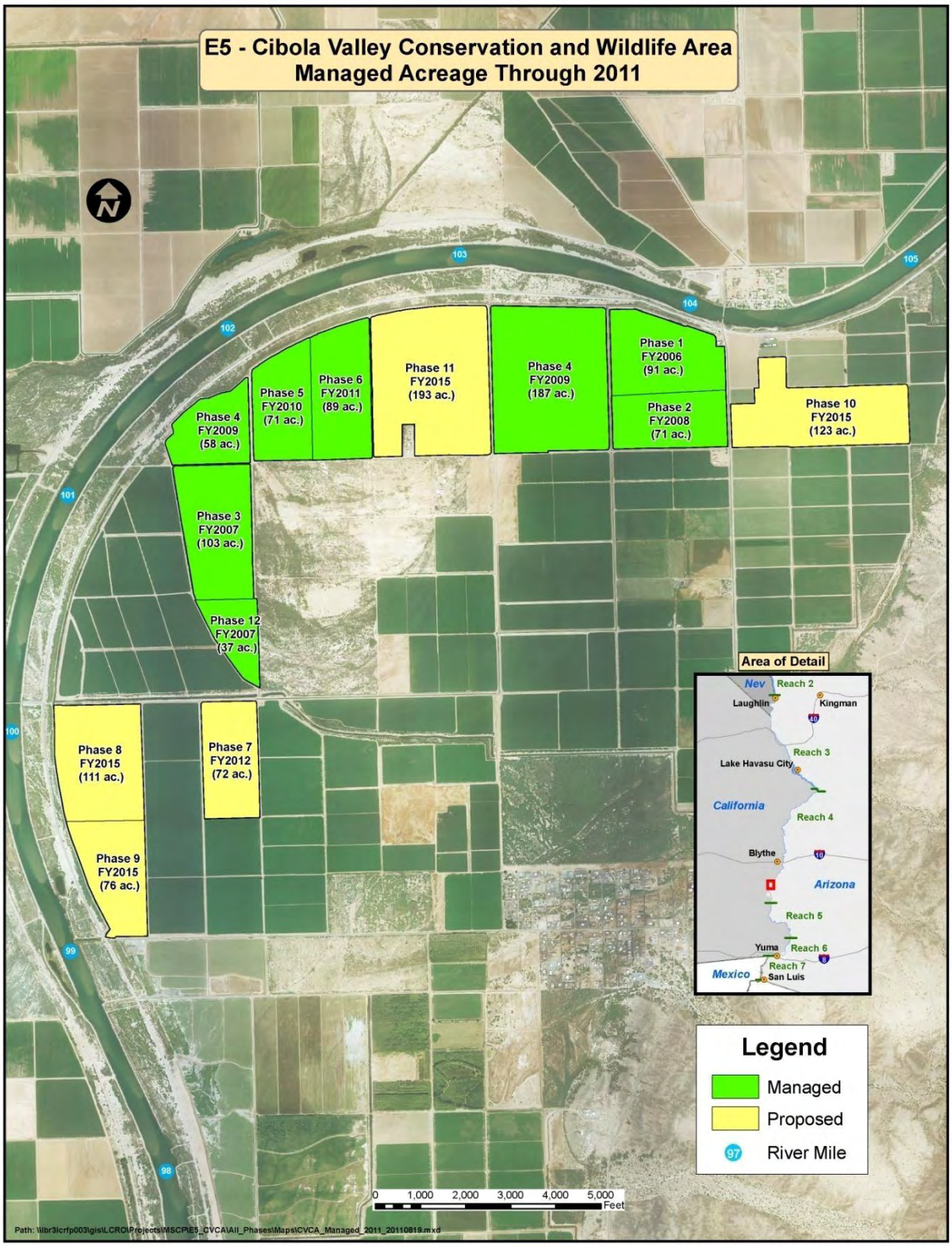

E5 - Cibola Valley Conservation and Wildlife Area
Managed Acreage Through 2011
Phase 1 FY2006 (91 ac.)
Phase 2 FY2008 (71 ac.)
Phase 3 FY2007 (103 ac.)
Phase 4 FY2009 (58 ac.)
Phase 4 FY2009 (187 ac.)
Phase 5 FY2010 (71 ac.)
Phase 6 FY2011 (89 ac.)
Phase 7 FY2012 (72 ac.)
Phase 8 FY2015 (111 ac.)
Phase 9 FY2015 (76 ac.)
Phase 10 FY2015 (123 ac.)
Phase 11 FY2015 (193 ac.)
Phase 12 FY2007 (37 ac.)
Area of Detail
Nev
Reach 2
Laughlin
Kingman
Reach 3
Lake Havasu City
California
Reach 4
Blythe
Arizona
Reach 5
Yuma
Reach 6
Reach 7
Mexico
San Luis
Legend
Managed
Proposed
River Mile
0 1,000 2,000 3,000 4,000 5,000
Feet

Figure 5.

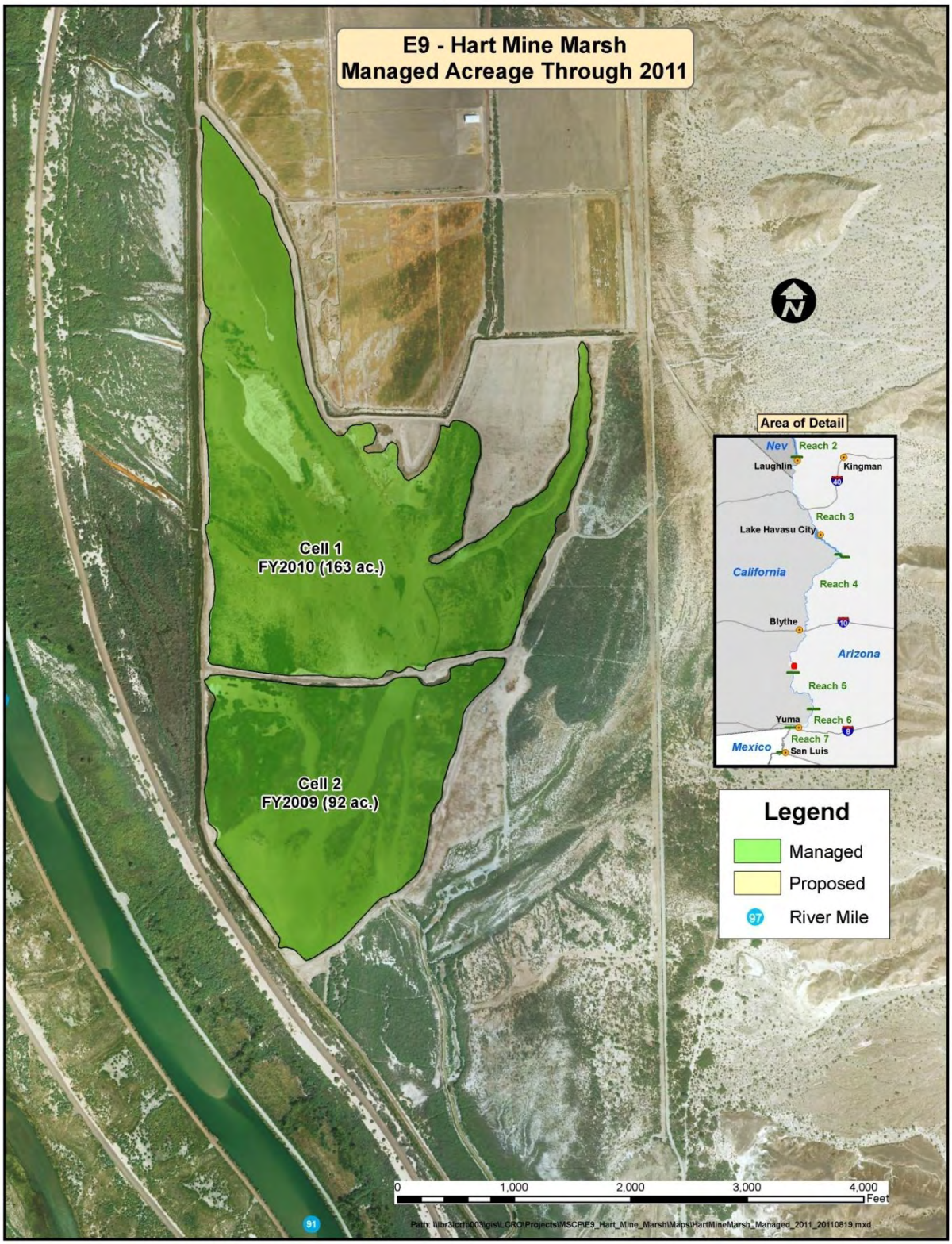

E9 - Hart Mine Marsh
Managed Acreage Through 2011
Cell 1
FY2010 (163 ac.)
Cell 2
FY2009 (92 ac.)
Area of Detail
Nev
Reach 2
Laughlin
Kingman
Reach 3
Lake Havasu City
California
Reach 4
Blythe
Arizona
Reach 5
Yuma
Reach 6
Reach 7
Mexico
San Luis
Legend
Managed
Proposed
River Mile
0
1,000
2,000
3,000
4,000
Feet

Figure 6.

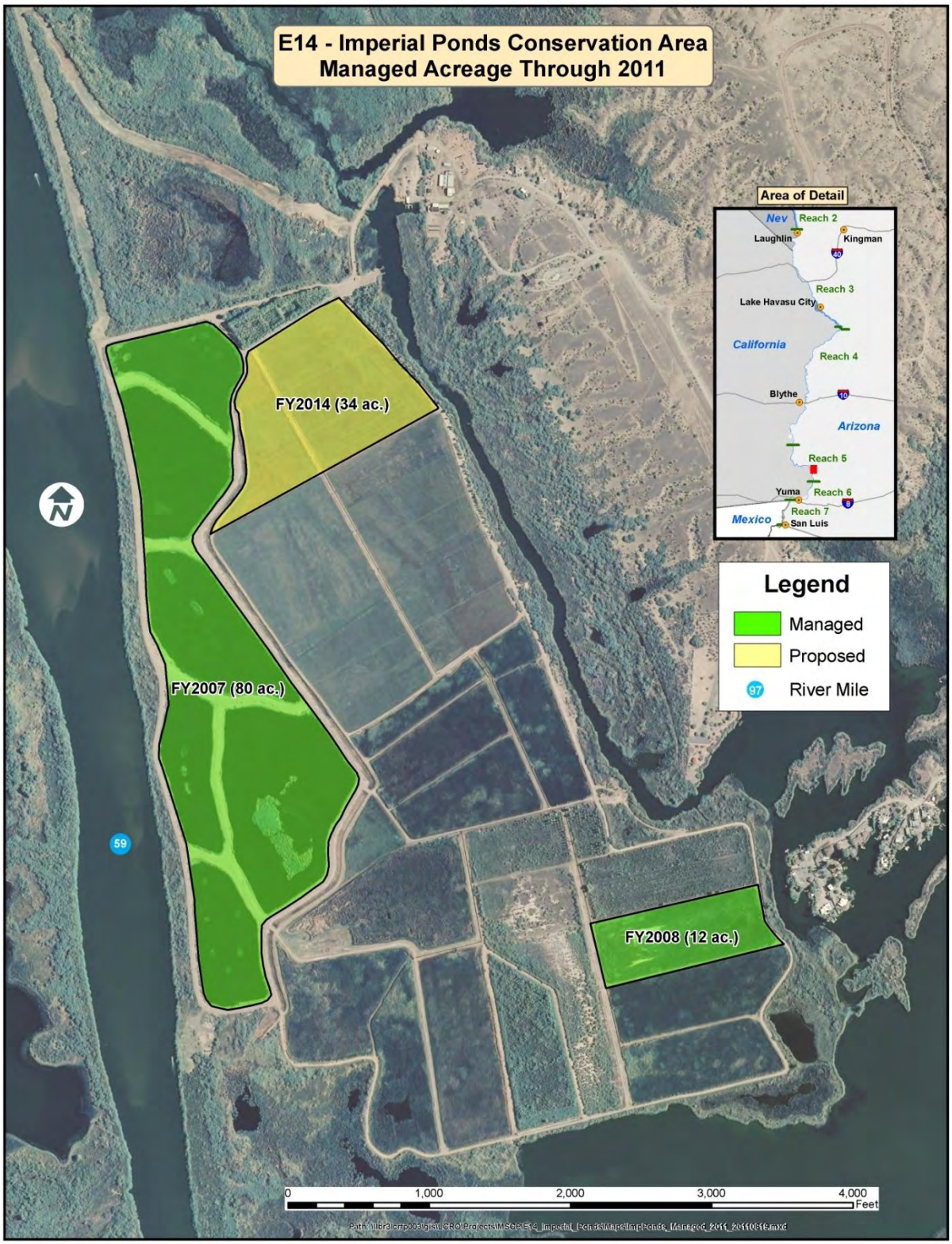

E14 - Imperial Ponds Conservation Area
Managed Acreage Through 2011
Area of Detail
Nev
Reach 2
Laughlin
Kingman
Reach 3
Lake Havasu City
California
Reach 4
Blythe
Arizona
Reach 5
Yuma
Reach 6
Reach 7
Mexico
San Luis
FY2014 (34 ac.)
FY2007 (80 ac.)
FY2008 (12 ac.)
Legend
Managed
Proposed
River Mile
0
1,000
2,000
3,000
4,000
Feet

Figure 7.

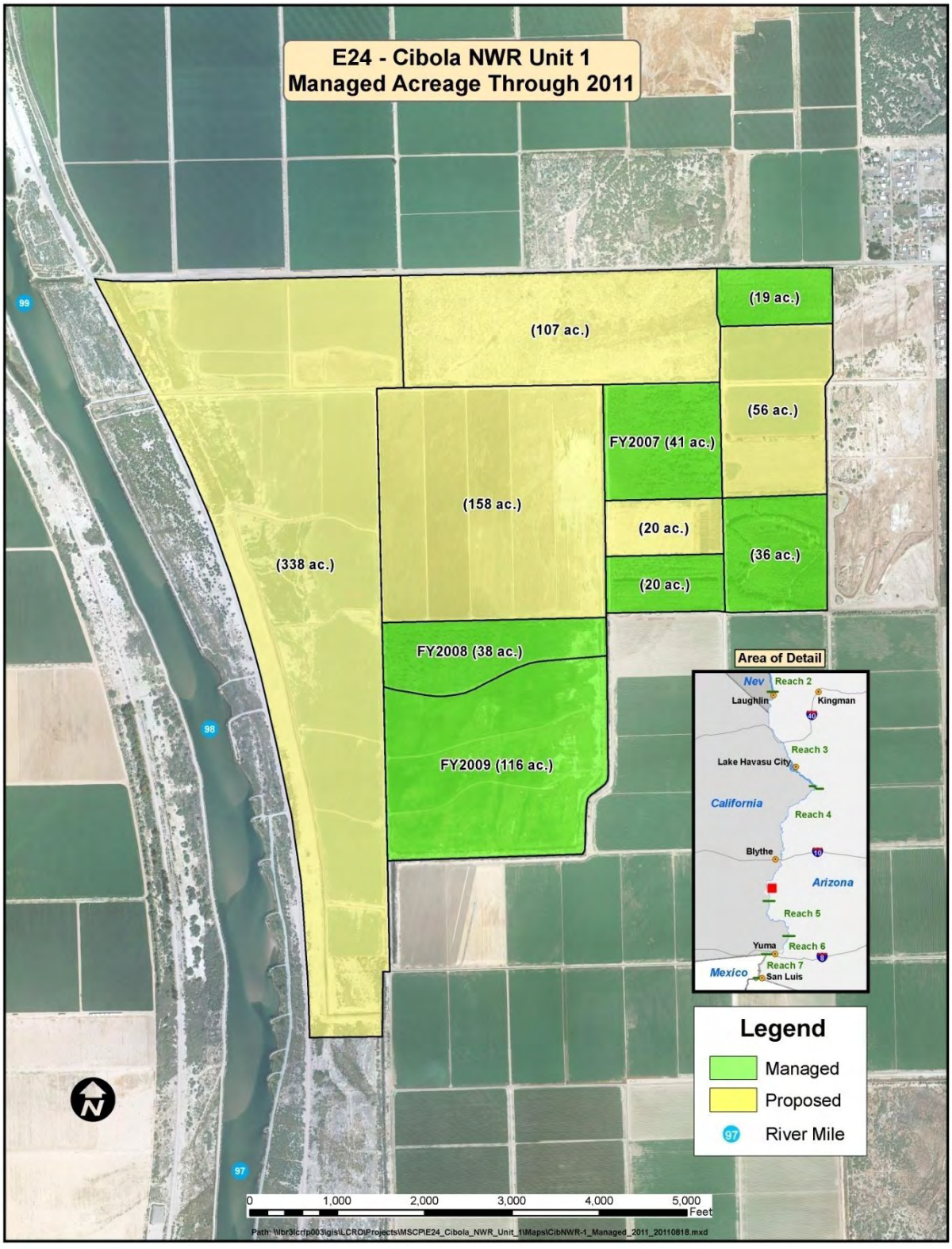

E24 - Cibola NWR Unit 1
Managed Acreage Through 2011
(107 ac.)
(19 ac.)
(56 ac.)
FY2007 (41 ac.)
(158 ac.)
(20 ac.)
(36 ac.)
(338 ac.)
(20 ac.)
FY2008 (38 ac.)
FY2009 (116 ac.)
Area of Detail
Nev
Reach 2
Laughlin
Kingman
Reach 3
Lake Havasu City
California
Reach 4
Blythe
Arizona
Reach 5
Yuma
Reach 6
Reach 7
Mexico
San Luis
Legend
Managed
Proposed
River Mile
0
1,000
2,000
3,000
4,000
5,000
Feet
Path: \\lbr3lcrfp003\gis\LCRO\Projects\MSCP\E24_Cibola_NWR_Unit_1\Maps\CibNWR-1_Managed_2011_20110818.mxd

Figure 8.

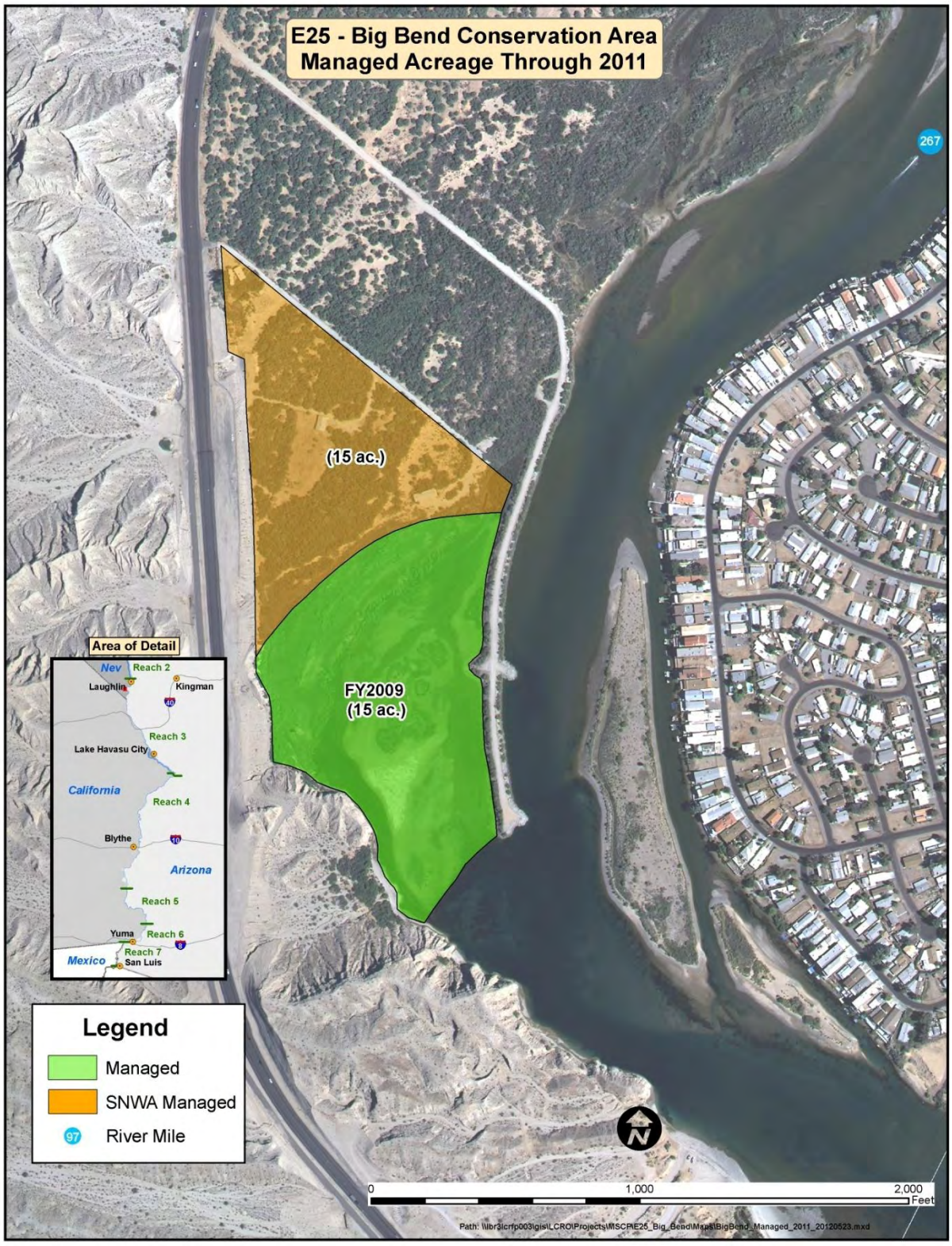

E25 - Big Bend Conservation Area
Managed Acreage Through 2011
267
(15 ac.)
FY2009
(15 ac.)
Area of Detail
Nev
Reach 2
Laughlin
Kingman
Reach 3
Lake Havasu City
California
Reach 4
Blythe
Arizona
Reach 5
Yuma
Reach 6
Reach 7
Mexico
San Luis
Legend
Managed
SNWA Managed
River Mile
0
1,000
2,000
Feet
Path: \\lbr3\crfp003\gis\LCRO\Projects\MSCP\E25_Big_Bend\Maps\BigBend_Managed_2011_20120523.mxd

Figure 9.

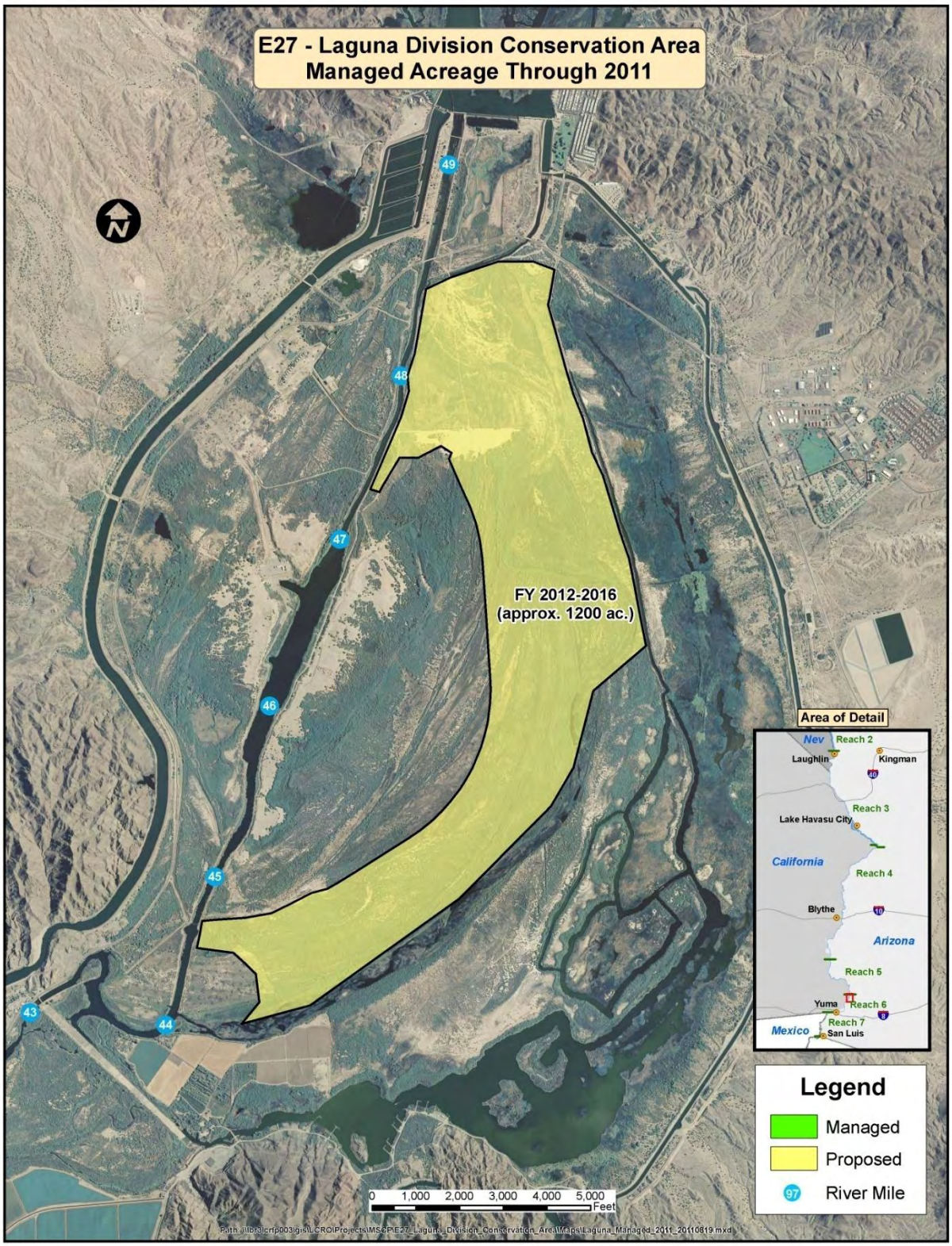

E27 - Laguna Division Conservation Area
Managed Acreage Through 2011
49
48
47
46
45
44
43
FY 2012-2016
(approx. 1200 ac.)
Area of Detail
Nev
Reach 2
Laughlin
Kingman
Reach 3
Lake Havasu City
California
Reach 4
Blythe
Arizona
Reach 5
Yuma
Reach 6
Reach 7
Mexico
San Luis
Legend
Managed
Proposed
River Mile
0 1,000 2,000 3,000 4,000 5,000
Feet

Figure 10.

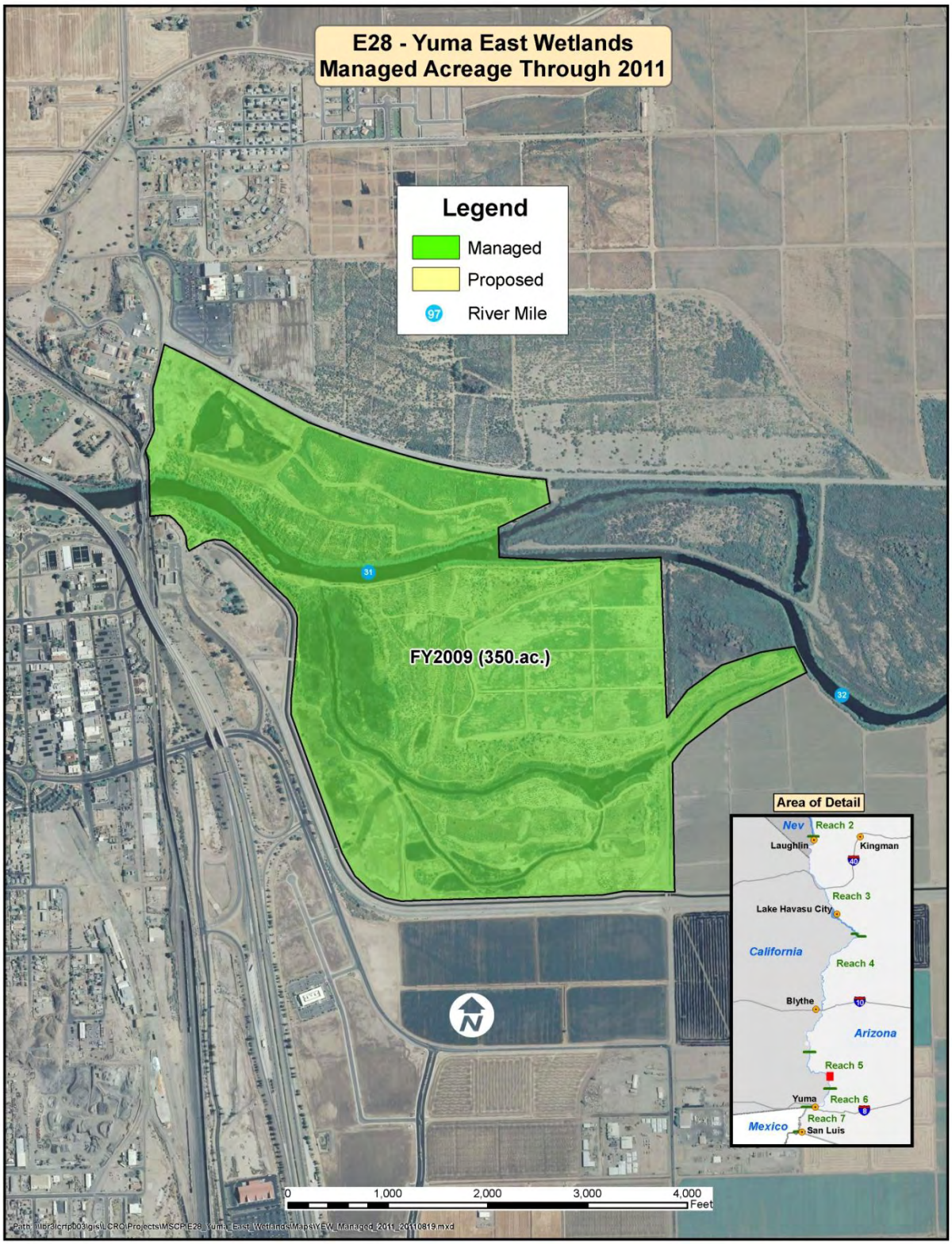
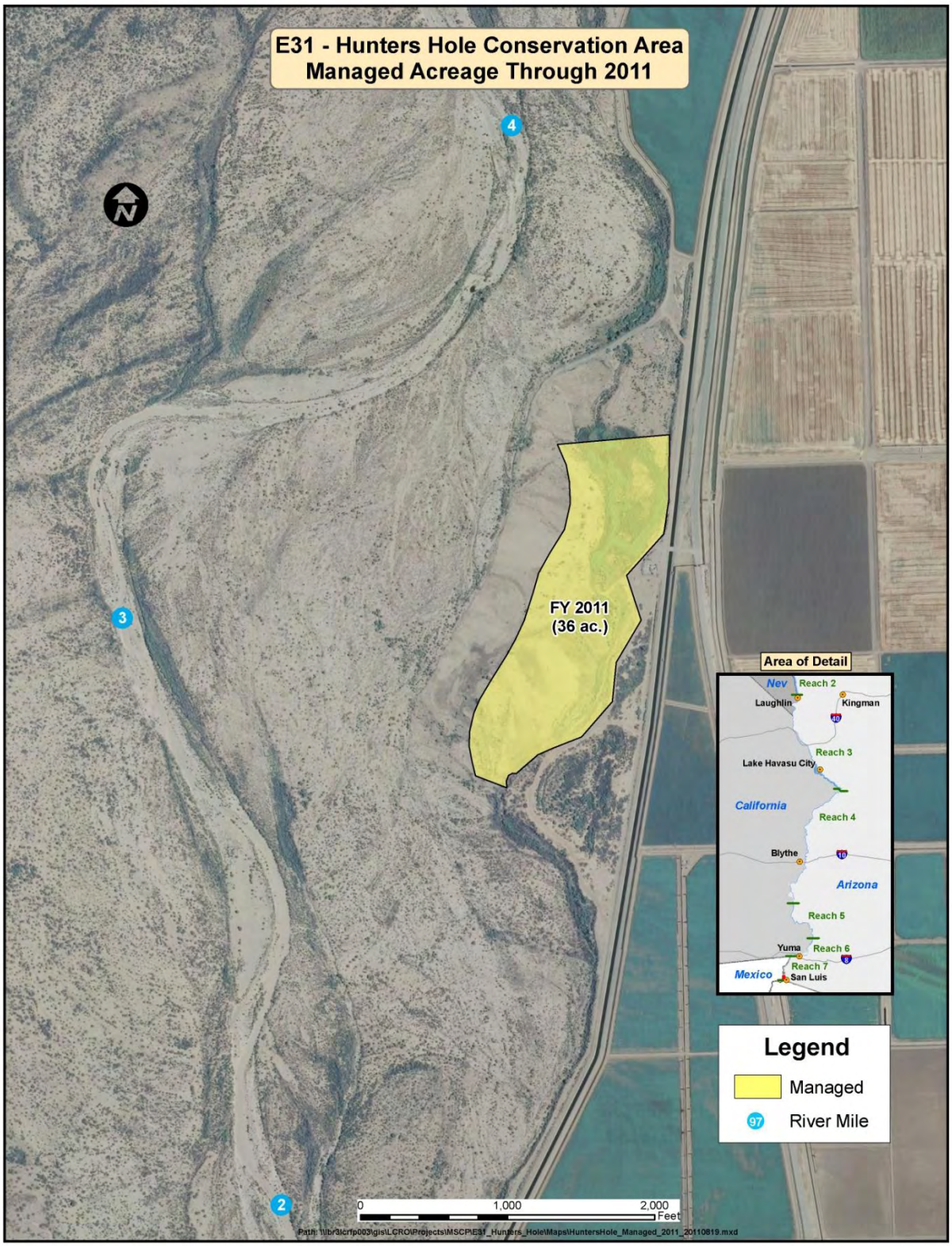

E28 - Yuma East Wetlands
Managed Acreage Through 2011
Legend
Managed
Proposed
River Mile
FY2009 (350.ac.)
Area of Detail
Nev
Reach 2
Laughlin
Kingman
Reach 3
Lake Havasu City
California
Reach 4
Blythe
Arizona
Reach 5
Yuma
Reach 6
Reach 7
Mexico
San Luis
0
1,000
2,000
3,000
4,000
Feet

Figure 11.


E31 - Hunters Hole Conservation Area
Managed Acreage Through 2011
FY 2011
(36 ac.)
Area of Detail
Nev
Reach 2
Laughlin
Kingman
Reach 3
Lake Havasu City
California
Reach 4
Blythe
Arizona
Reach 5
Yuma
Reach 6
Reach 7
Mexico
San Luis
Legend
Managed
River Mile
0
1,000
2,000
Feet

FY13 Proposed Activities

Conservation Areas
Coordination with resource agencies and attendance at planning meetings is expected to be similar to efforts in FY12. Activities in FY13 will focus on the identification and evaluation of potential conservation areas, primarily in California.

Backwater Site Selection
The evaluation of potential disconnected backwaters within Reach 3 and California will be completed, and potential disconnected backwaters within Reach 3 in Nevada or Arizona will be identified. Implementation of any actions at Bureau Bay will be addressed under Work Task E32. Implementation of any action at PVER-South will be addressed under a new work task.

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.

FY11 Accomplishments
A study on the implications of plant genetic diversity and vegetation density on habitat elements within southwestern flycatcher habitat was completed at PVER. The Fremont cottonwood genetic study initiated in FY07 was completed.

FY12 Activities
At Beal Lake Conservation Area, four fields that did not respond well to the original plantings have been cleared and will be used to demonstrate the feasibility of using the soil amendment Lassenite Pozzolan. Two of the fields are currently being used to determine whether the product can increase the irrigation efficiency in sandy soils, as well as increase the retention of soil

moisture. These fields will be planted with cottonwood and willow during the same effort as the willow marsh project. The two remaining fields will be used to test whether Lassenite Pozzolan can influence seeding success of Goodding's willow. This project is an extension of C42: Experiments and Demonstration of Soil Amendments for Use in Restoration Sites, which will provide funding for this research.

FY13 Proposed Activities

Monitoring soil and groundwater water conditions provides essential information about why some restoration sites establish and develop more successfully than others. Research from previous studies has suggested that riparian obligate trees will utilize groundwater when they have reached sufficient maturity. Studies have also suggested that this water source may be more important than applied surface water for long-term health and survival of the trees. In FY13, work initiated under G3 will continue in E34 Groundwater and Soil Salinity Monitoring Network to understand these interactions in order to effectively manage long-term health and survival.

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.

FY11 Accomplishments

Planting of the Phase 6 cottonwood-willow land cover type was completed at the Palo Verde Ecological Reserve, which established an additional 211 acres of the 220 acres projected of cottonwood-willow on the property owned by the California Department of Fish and Game. Planting of Phase 6 at the Cibola Valley Conservation Area was completed, which established another 89 acres of targeted land cover types on the property owned by the Arizona Game and Fish Department. The total number of acres developed in FY11 was 300 acres. The total number of acres being managed by the program on established conservation areas is shown in Table 1-13. Managed acreage at E24 includes 679 acres that is farmed and has not yet been restored

Table 1-13. Managed Acres by Conservation Area Through FY11

Conservation Area	Managed Acreage (with buffer)	Managed Acreage (without buffer)
E1: Beal Lake Riparian Restoration	107	107
E4: Palo Verde Ecological Reserve	750	750
E5: Cibola Valley Conservation Area	707	670
E9: Hart Mine Marsh	255	255
E14: Imperial Ponds Conservation Area	92	92
E25: Big Bend	15	15
E24: Cibola NWR	949	949
Total	**2,875**	**2,838**

The total number of acres being managed by land cover type and by reach and state on established conservation areas is shown in Table 1-14.

Table 1-14. Land Cover Type by Reach and State Through FY11

	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	405	255	0	37	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**	**405**	**267**	**80**	**37**	**1,431**
CALIFORNIA						
Reaches 1-2	0	0	0	0	0	0
Reach 3	0	0	0	0	0	0
Reach 4	710	10	0	0	30	750
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	**710**	**10**	**0**	**0**	**30**	**750**
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	**1,352**	**415**	**267**	**95**	**67**	**2,196**

Acreages 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.

FY12 Activities

Planting of the Phase 7 cottonwood-willow land cover type, plus 9 acres of Phase 6 that was not planted, are scheduled for FY12 at the Palo Verde Ecological Reserve, which would establish an additional 235 acres of targeted land cover types on the property owned by the California Department of Fish and Game. Planting of Hunters Hole Conservation Area is planned for FY12, which would establish another 50 acres of cottonwood-willow. The total number of acres to be developed in FY12 is 285 acres.

FY13 Proposed Activities

Planting of the Phase 8 honey mesquite land cover type is scheduled for FY13 at the Palo Verde Ecological Reserve, which would establish an additional 36 acres of targeted land cover types on the property owned by the California Department of Fish and Game. Planting of 80 acres of cottonwood-willow within Cibola NWR Unit #1 is also scheduled. The total number of acres to be developed in FY13 is 116 acres.

WORK TASKS SECTION A

PROGRAM ADMINISTRATION

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Work Task A1: Program Administration

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$1,212,438	$1,138,509.80	$7,017,771.28	$1,231,780	$1,273,518	$1,273,518	$1,273,518

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.

FY11 Accomplishments: Program Administration for FY11 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 2010 and April 2011. Technical Work Group meetings were held one month prior to these dates to review upcoming actions of the steering committee. The *Final Implementation Report, Fiscal Year 2012 Work Plan and Budget, Fiscal Year 2010 Accomplishment Report* was prepared and in conjunction with the USFWS, a Habitat Creation Conservation Measure Accomplishment Tracking Process was developed. The First Five Years River Tour was conducted for Steering Committee members.

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 Steering Committee meetings held on October 2011 and April 2012. Technical Work Group meetings were held one month prior to these dates to review upcoming actions of the steering committee. The *Final Implementation Report, Fiscal Year 2013 Work Plan and Budget, Fiscal Year 2011 Accomplishment Report* will be prepared. Financial tracking for the program will continue and the annual financial work group meeting was held in February 2012. Processes for the program will continue to be developed including criteria for use of the Habitat Maintenance Fund. A tour of the Laguna Division Conservation Area for the Steering Committee was conducted in March 2012.

Proposed FY13 Activities: Program Administration for FY13 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 2014 Work Plan and Budget, Fiscal Year 2012 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 2012 Work Plan and Budget, Fiscal Year 2010 Accomplishments* is posted on the LCR MSCP website. The [*Draft* and *Final*] *Implementation Report, Fiscal Year 2013 Work Plan and Budget, Fiscal Year 2011 Accomplishment Report* 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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$200,000	$206,468.97	$1,433,640.83	$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.

FY11 Accomplishments: Twenty-five thousand eighteen (25,018) wild larvae were collected from four areas. The 5,000 larvae that had been obligated to the Lake Mead Hatchery were not delivered to the hatchery because the Native Fish Work Group had no clear plan on where those

fish would eventually be stocked. 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, 2011

	January	February	March	April	May	Total
Nine Mile	500	584	5,879	134	0	7,097
Tequila	125	2,125	4,650	46	0	6,946
Yuma	0	3,153	4,500	200	0	7,853
AOP	0	0	1,089	1,896	137	3,122
Total	**625**	**5,862**	**16,118**	**2,276**	**137**	**25,018**

The most significant event of this past season was the discovery of RASU larvae at 24 new sites near Katherine's Landing. This information expands our knowledge concerning both habitat use and spawning behavior near Katherine's Landing. In addition, new spawning sites afford us the opportunity to further secure the genetic diversity of this adult population.

FY12 Activities: A target of 25,000 to 30,000 larvae was established at the Lake Mohave Native Fish Work Group meeting. These will be delivered to Willow Beach NFH for rearing. Presence/absence surveys near Katherine's Landing will lead to a continuation of this work in FY12.

Proposed FY13 Activities: RASU larvae collections will continue. The target level for FY13 is 25,000 to 30,000 larvae.

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

Work Task B2: Willow Beach National Fish Hatchery

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$250,000	$230,585.84	$2,021,047.79	$250,000	$609,000	$300,000	$300,000

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.** Willow Beach NFH 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.** Willow Beach NFH will rear 6,000 subadult RASU to 300 mm TL for stocking into Reach 3, and 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, the 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 was subsequently found at Willow Beach NFH. Larval RASU that were to be transferred to Bubbling Ponds SFH were not collected (B1) and no RASU 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).

FY11 Accomplishments: During 2011, 25,018 RASU larvae were received from Lake Mohave, and 904 RASU juveniles were stocked to lake-side rearing ponds (B7). A total of 5,300 FY10 RASU were transferred to Achii Hanyo Rearing Station (B3) for further grow out. A total of 4,891 RASU were repatriated into Lake Mohave (Reach 2), a total of 327 RASU were stocked into Lake Havasu (Reach 3), and a total of 507 RASU were stocked into Palo Verde Oxbow Lake (Reach 4). The majority of funds were for salary and consumable materials (fish feed, medicines, chemicals, etc.) but a portion of the funds were used to acquire motors, feeders, aluminum tubing, PVC pipe, tools, a trailer, and probes for monitoring ammonia, nitrate, and dissolved oxygen. A new well was drilled on station that will be able to supply 250 gpm at 19°C. Rehabilitation of one functioning well on station improved capacity from 120 gpm to 250 gpm. These two wells will be able to supply the hatchery with 500 gpm of pathogen free water.

FY12 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 269 RASU of the 2007 year class, 4,306 RASU of the 2008 year class, 7,903 RASU of the 2009 year class, 19,628 RASU of the 2010 year class, and 20,659 of the 2011 year class. BONY have not been reared at the hatchery since 2010. BONY from Dexter NFH (B4) are delivered directly to Achii Hanyo Rearing Station (B3). Investigations into methods for removing quagga mussel from transport tanks at Willow Beach NFH (C30) will continue.

Proposed FY13 Activities: Additional funding of $358,000 proposed in FY13 is to install a new well and pump, and a second pump with associated electrical parts will be installed on an existing well. A cost share from the USFWS will be supplied in the form of engineering and technical support for the installation of the new wells. Well water would supply Willow Beach NFH with pathogen free water, thereby helping eliminate quagga mussel from this facility. 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 scope of work and annual administrative reports are available upon request.

Work Task B3: Achii Hanyo Rearing Station

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$150,000	$136,901.52	$573,688.09	$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 eight 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.

FY11 Accomplishments: At the start of the year 11,290 BONY were on station. This number included 703 FY08, 5,279 FY09, and 5,308 FY10 fish. At the start of the year 5,900 RASU were on station. This number included 600 FY09 and 5,300 FY10. At the end of the year, 3,215 BONY and 2,002 RASU were harvested, tagged, and stocked into the LCR. A total of 2,002 RASU were stocked into Reach 2, 473 BONY were stocked into Reach 3, and 2,742 BONY were stocked into Reach 4. A total of 8,627 BONY were returned to ponds on station for further grow out. Of this 835 BONY were FY09, 1,292 BONY were FY10, and 6,500 BONY were FY11 young of the year. Also 461 RASU FY10 were returned to ponds on station for further grow out. All fish on station in FY11 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 one more year. Production goals will remain at 4,000 BONY greater than 300 mm TL. Two additional ponds were designed and constructed this year but only one was used due to a leak.

FY12 Activities: BONY left on station from FY11 will be reared to target size. Delivery of approx 4,000 BONY from Dexter NFH is expected if Largemouth Bass Virus issues are resolved. Earth work will be performed around the catch kettle on one pond this year. One additional pond is scheduled to be put into service to increase fish production and research. Disking and grading of three ponds will be accomplished this year and one additional pond is scheduled for construction.

Proposed FY13 Activities: BONY left on station from FY12 will be reared to target size, fingerling BONY will be delivered from either Dexter NFH or Willow Beach NFH.

Pertinent Reports: The scope of work and annual administrative reports are available upon request.

Work Task B4: Dexter National Fish Hatchery

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$180,000	$150,310.56	$966,984.84	$200,000	$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 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, B5, and B10, as fish from Dexter NFH will be delivered to Willow Beach NFH, Achii Hanyo Rearing Station, Bubbling Ponds State Fish Hatchery 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 2010, 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 1,357 BONY have been stocked into Reach 2, and a total of 8,769 BONY have been stocked into Reach 3, and a total of 535 BONY have been stocked into Reach 4. 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 LCR MSCP augmentation program, thus impacting the number of deliverable fish for the program.

FY11 Accomplishments: In October 2011 the Fish Health Unit concluded Dexter's annual fish health inspection using enhanced testing protocols. No pathogens of concern were detected and the facilities disease classification was upgraded from LMBV positive to s*uspect* LMBV. Prior to the annual inspection, fish lots had been tested in Nov 2010 and April 2011 and no pathogens of concern were detected at that time as well. Dexter is currently on track to regain its Class A (pathogen free) disease classification in October of 2012. Negotiations between state and federal agencies resulted in a onetime dispensation in 2011 that allowed the stocking of certain, specific lots of fish from Dexter NFH into the LCR.

BONY: Dexter NFH staff maintained 2,000 adult BONY broodstock. The stock comprises six year classes of Lake Mohave origin fish. Approximately 49,000 BONY were maintained on station for future stocking into the lower Colorado River; 4,000 (07 year class), and 25,000 (09 year class) and 20,000 (11 year class). Staff from the USFWS hormonally induced and hand-stripped eggs and sperm from 50 adult BONY, producing 538,334 eggs. No BONY were transferred to Willow Beach NFH, or Achii Hanyo Rearing Station, during 2011. USFWS staff harvested, PIT tagged, hauled, and stocked a total of 3,907 subadult BONY (300+ mm TL) into Lake Havasu (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 40 adult RASU, producing 385,667 eggs. No RASU were transferred to Bubbling Ponds SFH due to the facilities suspect LMBV disease classification. 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. A total of 500 RASU from Dexter NFH were stocked into Lake Mohave (Reach 2) in 2011.

FY12 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 pathogen free certification for delivery of fish to avoid contamination of LMBV-free areas. Fish on station are scheduled to be tested for the presence of LMBV. If all tests come back negative these fish could then be stocked into the LCR after October 2012.

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 FY13 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 scope of work and annual administrative reports are available upon request.

Work Task B5: Bubbling Ponds Fish Hatchery

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$250,000	$270,542.88	$1,673,211.86	$250,000	$300,000	$300,000	$300,000

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 2010, Bubbling Ponds SFH has reared and stocked 69,714 RASU.

FY11 Accomplishments: No fry were received for rearing from Dexter NFH in April due to largemouth bass virus concerns. This year a total of 17,077 RASU were harvested, PIT/wire-tagged, and stocked: 10,224 were stocked into Lake Havasu (Reach 3), and 6,853 were stocked below Parker Dam (Reach 4).

During 2011 funds were expended for salaries and associated costs for fish rearing activities. Funds were also used to purchase feed, chemicals, waders, wader lockers, seine nets, one small boat, tools and gravel. All overflow and inflow piping on upper nine ponds was replaced with corrugated polyethylene pipe. A new six inch PVC pipe was brought to the holding tank supplying fish held overnight with enough fresh water to alleviate dissolved oxygen problems. The same holding tanks were coated and new valves were installed to cut down water loss and calm fish while being held. Three large brass gate valves were replaced that supply water to outside raceways.

FY12 Activities: Bubbling Ponds SFH began 2012 with approximately 42,000 RASU on station. These fish are from Dexter NFH and were delivered prior to the outbreak of LMBV at Dexter NFH. They are expected to reach target size in 2012 and 2013. 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 2012 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 FY13 Activities: RASU larvae will be received from Dexter NFH; RASU from the 2012 and 2013 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 scope of work and annual administrative reports are available upon request.

Work Task B6: Lake Mead Fish Hatchery

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$50,000	$17,692.75	$283,468.47	$50,000	$100,000	$125,000	$125,000

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

Start Date: FY05

Expected Duration: FY16

Long-term Goal: Operate and maintain the 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 B11, C13, and C26. Razorback sucker larvae are captured from Lake Mead as part of the Long-Term Lake Mead Razorback Sucker Monitoring (D8) and reared at Lake Mead SFH. Once fish reach subadult size, they are transferred to grow-out ponds at Overton WMA (B11) to complete the rearing process. A portion of the subadult fish have also been utilized to evaluate rearing RASU in flowing conditions (C26), and will continue to be available for future research needs.

Project Description: Lake Mead SFH is managed and operated by the Nevada Department of Wildlife. Renovation of Lake Mead SFH allowed for the development and inclusion of dedicated facilities for rearing RASU and other natives. Reclamation and NDOW are cooperatively rearing RASU larvae captured from Lake Mead for future needs. Funds from this work task provide for the staff, equipment, feed, and chemicals necessary to rear these fish. Additional hatchery rearing space will be made available in FY12 in support of the LCR MSCP Fish Augmentation Program. This additional rearing capacity is needed in 2016, when the number of RASU annually stocked into reaches 3-5 is expected to increase. This additional space will also support FLSU rearing for research projects occurring in reach 3.

Previous Activities: 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.

FY11 Accomplishments: Three thousand and seventy larval RASU were collected from Lake Mead during the course of the spawning season and taken to Lake Mead SFH for grow-out. To make room for incoming larvae, NDOW delivered and stocked 600 juvenile RASU from the 2009 year class into Center Pond at the Overton WMA. Over 4,000 RASU from multiple year classes remain on station. In FY11, NDOW also began evaluating additional, new ponds that may be used for future grow-out and rearing of Lake Mead RASU. No sites have been selected to date, but negotiations are ongoing with property managers.

FY12 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, 2010, and 2011 year classes. Additional hatchery space will also be made available in FY12 for rearing Lake Mohave RASU and FLSU from below Davis Dam. The remaining 2009 Lake Mead RASU year class and a portion of the 2010 year class will be stocked at the Overton WMA. It is anticipated that NDOW will continue their evaluation of additional ponds that may be used as future rearing sites through their Safe Harbor Agreement Program.

Proposed FY13 Activities: Continued rearing of Lake Mead RASU captured during previous years will occur and hatchery stock will be augmented with 2013 year-class RASU larvae. Adult and subadult Lake Mead RASU from the 2010 and 2011 year classes will be delivered to the Overton WMA and potentially to additional grow-out sites. Rearing of Lake Mohave RASU and FLSU from below Davis Dam will also continue. The additional funding requested in FY13 will be used to support rearing an increased number of Lake Mohave RASU for future repatriation to Lake Mohave.

Pertinent Reports: The *2010 Nevada Department of Wildlife Lake Mead Razorback Sucker Augmentation Project Activities Report* will be posted to the LCR MSCP website. The 2011 Activities Report is in development and will be posted to the website upon completion.

Work Task B7: Lake-Side Rearing Ponds

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$250,000	$246,148.11	$1,291,745.10	$175,000	$200,000	$200,000	$200,000

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

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Maintain fish-rearing capability, provide 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 brood stock 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 deposits into sandbars or natural berms. In some areas these sandbars isolate the lower portions of the desert washes from the lake proper, and when the lake is at full pool, lake-side ponds form at many of these washes. Reclamation and its partners in the Lake Mohave Native Fish Work Group have been using these lake-side ponds since 1993 as rearing and grow-out areas for 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 31,000 RASU have been reared and repatriated to Lake Mohave. In an effort to expedite development of RASU brood stock, 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 TL. In 2009, Nevada Egg's earthen berm was 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.

FY11 Accomplishments: With cooperation from the National Park Service, the berm at the Yuma Cove backwater was successfully rebuilt on time and within the budget estimates. Six 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. AJ and Dandy backwaters were stocked in January as part of the C40 work task. The remaining backwaters were stocked in March: this included Yuma, North Chemehuevi, Nevada Larvae, and Willow. The last backwater stocked was Davis as part of the C41 work task in April of 2011. The backwaters received 200, 199, 200, 201, 52, 52, and 376 razorbacks, respectively, for a total of 1280 fish. Mean TL for all backwater pond fish at harvest were 338.0 mm with a range of 300 mm to 525 mm. Year classes for all fish stocked in 2011 were 2007 and 2008. North Nine Mile backwater did not receive any fish in 2011. All fish were PIT tagged at the time of initial stocking into the backwaters. Fish were re-scanned at the time of harvest and a new tag was inserted if the original PIT tag was not detected. The total number of fish harvested from the 2011 stocking into Yuma was 19 and 239 additional fish were harvested and released into Lake Mohave. Zero fish were harvested from the 2011 stocking at Davis. Table 1 lists numbers of fish for the 2011 harvest.

Table 1. 2011 Adult razorback suckers repatriated to Lake Mohave from lake-side rearing ponds

Pond/Backwater	# Stocked	Mean Length at Stocking	# Harvested	Mean Length at Harvest	% Harvested from 2011 Stocking
Yuma	200	403	19*(258)	496*(435)	10.0
Willow	52	402	23	418	44.0
Dandy	199	412	94	450	47.0
Arizona Juvenile	200	417	111	438	56.0
Nevada Larvae	52	402	21	415	40.0
N. Chemehueve	201	315	97	465	48.0
Davis	376	218	0*(2)	0*(470)	0.0
Total	1280	338.0	365*(606)	449*(442)	29.0

*Numbers in parentheses indicate the total number and overall mean lengths of fish at harvest for ponds that contained fish prior to 2011.

FY12 Activities: Lake-side ponds are again being used for RASU brood stock maintenance and development. Research investigations have been initiated to look at ways to better manage natural food resources in these ponds (Work Task C44: Management of Fish Food Resources in Off-Channel Native Fish Habitats).

Proposed FY13 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 brood stock.

Pertinent Reports: The updated *Fish Augmentation Plan* will be posted to the LCR MSCP website.

Work Task B8: Fish Tagging Equipment

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$85,000	$83,094.77	$504,523.15	$90,000	$100,000	$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): 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 new 134.2-kHz frequency PIT 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 24,299

RASU and 6,579 BONY were PIT-tagged and/or wire-tagged and released into the LCR during 2009 and 22,476 RASU and 4,993 BONY for 2010.

FY 11 Accomplishments: PIT tags, tagging equipment, and tag readers were purchased as needed to mark fish for monitoring and research. A total of 25,598 RASU and 7,122 BONY were PIT-tagged and/or released into the LCR during 2011.

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

Proposed FY 13 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 B11: Overton Wildlife Management Area

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$50,000	$25,979.31	$322,905.57	$75,000	$50,000	$50,000	$50,000

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, and complete RASU conservation measures identified in the 2001 SIA BO.

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), the Lake Mead Razorback Sucker Study (C13), and Lake Mead System Monitoring (D8). Once developed, ponds at the Overton WMA may receive additional fish from Willow Beach NFH (B2) for grow-out.

Project Description: Overton WMA is located in Clark County, Nevada, at the upper end of Lake Mead at the confluence of the Moapa and Virgin rivers, 65 miles northeast of Las Vegas. The Overton WMA was established in 1953 under a joint agreement with Reclamation and the NPS. The wildlife area is managed solely for fish and wildlife and their habitats and has limited public access. The Overton WMA covers more than 17,000 acres, and includes three primary waterfowl management ponds, all of which are available for native fish culture.

The LCR MSCP activities for this site include receiving RASU originally captured from Lake Mead and initially reared at Lake Mead SFH, and growing them out to target size (300+ mm) for future program needs. Overton WMA may also provide opportunities to conduct species research under the LCR MSCP AMP.

Previous Activities: Originally planned as a 2007 start, this project was initiated in 2006 when funds became available from closure of another project (B9). 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 began in 2007, and prior to stocking native fishes, LCR MSCP fisheries staff assisted with sampling these ponds to determine species composition. To curtail aquatic vegetation and maintain ponds with sufficient open water areas, a 14-foot aluminum boat with chemical spray unit was purchased in 2008. Pond improvements continued in 2010 with the addition of a new boat ramp in the northeast corner of Center Pond.

FY11 Accomplishments: A total of 600 juvenile RASU reared at Lake Mead SFH were delivered and stocked into Center pond during FY11. Associated field work was performed and included periodic monitoring of pond water quality as well as two sampling events to assess RASU pond stock. Pond infrastructure was routinely inspected and minor repairs were completed as necessary.

FY12 Activities: RASU reared at Lake Mead SFH will be transferred to Overton WMA ponds for further rearing. RASU currently held in Overton WMA ponds will be monitored at least twice annually using standard methods including hoop and trammel nets and/or electrofishing. Water quality parameters in Center Pond, and other Overton WMA ponds as necessary, will be collected quarterly in association with fish monitoring activities using standardized methods consistent with water quality data collection in previous project segments. Existing water delivery infrastructure to Center and Wilson ponds will be evaluated and repair/replacement of control valves and other infrastructure may be performed as necessary.

Proposed FY13 Activities: Razorback sucker from Lake Mead SFH will be stocked for grow-out and future program needs. Overton WMA ponds, principally Center Pond, will continue to be monitored through sampling efforts. Improvements to existing ponds and infrastructure will occur as needed.

Pertinent Reports: The scope of work for this agreement is available upon request from the LCR MSCP.

WORK TASKS SECTION C

SPECIES RESEARCH

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Work Task C2: Sticky Buckwheat and Threecorner Milkvetch Conservation

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$11,000.00	$11,293.33	$51,293.33	$11,000.00	$11,000.00	$11,000.00	$11,000.00

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 five years, depending on availability, to keep administrative costs at a minimum.

Previous Activities: In FY10, $10,000 was provided to the NPS via a five-year agreement between Reclamation and the NPS. Monitoring of select populations implemented in 2008 continued through 2009. Data were summarized and a report written summarizing results of two years monitoring sticky buckwheat and threecorner milkvetch. In 2010, presence/absence surveys of sticky buckwheat and threecorner milkvetch were conducted at select sites.

FY11 Accomplishments: 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". In FY11, $10,000 was provided to the NPS via a one-year agreement between Reclamation and the NPS. Tasks included surveys, and invasive species removal. A final report covering 2011 activities will be posted to the website when complete.

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.

Proposed FY13 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 survey and 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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$15,000	$10,270.70	$236,034.68	$15,000	$30,000	$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, LEBI1, BLRA1, BLRA2, YBCU1, YBCU2, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, FTHL1, FTHL2, FLSU1, MNSW1, MNSW2, CLNB1, CLNB2, PTBB1, PTBB2, CRTO1, CRTO2, CRTO3, LLFR1, LLFR2, and LLFR3.

Location: System-wide, Arizona, California, Nevada.

Purpose: 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.

FY11 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 management guidelines. Literature searches, literature acquisition, and data compilation were conducted to update species accounts as needed.

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

Proposed FY13 Activities: Information will be gathered from recent literature and will be incorporated into the species accounts on a five-year cycle. An updated species accounts report will be completed.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$11,000	$11,705.91	$73,662.08	$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.

Previous Activities: In FY06, FY07, FY08, FY09, and FY10, funds in the amount of $10,000 annually were transferred to the NPS through a five-year agreement.

FY11 Accomplishments: Funds in the amount of $10,000 were transferred to the NPS through the first year of a new five-year agreement. In 2012, a report was generated to document 2011 activities. Major relict leopard frog conservation activities supported by these funds were completed at 15 sites within southern Nevada and northwestern Arizona and included:

1. 1,049 tadpoles and 288 juvenile frogs were released at three experimental and two natural sites.
2. Diurnal and nocturnal surveys were conducted year-round at natural and experimental sites; egg masses were seen at 10 of 15 sites and adult or juvenile frogs were seen at all but one site.
3. Union Pass Spring was added as a translocation site, and tadpoles and frogs were released in the spring.

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 2011 monitoring of experimental and natural populations of relict leopard frogs, and frog rearing and relocation activities.

Proposed FY13 Activities: Funds in the amount of $10,000 will be transferred to the NPS through the third 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. *Relict Leopard Frog Monitoring and Management, 2011 Activity Report* will be posted on the LCR MSCP website.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$90,000	$95,482.79	$415,081.35	$90,000	$95,000	$95,000	$0

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: Beal Riparian Restoration Site (Havasu NWR), Palo Verde Ecological Reserve, Cibola Valley Conservation Area.

Purpose: The purpose of this work task is to determine the effect of two abiotic factors, water and nutrient contents, on abundances of insects and insectivorous birds and bats covered by the LCR MSCP. Establishing vegetation at restoration sites will not by itself provide habitat for birds and other wildlife. Proper amounts of plant water and other nutrients in plants and insects will be needed to support wildlife.

Connections with Other Work Tasks (past and future): Work task C5 developed from the Southwestern Willow Flycatcher Prey Base Study (C20). Work task C20, completed in 2006, identified insects and spiders eaten by the southwestern willow flycatcher. Work task C6 was folded into C5 beginning in FY08. 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 is especially difficult at the LCR MSCP habitat creation sites being developed, because riparian vegetation is being planted in non-riparian farmland.

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 LCR 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. Greater abundances, or masses, of insects and spiders combined were not found on fertilized trees. Abundances and masses of insects in Homoptera (leafhoppers and aphids) were higher on branches on fertilized trees. Fertilizing trees with nitrogen had a small but significant affect on insect abundance and mass.

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.

A follow-up study was performed in 2010 examining the occurrence of resilin in insects. Resilin is an elastic protein found in the cuticle of insects, but not spiders that is digestible by birds. Most insect cuticle, where most nutrients reside, is hardened and not digestible by birds or bats. Resilin therefore may be in important source of protein nutrients for wildlife. Resilin fluoresces in UV light. We photographed a variety of insects in UV light to examine the prevalence of resilin. Resilin was abundant in grasshoppers, dragonflies, and true bugs and rare in flies and beetles.

FY11 Accomplishments: We examined amounts of sulfur in spiders and insects collected at the Beal Riparian Restoration Site during 2011. Sulfur occurs in two amino acids, methionine and cysteine, and a related compound, taurine, which are important nutrients for plants and animals. Insectivorous birds require these compounds for growth and reproduction. Concentrations of sulfur were measured in 4 families of spiders and 22 families of insects. Spiders contained higher sulfur-concentrations than insects, and concentrations of sulfur were lower in beetles than in other insects. Insectivorous birds, including the willow flycatcher, likely require spiders as prey to obtain required amounts of sulfur-containing compounds.

FY12 Activities: We will expand our investigations of nutrients in spiders and insects eaten by birds by including the element phosphorus. Phosphorus is found in adenosine triphosphate, the primary compound that supplies energy to all living cells. Concentrations of phosphorus in spiders and insects may influence foraging by insectivorous birds. In FY12, we will measure phosphorus concentrations in a variety of riparian spiders and insects collected from one or more of the LCR MSCP habitat-restoration sites.

Proposed FY13 Activities: The effects of plant water content, controlled by irrigation, may be examined if a study site becomes available. Alternatively, we will further examine the

importance of sulfur and phosphorus as nutrients for insectivorous wildlife. Insect immigration, especially from agricultural lands into restored habitat, may also be examined.

Pertinent Reports: Study plans are available upon request. The following reports were published in 2011:

Wiesenborn, W.D. 2011. UV-excited fluorescence on riparian insects except Hymenoptera is associated with nitrogen content. Psyche: A Journal of Entomology, available online at: www.hindawi.com/journals/psyche/.

Wiesenborn, W.D. 2011. Nitrogen content in riparian arthropods is most dependent on allometry and order. Florida Entomologist 94:71-80.

Wiesenborn, W.D. 2011. Biomasses of arthropod taxa differentially increase on nitrogen-fertilized willows and cottonwoods. Restoration Ecology 19:323-332.

Work Task C6: Insectivore Prey Base Abundance and Diversity in Riparian Restoration Sites

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$0	$0	$101,441.68	$0	$150,000	$175,000	$175,000

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

Re-Start Date: FY13

Expected Duration: FY15

Long-term Goal: Species Research.

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

Location: Topock Marsh (Reach 3, Havasu NWR, Arizona, 3 miles east of River Mile 243), Beal Lake (Reach 3, Havasu NWR, Arizona, 1 mile east of River mile 239), and Cibola Valley Conservation Area (Reach 4, Reclamation, Hopi Tribe, and Mohave County, Arizona, south of River Mile 103).

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

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

The LCR MSCP now has several habitat creation sites that are of the right structure for several covered species. Most of these habitat creation sites include using mass planting techniques to establish target tree densities similar to known densities of covered species habitat. This technique has been effective and successful for the development of habitat for the LCR MSCP, but it circumvents the “typical” and gradual stages of plant succession (i.e. changes in species composition over time) that takes place as habitats develop slowly over time; a process that allows for a simultaneous succession of arthropod species. The LCR MSCP needs data to show which arthropod species are currently present or absent at LCR MSCP sites.

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

Connections with Other Work Tasks (past and future): This is a re-initiation of Work Task C6 that was in place during FY 06-07. This work task initially developed from Southwestern Willow Flycatcher Prey Base Study (C20). Work task C20, completed in July 2006, identifies insects and spiders eaten by the southwestern willow flycatcher. This work task, C6, parallels work task Effects of Abiotic Factors on Insect Populations in Riparian Restoration Sites (C5).

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

Previous Activities: We identified insects collected from tamarisk (*Tamarix ramosissima*) flowers during FY06 at Topock Marsh, Arizona, where earlier work identified insects eaten by Southwestern Willow Flycatchers. We also estimated specificities of insects to tamarisk flowers by determining proportions of pollen carried comprised of tamarisk pollen. All insects collected were specific to tamarisk flowers, with pollen loads comprising greater than 86% tamarisk pollen on leaf-cutting bees and *M. tepida,* and greater than 95% on other insects.

FY11 Activities: N/A

FY12 Activities: N/A

Proposed FY13 Activities: This study will determine arthropod species richness associated with vegetation monitoring plots at four LCR MSCP habitat creation sites. This study will also estimate abundances of insect species found at LCR MSCP habitat creation sites.

Insect species richness and estimates of abundance will be determined at LCR MSCP vegetation monitoring plots utilizing several collection methods which may include sweeps, traps, and stem counts. Arthropods will be collected, counted and, at a minimum, be identified to the family, if not genus level.

Pertinent Reports: The study plan is available upon request.

Work Task C10: Razorback Sucker Rearing Studies

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$125,000	$132,922.93	$693,462.54	$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: Provide RASU of sufficient quantity and quality for the Fish Augmentation Program, and ensure that these fish are reared in a cost-effective manner.

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 task is a companion study to Bonytail Rearing Studies (C11) and may share some of the same locations, source data, and testing staff during implementation. Also, investigations carried out may be conducted at hatcheries identified in Section B.

Project Description: These projects provide funding for investigating rearing and culture practices 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.

During 2009 RASU were reared in recirculating raceways at Willow Beach NFH to determine maximum growth. RASU grew on average 110 mm and doubled their weight in 2009. RASU growth studies continued in 2010 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.

Polyculture of RASU and BONY was investigated at Achii Hanyo Rearing Station in 2009 and 2010. In December of each year 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. Polyculture of BONY and RASU were not detrimental to either species provided that densities did not exceed carrying capacity.

FY11 Accomplishments: ADFG is in the fifth year of research investigating factors to improve growth in rearing ponds. Data suggest that the current growth rates (6-9 mm/ month) at Bubbling Ponds SFH cannot be exceeded due to current production goals and the presence of *Ichthyophthirius multifiliis* in the receiving waters. The final report, *Growth of Razorback Sucker (Xyrauchen texanus) at Bubbling Ponds Fish Hatchery* is in review and will be posted to the LCR MSCP website once finalized.

The USFWS completed the first year of a two-year investigation of RASU growth to 500 mm reared in raceways. 1,494 RASU were PIT tagged, weighed, and measured. Sample counts were performed every two months and feed, temperature, and mortality data were collected daily.

A workshop to review the status of culturing native Colorado River Fishes was planned to be held in Boulder City, Nevada in August. However, the workshop was postponed due to travel restrictions. The workshop may be held at a later date.

FY12 Activities: Classical conditioning techniques will be used while introducing predator-naive RASU to predators with temporarily incapacitated jaw muscles in the presence of its conspecific alarm substance. Survival of conditioned and unconditioned RASU exposed to a single predatory species will be compared.

The USFWS will stock growth study fish, compile data, evaluate results, and submit a final report.

Proposed FY13 Activities: Conditioning studies are to continue with survival of conditioned and unconditioned RASU exposed to multiple predatory species compared.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$150,000	$57,589.11	$713,586.43	$150,000	$150,000	$150,000	$150,000

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

Start Date: FY06

Expected Duration: FY15

Long-term Goal: Provide BONY of sufficient quantity and quality for the Fish Augmentation Program, and ensure that these fish are reared in a cost-effective manner.

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: This work task 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). Funds are expended over numerous small studies which provide information to fill in gaps in this species' life history.

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 currently being carried out. 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 brood stock 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. 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.

Arizona State University conducted a comprehensive review of available published and gray literature, compiling it into an annotated bibliography.

Investigations into handling stressors in BONY at Achii Hanyo Rearing Facility were completed. Recommendations were that fish tagging should be done at temperatures below 16°C.

A site visit to Achii Hanyo Rearing Facility during the annual harvest was conducted. Observations were made on the culturing, handling, tagging, and transporting procedures at Achii Hanyo Rearing Facility. 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.

FY11 Accomplishments: FY11 activities were limited due to the detection of Largemouth Bass Virus (LMBV) at Dexter NFH. Dexter maintains the only broodstock of BONY and were unable to transport BONY off station most of FY11, limiting the availability of BONY for research purposes. The workshop to review the status of culturing native Colorado River Fishes was planned to be held in Boulder City, Nevada in August. However, the workshop was postponed due to travel restrictions. The workshop may be held at a later date.

Site visits were made to Cibola High Levee Pond, Parker Dam Pond, Davis Cove, and Imperial Ponds to evaluate cover available at backwaters where BONY are known to persist and spawn. This information was used to develop Work Task C58, Investigating Habitat Cover for BONY. Discussions were held with research agencies to improve survival of BONY after stocking into the LCR. A research proposal was designed with AGFD to investigate predator recognition associated with an alarm substance in BONY.

FY12 Activities: Classical conditioning techniques will be used while introducing predator-naive BONY to predators with temporarily incapacitated jaw muscles in the presence of its conspecific alarm substance. Survival of conditioned and unconditioned BONY exposed to a single predatory species will be compared.

Proposed FY13 Activities: Conditioning studies are to continue with survival of conditioned and unconditioned BONY exposed to multiple predatory species compared.

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

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$200,000	$196,158.23	$1,044,536.89	$0	$0	$0	$0

Contact: Jon Nelson (702)293-8046, jrnelson@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 brood stock for the LCR MSCP.

Connections with Other Work Tasks (past and future): This activity uses data managed under G1 and collected under C23.

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 brood stock 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 sonic tracking of fish was used to assess distribution and survival. Demographic modeling was used to assess population structure. The study was designed as a multi-year, iterative process. Observations and conclusions from first-year activities provided direction for work in subsequent years. Initial findings 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 has taken longer than expected. Only a few hundred fish were available for research subjects during 2007.

Three additional six-month sonic telemetry studies were conducted from FY08 through FY10. The first two studies focused on comparative post-stocking survival of adult (500 mm TL or longer) and subadult RASU (350 mm TL to 415 mm TL). Adult survival was 36% (5 of 14 tracked throughout the study) and 80% (16 of 20) for the first and second study respectively, while subadult survival was 7% (1 of 15) and 67% (6 of 9), respectively. The final telemetry study compared the post-stocking survival of adult RASU raised at Bubbling Ponds and released into the lake with repatriate RASU captured in Lake Mohave. All study fish remained active for the entire six-month study period (100% survival).

The four sonic telemetry studies completed under this work task implicated predation as a major cause of post-stocking mortality, and 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. 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.

Based on monitoring data from 2009 and 2010, the wild RASU population in Lake Mohave was 30 fish. The repatriated RASU population was estimated to number 1,439 with a 1% estimated survival of all repatriates released as of March 2009.

In addition to routine monitoring data, remote sensing data from a study to evaluate the efficacy of the technique for monitoring RASU on Lake Mohave (C23 closed in 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).

FY11 Accomplishments: Routine monitoring during March 2011 resulted in the capture of 13 RASU. Population estimates from March roundup data declined for wild fish; however, the repatriate population estimate increased by more than 100% between 2009 and 2010. Wild population estimates declined from 24 fish in 2009 to 13 fish in 2010, and repatriated RASU estimates increased from 1,439 to 2,966 fish. The current (2010) total population estimate for RASU in Lake Mohave is 2,979.

Stocking simulations based on size-survival relationships and growth and release data from the Lake Mohave Native Fish Work Group database reveal that post-stocking survival for RASU is between four and eight times higher when the target release size is 45 cm compared to a target size of 30 cm. Uncertainty in results is due to differences in stocking protocols between the 1990s and 2000s including stocking size and location.

Remote PIT-scanners were deployed twice a month in the riverine portion of Lake Mohave upstream of Willow Beach from February through September 2011, and in the basin from February through April 2011. These efforts contacted 1,044 unique RASU. Scanning data from 2010 and 2011, along with March roundup and electrofishing data, resulted in zone-specific population estimates of 1,086 and 1,654 RASU (134.2kHz PIT tags only) for the basin and river zones, respectively. Only seven individuals contacted were detected in both river and basin zones, suggesting relatively segregated populations, although those few fish moving between zones may be adequate to maintain gene flow.

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

Proposed FY13 Activities: Closed in FY11.

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

Work Task C13: Lake Mead Razorback Sucker Study

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$125,000	$80,324.83	$1,386,783.91	$125,000	$135,000	$135,000	$135,000

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. The focus areas of these studies are to:

1. Locate populations of RASU in Lake Mead.
2. Document use and availablility 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 had 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.

FY11 Accomplishments: Monitoring of RASU ecology in Lake Mead as described in the report *Lake Mead Razorback Sucker Monitoring Recommendations* (available on the LCR MSCP website) 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 (see D8).

The second year of research in the Colorado River inflow (CRI) area of Lake Mead was completed in FY11. Using sonic-tagged RASU to locate potential spawning sites, larval sampling was conducted on 39 nights and resulted in the capture of 65 larval RASU and 11 larval FLSU. Trammel netting was used to capture adults where concentrations of razorback sucker were suspected, and fin ray specimens were obtained from adult razorback sucker for aging purposes. From 187 net-nights, 9 wild razorback suckers, 7 razorback-flannelmouth sucker hybrids, and 112 flannelmouth suckers were captured. Of these fish, 2 razorback suckers, 1 hybrid, and 39 flannelmouth suckers were recaptures from 2010. Three of the wild razorback suckers were males expressing milt; the other six were females showing signs of spawning, which helped confirm spawning activities. To our knowledge these are the first female razorback suckers collected from within the CRI. Ages from the seven new wild razorback suckers ranged from 6-11 years.

FY12 Activities: All research actions including larval sampling, trammel netting, monitoring of sonic-tagged fish, evaluating growth rates of recaptured fish, and fin-ray sectioning for aging subadult and adult RASU are expected to continue. Sampling efforts will be performed at the same level as FY11 to increase the opportunity of contacting various life stages of RASU in the area. If captured through trammel netting efforts, 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. Data obtained through these actions will help further identify the size, age structure, habitat use, spawning areas, and recruitment patterns of the RASU aggregate located in the CRI.

Proposed FY13 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 three study years.

Pertinent Reports: The *Razorback Sucker Studies on Lake Mead, Nevada and Arizona 2010-2011 Final Annual Report,* and the *Razorback Sucker Investigations at the Colorado River Inflow Area Lake Mead, Nevada and Arizona 2011 Final Annual Report* are available upon request and will be posted to the LCR MSCP website.

Work Task C14: Humpback Chub Program Support

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$75,000	$71,883.70	$202,501.52	$11,000	$57,000	$57,000	$57,000

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

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Support 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 was in place for FY09-FY11. This increased funding effort between FY09 and FY11 along with the baseline funding levels between FY06-08 means that approximately half of the original $5,000,000 commitment to this work task has been spent.

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. Through the end of 2010, 657 HUCH have been brought on station for 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.

FY11 Accomplishments: This marks the third 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 500 young of the year HUCH collected from the Little Colorado River, Grand Canyon. Following a quarantine period, 200 fish were added to the captive broodstock and 300 will be translocated into Havasu Creek in spring 2012. In 2011 Dexter successfully maintained 857 HUCH; 277 (2008 year class), 205 (2009 year class), 175 (2010 year class), and 200 (2011 year class). Acute toxicity tests were conducted on HUCH larvae and juveniles to determine median lethal concentration (LC50) of potassium chloride.

FY12 Activities: Options for allocation of the remaining funds are being considered and a decision will be made this fiscal year. 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. A total of 300 HUCH will be translocated into Havasu Creek in spring 2012.

Dexter staff will also evaluate and refine fish culture, marking, and transport methodologies for wild-caught HUCH.

Proposed FY13 Activities: Continue support for HUCH conservation in coordination with USFWS and Glen Canyon AMP. The goal is to achieve 1,000 individuals in the refuge population at Dexter.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$25,000	$23,239.78	$495,740.45	$0	$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: Provide funding to 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, C53 and D8 as all FLSU and RASU captured provided tissues for aging and for genetic analyses, and the capture data are covered in the System Monitoring program. This work was the precursor to the C53 work task.

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, seven 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. Twenty-eight adult flannelmouth suckers were fin clipped for aging purposes and averaged 15 years of age (range 7-26). The telemetry work continued with tracking of about seven active transmitters in FY09. 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 was the final field year, and we conducted sampling for all life stages of FLSU. Collection efforts utilizing seines for YOY relative abundance were extended from river mile 251to 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 boat ramp. These juveniles represent the eighth and ninth juveniles collected since 2006. We collected 228 adults with trammel nets and boat electrofishing. The population at this time 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 Accomplishments: A final report assimilating the data for the five-year study was prepared, along with a management needs strategy that assesses main channel and backwater habitats for the benefit of FLSU.

FY12 Activities: Closed in FY11.

Proposed FY13 Activities: Closed in FY11.

Pertinent Reports: Annual reports titled, *Investigations of Flannelmouth Sucker Habitat Use, Preference and Recruitment Downstream of Davis Dam*, for 2007, 2008, and 2009, along with the 2006-2010 final report, are available on the LCR MSCP website.

Work Task C24: Avian Species Habitat Requirements

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$175,000	$183,056.69	$643,095.14	$200,000	$200,000	$250,000	$250,000

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

Location: LCR MSCP project area; Imperial Ponds HCA, Arizona.

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. Studies will be conducted to determine habitat requirements for riparian obligate species. Results from these studies may be utilized in created habitats. Habitat models will be created for the Sonoran yellow warbler,

Arizona Bell's vireo, summer tanager, Gila woodpecker, vermilion flycatcher, gilded flicker and elf owl. 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.

In 2010, a draft report summarizing the results of the GIS habitat model was 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.

Habitat Associations for Riparian Obligate Species. 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 with non-use sites from the same region and habitat type. From 2008-2010, habitat data was gathered at144 use and 181 non-use sites for the Arizona Bell's vireo, Sonoran yellow warbler, summer tanager, vermilion flycatcher and the Gila woodpecker. Habitat assessments were not conducted for the gilded flicker due to lack of gilded flickers detected in the bird surveys. A preliminary habitat suitability model was created for these species from the three years of data (2008-2010).

FY11 Accomplishments:

Restoration of Managed Marsh Units to Benefit Black Rail and other Marsh Birds. A final report has been submitted to Reclamation and this marsh bird habitat study has been completed. Final results indicate that with proper water level management and marsh vegetation species present, management for black rail, clapper rail and other marsh bird species can be

accomplished in the same impoundment. The probability of black rail occupancy was positively associated with chairmaker's bulrush and southern cattail, negatively associated with river bulrush, and highest if the water depth was maintained between -44mm and 40mm. For clapper rails, positive correlations with early successional cattail and *Phragmites* were found coupled with water depths between 0-65mm. A sample wetland design based on the results of this study would include 3 components: 1) an area with shallow and stable water depths at one end of the impoundment planted with chairmaker's bulrush, 2) a gradual slope planted with a mix of 30% chairmaker's bulrush and 70% cattail, and 3) an area with deep water (250-350 mm) planted with cattail.

Wetlands can be managed simultaneously for both California black rails and Yuma clapper rails by 1) maintaining mostly shallow water depths (saturated soil to <40 mm), 2) maintaining stable water in shallow areas (where black rails are expected), and 3) promoting chairmaker's bulrush in shallow water areas (<30 mm) where black rails are most likely to occur and southern cattail in deeper water areas (>30 mm) where clapper rails are most likely to occur. Planting species other than chairmaker's bulrush or southern cattail is not recommended. In areas where water depths are likely to exceed 350 mm, California bulrush, which is tolerant of deep water and common on the lower Colorado River, can be planted instead of cattail, as cattail will likely become established voluntarily. Planting any new marsh restoration sites should occur immediately after water is added to the site to discourage the growth of *Phragmites* and other invasive plants. The use of automated irrigation procedures such as those implemented in impoundments 16 and 18 in 2010 are strongly recommended as automated irrigation stabilizes water depth, reduces the time and money necessary to maintain water delivery, and ensures proper water levels during holidays and weekends.

Yellow-billed Cuckoo Habitat Modeling. A draft final report has been reviewed by Reclamation and is in final preparation with USGS. Landscape-scale habitat variables on cuckoo distribution and the identity of features that constitute high quality cuckoo habitat within the Bill Williams River NWR and the Grand Canyon/upper Lake Mead areas were used to develop a habitat model. The model will be enhanced by including recent cuckoo habitat created under the LCR MSCP at PVER and CVCA, which is quite different from previous cuckoo nesting areas that were included in the model.

Habitat Associations for Riparian Obligate Species. In 2011, system wide surveys (D6), post-development monitoring on habitat conservation areas (F2) and habitat modeling were continued under a new contract. More detailed habitat models for the Sonoran yellow warbler, Gila woodpecker, Arizona Bell's vireo and the summer tanager are to be created during a five year period from 2011-2015. These models will add to the preliminary models developed from 2008-2010. Fifty use and fifty non-use sites will be evaluated per species over the five year period (10 per year).

In 2011, the first year of data for these models was collected from mid September to mid October. Ten use site and 10 non-use sites were evaluated per species for the four species mentioned above. Ten use sites were randomly chosen from all available territories and paired with a non-use site randomly chosen in the same habitat stratum and region. Vegetation plots were randomly placed within use sites (established territories) with one vegetation plot per two acres. There was a maximum of five vegetation plots within each territory (established

territories). Only one vegetation plot was measured per non use site regardless of the territory size of its paired use site. The random points translated to the center of each vegetation plot.

Temperature and humidity were also assessed at the vegetation plots. Six vegetation plots per species were randomly selected from all the use site vegetation plots and the non-use site vegetation plots. The data loggers were set to record temperature and relative humidity measurements every 15 minutes.

FY12 Activities:

Yellow-billed Cuckoo Habitat Modeling. The USGS habitat model and report will be reviewed and finalized, and additional LCR MSCP conservation site data will be added to enhance the model.

Habitat Associations for Riparian Obligate Species. Habitat assessments for the new detailed models (2011-2015) will continue to be conducted in 2012. Ten use sites (established territories) and ten non use sites will be evaluated per species for the Sonoran yellow warbler, Gila woodpecker, Arizona Bell's vireo and the summer tanager. The parameters measured and field protocol will be the same as in 2011.

Data will be downloaded from the data loggers that were established in August and September of 2011 every three months. In August and September of 2012 the data loggers will be moved to six new randomly selected use vegetation plots and six randomly selected non use vegetation plots.

In 2012, the 2011 and 2012 data will be entered into the BOR vegetation database. The 2011 and 2012 data will be analyzed and included in the 2012 report.

Proposed FY13 Activities:

Habitat Associations for Riparian Obligate Species. Habitat assessments for the new detailed models (2011-2015) continue to be conducted in 2013. In 2013, ten use sites (established territories) and ten non use sites will be evaluated per species for the Sonoran yellow warbler, Gila woodpecker, Arizona Bell's vireo and the summer tanager. The parameters measured and field protocol will be the same in previous years.

Data will be downloaded from the data loggers that were established in August and September of 2012 every three months. In August and September of 2013 the data loggers will be moved to six new randomly selected use vegetation plots and six randomly selected non use vegetation plots.

Habitat Associations for the Elf Owl. A habitat modeling study for the elf owl will be initiated in FY2013. The objective of the study is to quantify habitat preferences of elf owls in riparian habitat.

A thorough literature review of elf owl habitat studies and preferences will be initiated. The only known population of elf owls within the LCR MSCP program area is located at the Bill Williams NWR on the edge of mosquito flats. Additional populations of elf owls in riparian habitats similar to type of habitat in the LCR MSCP program area will be located. Preferably, some

locations will include elf owls that are nesting in cavities in riparian trees (willows, cottonwoods, etc.). Habitat factors that need to be rigorously tested in the study will be defined. A study plan and scope of work will be drafted for the study.

Pertinent Reports: Study plans are available upon request. The following reports are posted on the LCR MSCP website: *Lower Colorado River Riparian Bird Surveys 2011; Restoration of Managed Marsh Units to Benefit California Black Rails and other Marsh Birds: An Adaptive Management Approach, Final Report 2011*.

Work Task C25: Imperial Ponds Native Fish Research

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$235,000	$252,351.95	$835,475.48	$250,000	$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.

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 as delineated in ArcView. 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. The renovation of pond 3 was successful; no fish have been detected to date.

FY11 Accomplishments: Continued research on habitat use and recruitment of RASU and BONY. November 2010 thru March 2011, 124 RASU were captured and removed from ponds 2, 4, and 6 and 109 BONY were captured and removed from pond 2, all were transferred to pond 1. RASU and BONY populations remained stable without a detectable decline in numbers since release. Larval sampling was conducted in pond 1, resulting in 0 BONY and 60 RASU being captured.

Four BONY and 10 RASU were implanted with acoustic transmitters in March 2011. BONY were distributed in deep waters along the north, south, and northeast corner during daylight monitoring, and in open water across the length of the pond avoiding shallow areas during night time monitoring. RASU utilized deep waters west of the hummock during the day and night-time monitoring results found RASU concentrated on the boat ramp and on or around the six gravel spawning beds. Spatial overlap was minimal between the two species.

FY12 Activities: Monitoring of survivorship and recruitment of BONY and RASU will continue in pond 1. A five-year research priorities plan will be developed.

Proposed FY13 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 are posted to the LCR MSCP website.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$70,000	$4,795.46	$162,522.23	$0	$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 the 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 under the Lake Mead Fish Hatchery Work Task (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 under non-flowing conditions.

This research is designed to take advantage of a unique opportunity at Lake Mead SFH. Research previously completed at the Achii Hanyo Rearing Station (B3) by the USGS and USFWS showed 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 State 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. 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 were 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 were planned for the following study year to help validate these findings and direct future research in this area.

FY11 Accomplishments: Rearing trials continued with minor modifications to the initial study design. Previously fish had been exposed to flowing conditions for twelve out of every twenty-four hours, but in the final study year one of the treatments from each trial increased flow to eighteen hours per day. Another change that occurred during the final study year was the inclusion of winter trials which aimed to evaluate the effect of water temperature on growth, food conversion efficiency, and swimming performance. Winter trials averaged 13°C for their duration while summer trials averaged around 20.5°C.

Results from the FY11 trials helped to validate the findings from the previous study year. Again RASU exposed to the highest velocity flows (38 and 39 cm/s) exhibited the most growth, highest food conversion efficiency, and best swimming performance when compared to lower flow and no flow treatments. Unexercised fish grew an average of 0.44 mm/day, while fish exercised for 12 and 18 hour periods grew an average of 0.85 mm/day and 0.94 mm/day respectively. It was also observed that growth rates were significantly lower during the winter trials. Food conversion rates showed a similar trend and were highest among fish exercised in the summer trials. RASU flow conditioned for 12 hour periods during the summer exhibited a 43% higher mean failure velocity than fish exercised for the same period in the winter. Similar results were observed for the 18 hour trials, where summer months produced a mean failure velocity that was 45% higher than the winter trials. These findings suggest that rearing RASU in flowing conditions for a period of 30 days has a positive effect on overall growth, food conversion efficiency, and swimming performance. Additional research evaluating optimal densities for rearing fish under these conditions as well as how improved swimming performance may enhance predator avoidance and survival may be explored in the future.

FY12 Activities: Closed in FY11.

Proposed FY13 Activities: Closed in FY11.

Pertinent Reports: The 2010 annual report titled, *Evaluation of Rearing Razorback Sucker (Xyrauchen texanus) in Flowing Raceways at Lake Mead Fish Hatchery*, and the final project report from 2011 titled, *Final Evaluation of Flow Conditioning Razorback Sucker (Xyrauchen texanus) in Flow-Through Raceways at Lake Mead Fish Hatchery* will be posted to the LCR MSCP website.

Work Task C27: Small Mammal Population Studies

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$70,000	$42,984.20	$301,028.84	$50,000	$50,000	$0	$0

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

Start Date: FY08

Expected Duration: FY13

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.

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. Population monitoring and habitat model development research began in FY10.

FY11 Accomplishments: Trapping grids continued at three 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.

FY12 Activities: Vegetation/habitat data collection finished in the fall of 2011. Mark-recapture data will continue to be collected at the three sites and may be expanded as additional populations become established at habitat creation areas. Because there was insufficient data to complete appropriate statistical analysis, data will be collected for one more year. A complete analysis of the habitat characteristic part of the study will begin. A population monitoring protocol for S*igmodon* is being developed with the demographic and capture data generated here and under D10 and F3.

Proposed FY13 Activities: Continue population/demography monitoring design and research. Long term datasets are necessary for this species because of drastic population cycles which may have short-term local effects on the population. A complete analysis of the habitat characteristic part of the study will be completed and a long term protocol for the population/demography portion of the study will be finalized.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$150,000	$91,603.18	$237,588.46	$150,000	$160,000	$0	$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 operations at Willow Beach NFH. 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. In FY10 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 Accomplishments: A new two-year agreement was formed in FY11, as standard operating procedures with KCL/formalin were not found to be effective under water conditions present at Willow Beach NFH. Objectives of the new agreement are: 1) to perform a literature search on physiological stress responses of mussel species to chemical and environmental stressors, 2) to develop alternative treatment protocols, and conduct tests using those protocols in a laboratory setting on quagga mussel veligers at Willow Beach NFH to determine lethality, 3) to test protocols found to produce 100% mortality of veligers from objective 2 on endangered fish species to determine the effect of the treatment on fish, 4) based on the results from objective 3, conduct trials to evaluate lethality of treatment protocols under normal transport conditions with fish present, and 5) make management recommendations for hauling protocols to agencies transporting fish from quagga-positive waters. Objectives 1, 2, and part of 3 were accomplished in FY11. The literature search resulted in six chemicals being chosen for testing on quagga mussel veligers; benzocaine, clove oil, magnesium chloride ($MgCl_2$), menthol, a clove oil/menthol mix, and propylene phenoxytol. Four of the six chemicals produced 100% mortality in quagga mussel veligers but only at relatively high concentrations within the specified time frames of each test. However, a high degree of physical deterioration was observed among the surviving veligers in the lower concentrations of $MgCl_2$. Preliminary acute toxicity tests with those four chemicals were then conducted on juvenile humpback chub at Dexter. Menthol, the clove oil/menthol mix, and propylene phenoxytol were found to be highly toxic, killing all the fish in less than 30 minutes in the concentrations needed to kill mussel veligers. Magnesium chloride has shown the most promise to date for a potential treatment to be used for quagga mussel veligers.

FY12 Activities: Research will be conducted to determine the lowest concentration of $MgCl_2$ required to produce 100% veliger mortality. Research on the acute toxicity of $MgCl_2$ to endangered larval fish species as well as the chronic effects on larval development will be conducted. Research on $MgCl_2$ toxicity to mussel veligers may also be expanded to include

different water quality conditions such as temperature and hardness, and potential synergistic effects of chemical additives. Currently regulations on the use of $MgCl_2$ to treat water containing fish intended for consumption are being investigated through cooperation with Colorado Division of Wildlife (CDOW). 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.

Investigations into the efficacy of Zequanox, a trademarked bio-control agent, will also be undertaken in 2012. Zequanox has been shown to be effective in controlling the spread of quagga and zebra mussels in other parts of the country and work will be done to test its efficacy in the water quality parameters present in the Lower Colorado region.

Proposed FY13 Activities: Investigations will continue into alternative treatment regimes.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$125,000	$111,372.84	$315,969.69	$125,000	$130,000	$130,000	$130,000

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, F5, and C40). Larval and tissue samples are collected from each Reach of the program wherever RASU are captured. This includes work accomplish under work task D8, C13, C33, C45, C49.

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: Samples of larvae and adult fin clips were obtained on an annual basis from multiple time periods and from various spawning areas, reservoirs, river reaches, and off-channel habitats within the LCR MSCP area. DNA was extracted and samples characterized for

mtDNA and microsatellite variation. 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 Accomplishments: Annual analyses of samples for mtDNA and microsatellite variation were completed. All available data (from samples collected over the past 15 years) was analyzed and a draft final report generated that summarizes all results to date. Analyses indicate that the razorback sucker conservation strategy employed in Lake Mohave is maintaining genetic diversity. Interpretation of the data in the context of effective number of breeders and census size identifies the importance of increasing census population size in Lake Mohave.

FY12 Activities: Reclamation will continue to assess razorback sucker genetics for the LCR through analyses of RASU fin clips and larvae collected from spawning areas, reservoirs, river reaches, and off-channel habitats within the LCR MSCP area.

Proposed FY13 Activities: Collection of larval RASU, fin clips, and muscle plugs will continue from spawning areas within the LCR MSCP area. DNA will be extracted and samples characterized for mtDNA and microsatellite variation.

Pertinent Reports: The study plan for Razorback Sucker Genetic Diversity Assessment is available upon request. All interim reports are posted to the LCR MSCP website. A draft final report is under review and will be posted to the website upon completion.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$100,000	$92,560.49	$265,682.30	$125,000	$115,000	$115,000	$115,000

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

Start Date: FY09

Expected Duration: FY17

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

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

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

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

Connections with Other Work Tasks (past and future): This work began under Adaptive Management Research Projects (G3). This work is related to management of fish habitat restorations sites (e.g., E14).

Project Description: This study will evaluate through laboratory testing the threshold levels 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, dissolved oxygen, and temperature). Reclamation has now extended the study for five years to allow for the inclusion of pH studies and the investigation of double parameter tests for eggs, larvae, and fingerlings.

Previous Activities: Laboratory research began in March of FY07 under work task G3. Salinity concentrations evaluated during the first two study years indicated that upper salinity tolerances ranged from 11,000 to 12,000 µS/cm and from 23,000 to 27,750 µS/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 µS/cm when larval RASU are properly acclimated. FY09 was the first year this continuing research was accomplished under work task C32. During this study year research to determine RASU early life stage dissolved oxygen limits was conducted. 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. 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. Research during the FY10 study year was focused on determining the threshold levels of pH for early life stage RASU. Results from egg trials indicate that the threshold levels for successful embryo development are between pH 9 and 10. The pH threshold observed for RASU larvae was slightly higher, with long-term exposure (20 days) to pH 10 resulting in 98% survival.

FY11 Accomplishments: Research during this study year focused on determining the threshold levels of pH for fingerling BONY and RASU survival. Trials for BONY and RASU were run separately, and both were exposed to pH ranging from 7 to 11 at 20°C and 30°C. Survival was evaluated at 72 hours (acute toxicity) and after 15-20 days of exposure (chronic toxicity). Each pH treatment was run as a static bath in triplicate and each tank contained 20 or 25 fish depending on availability. Water quality was recorded at least three times each day, and manual water exchanges were performed when un-ionized ammonia concentrations (measured as mg NH3-N/L) began to increase. Bio filters were also used to alleviate un-ionized ammonia buildup.

Results from BONY trials indicate that the threshold levels for survival are likely near pH 10 at both 20°C and 30°C. At both temperatures low levels of mortality were observed during the first 72 hours, but mortality increased to 93% after 20 days of exposure at 20°C and to 83% after 15 days of exposure at 30°C. Survival improved at pH 9.5 with only 22% mortality after 28 days at 20°C and approximately 40% mortality after 15 days at 30°C. It should be noted however that BONY exposed to pH 9 at 20°C displayed zero mortality over 20 days and only 8% mortality after a 15 day exposure at 30°C.

Results from RASU trials also indicate that the threshold levels for survival are likely near pH 10 at both 20°C and 30°C. For the 20° trials, zero mortality was observed during the first 72 hours, but mortality increased to 87% after 15 days of exposure. Survival at 30°C was lower, with 38% mortality observed in the first 72 hours and 97% mortality observed over 15 days. Similar to the results from the BONY trials, RASU survival increased significantly in pH 9.5 and below.

FY12 Activities: Research during this study year will be focused on determining dissolved oxygen limits for fingerling BONY. It is anticipated that multiple trials will be run to evaluate the combined effects of increased temperature and decreased dissolved oxygen on BONY survival. The current study design includes dissolved oxygen levels of 1 mg/L to saturation (at 1 mg/L increments) and temperatures of 20°C, 25°C, and 30°C. Additional trials may be conducted for fingerling RASU if they become available during the study year.

Proposed FY13 Activities: Research actions will continue to build based on findings from previous study years, observations and measurements made during monitoring, and the review of available literature.

Pertinent Reports: Study plans are available upon request. A draft report, *Effects of Elevated pH on Egg and Larval Stages of Razorback Sucker,* detailing the 2010 pH study is in review, and the 2011 annual report, *Effects of Temperature and Elevated pH on mortality of Juvenile Bonytail and Razorback Sucker,* is in development.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$100,000	$50,844.82	$326,891.97	$100,000	$100,000	$0	$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 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 brood stock 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 35,000 RASU (>300 mm TL) have been PIT tagged and released into Reach 3 and its associated floodplain since October 2006, and all are research subjects for this study. More than 24,000 have either been stocked directly into the main channel or redistributed into the main channel following grow out at off-channel habitats, of which 2,086 were greater than 400 mm TL. The remaining fish are still growing in various off-channel habitats that are currently being managed by the LCR MSCP and/or 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 larger 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.

FY11 Accomplishments: Large numbers of RASU in excess of 500mm TL have been difficult to obtain, and approximately 500 fish in excess of 450mm TL were harvested from off-channel habitats and released into the main channel near Needles, CA. The reduced target size should still allow for meaningful analysis in determining the effects size has on survival. The fish augmentation program has continued the PIT tagging of RASU greater than 300 mm TL for release into Reach 3, and a total of 10,551 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 during annual multi-agency surveys, as well as contacts resulting from other work task, such as C45.

To date 488 fish have been captured and met the requirements for being included in the analysis for the differential survival. Further analysis of the 488 captured razorbacks showed relative capture probabilities for each four size classes (< 300 mm, 300-349 mm, 350-399 mm, and ≥400 mm) that ranged from of 1.35, 1.29, 2.84, and 3.07 percent, from smallest to largest. These capture probabilities were significant between all size classes. This illustrates a positive correlation between size at release and capture probability, which is a clear indication of survival.

FY12 Activities: The stocking/harvesting activities listed in FY11 will be continued, along with the monitoring associated with annual multi-agency surveys. A contract was awarded in FY12 to initiate remote scanning of the numerous spawning aggregations in Reach 3. Based on results seen in Lake Mohave, it is expected that the remote sensing will increase the total number of RASU contacts and allow for greater analysis relative to differential survival.

Proposed FY13 Activities: The activities listed in FY12 will be continued. This will be the second year of the remote sensing contract and our efforts may shift depending on FY11 results. A final report summarizing the 5 years of work with recommendations for the program's Fish Augmentation Plan will be completed and posted to the LCR MSCP website.

Pertinent Reports: A report summarizing work completed through FY11 in draft and will be posted to the LCR MSCP website upon completion.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$10,000	$12,304.81	$124,019.12	$0	$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 at Conservation Areas (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 and FY10. Samples were analyzed and zooplankton community structures were characterized and identified to the division, genus, and species levels.

FY11 Accomplishments: Efforts during the last year of the study were focused on summarizing and interpreting data from two years of sampling. A literature search for publications detailing the known food and feeding habits of native fish was also completed, and a comparison between the observed zooplankton community of these ponds and what was found in the literature was begun. A short series of feeding trials was conducted in the laboratory to evaluate the food preference of larval RASU. Zooplankton were sampled from Lake Mead using standard methods and introduced into tanks containing know numbers of larval RASU. Larval RASU appeared to feed solely on zooplankton of the *Bosmina* genus. This finding reflects information found within previously published literature.

FY12 Activities: Closed in FY11.

Proposed FY13 Activities: Closed in FY11.

Pertinent Reports: An outline for the final project report, *Characterization of Zooplankton Communities in Off-Channel Native Fish Habitats,* has been drafted and all pertinent data sets have been prepared. It is anticipated that the report will be available through the LCR MSCP website in 2012.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$150,000	$146,076.28	$21,849.74	$175,000	$150,000	$0	$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 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.

Previous Activities: 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 Accomplishments: This was the first year of the project. One western red bat was captured and tracked at the ʻAhakhav Tribal Preserve (AKTP) and another was captured and tracked at the Palo Verde Ecological Reserve (PVER) during the cold season (February-March). During the warm season (May-July), six red bats were captured across three sites: PVER, Cibola Valley Conservation Area (CVCA), and the San Pedro River Preserve. Red bats were most often found roosting in Fremont cottonwoods, but other trees that were used included coyote willow, Athel tamarisk, and Mexican fan palm. Most red bats captured within habitat creation areas were

tracked back to roosting locations within those areas. Preliminary analysis shows a possible roosting preference based on patch scale characteristics rather than specific tree characteristics.

A total of nine western yellow bats were captured (all during the warm season) across five sites: a re-vegetation area at Havasu NWR, AKTP, PVER, CVCA, and Cienega Park, Tucson, Arizona. All yellow bats except one were tracked back to Mexican fan palms. A single yellow bat captured at Havasu NWR that was released on a cottonwood near the capture site was found in the same location the next day and was never found on any subsequent visits. Preliminary analysis shows that yellow bats may have a tree specific roosting preference that is highly correlated with palm trees with large skirts of dead fronds.

FY12 Activities: The project will continue in 2012 at all the same sites as 2011 except for Cienega Park. Two additional sites will be added on the Santa Cruz River in order to increase the likelihood of capturing enough individuals to track from each species. Vegetation data will again be collected and analyzed. Additional analyses will be conducted to determine if the sample size is high enough for statistically robust data for roosting characteristics and management recommendations. A preliminary analysis from the first year shows that a third year may be warranted.

Proposed FY13 Activities: The project will continue by capturing and tracking more bats to roosting locations and vegetation analysis will be conducted to increase statistical robustness. Information on roosting requirements and management recommendations for habitat creation areas will be presented in a final report.

Pertinent Reports: The study plan and FY11 annual report are available upon request.

Work Task C36: Elf Owl Detectability Study

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$50,000	$50,440.81	$231,212.25	$20,000	$0	$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 field protocol 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-broadcast 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: In FY2010, a study plan for the elf owl detectability study was completed. An annual report for the first year of the study was prepared. Passive listening and call-broadcast surveys were conducted along the survey routes to inventory elf owls and determine their nesting

sites and/or activity centers. Seven territories were identified that were all located on the edge of the riparian habitat that interfaces with upland habitat.

Capturing and radio tagging of the elf owls occurred and six elf owls were captured and radio-tagged. Detectability experiments were conducted on these seven pairs. In total, 53 detectability trials were performed.

FY11 Activities: In FY11, field work took place at the Bill Williams River NWR from 1 March to 2 June. A draft final report incorporating both years of data was prepared (2009 and 2010). A draft recommended call-broadcast survey protocol was prepared giving recommended distance between points, call-broadcast listening time at each point, illumination levels, time of night surveys shall be conducted, decibel level of call-broadcast, time of year surveys shall take place, and number of surveys in a season. A likelihood of detection of 95% was calculated for the recommended survey protocol.

Passive listening and call-playback surveys were conducted along survey routes in the interior and along the edges of the riparian habitat to inventory elf owls and determine their nesting sites and/or activity centers. Ten territories were identified on the edge of the riparian habitat that interfaces upland habitat. Five of the territories were in the same locations as in 2010. Two additional territories were identified in the riparian interior.

Detectability experiments were conducted on five of the pairs from 28 April to 21 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., Midnight: 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. In 2011, tests were conducted within open upland habitat and dense riparian habitat. Responsiveness of elf owls was highest at dusk (78%), at the 100 m distance (77%) and in low and intermediate illumination (63% and 65%, respectively). The majority of elf owls (85%) responded within two minutes of the start of the call-broadcast. Elf owls exhibited some movement in response to call-broadcast; however, movement patterns differed greatly between the individual owls.

In 2011, two birds were captured in late May and radio transmitters were attached. They were telemetered over the course of several nights to gather more detailed information about activity budgets, habitat use, and home range. Male birds appear to spend the daylight hours in a day roost site, which is usually located within 100 m of the nest cavity. Emergence from the day roost occurs during the dusk period, after the sun has set but before full darkness occurs. Typically, emergence is followed by a nest-attendance shift between the mates as the female departs for a foraging foray. Additional nest exchanges between the male and female occurred occasionally during the early and middle part of the night. The early part of the night was characterized by territorial behavior, movement near its territory, and vocalizations. The middle part of the night was characterized by extended feeding forays within the riparian habitat. The later part of the night was characterized by sheltering behavior in the canyons or near the nest cavity.

Natural elf owl chatter vocalizations were measured at several locations. Four good readings were obtained that were within or close to the decibel range of recordings used for this study (65-70 db at 1 m from the speaker).

Digital recordings of elf owl vocalizations were obtained. A peeper cam was used to locate and visually examine the contents of three different elf owl nest cavities and to photograph owls in the nest cavities. On the same date, breeding stage was different among the three territories, ranging from presence of eggs to presence of feathered nestlings.

FY12 Activities: The project report and the recommended elf owl survey protocol will be reviewed and finalized.

FY13 Activities: Closed in FY12.

Pertinent Reports: The report, *Elf Owl Detectability Study 2010 and 2011*, 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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$50,000	$53,704.86	$264,811.55	$10,000	$0	$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 needed underneath habitat for the willow flycatcher and yellow-billed cuckoos in order to duplicate conditions at 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 types 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 in order to quantify them.

Previous Activities: 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 restoration site. Piezometers were be 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.

FY11 Accomplishments: A second year of data collection was completed starting in April and ending in September. Most of the same locations were sampled in 2011 as were sampled in 2010, with a few exceptions. The sites in Littlefield, Arizona were destroyed by flooding that occurred in late 2010. Sites were added in the Palo Verde Ecological Reserve, due to the high use by yellow-billed cuckoos at this site. A total of eight permanent data loggers were located in a subset of the sites to measure surficial soil measurements every 10 minutes throughout the period of data collection. Gravimetric soil measurement was the only method used to obtain soil moisture data as the use of the AquaTerr M300 Soil Moisture Meter was discontinued after the problems encountered in 2010. Besides the aforementioned changes and additions, the same methods were utilized in 2011 as were used in 2010.

The data was used to compare vegetation and hydrologic characteristics within both SWFL and YBCU habitat separately, and to compare SWFL habitat to YBCU habitat. Logistic regression and correlation analysis were used to compare habitat characteristics. From the final report several conclusions of note were obtained. At both SWFL and YBCU sites, correlations identified a negative relationship between percent sand (soil texture) and percent soil moisture. At SWFL sites correlations identified a positive relationship between distance to flowing water and tree height and between stream discharge and tree height. At the SWFL sites the average percent soil moisture was more than twice as high as YBCU sites and SWFL sites had shallower depths to ground water than YBCU sites. SWFL sites had a higher number of sites with standing water present (29) than YBCUs (4). YBCUs utilized sites much farther from the nearest flowing water (up to 2100 m) than SWFLs (up to 542 m). The logistic regression indicated that depth to ground water was the variable with the highest influence in predicting SWFL versus YBCU sites, followed by soil texture and distance to flowing water.

FY12 Activities: The final report has been delivered to Reclamation and will be posted in early 2012. The agreement will then be closed out and no more work will continue associated with this work task.

Proposed FY 13 Activities: Closed in FY12.

Pertinent Reports: The final report, *Soil Hydrology Conditions in Occupied Southwestern Willow Flycatcher and Yellow-Billed Cuckoo Habitat*, will be posted on the LCR MSCP website.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$250,000	$174,690.00	$371,856.17	$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: The first round of acoustic telemetry implemented under the reported work task was completed. On 13 April 2010, 20 bonytail (mean total length = 410 mm) reared at Dexter National Fish Hatchery and Technology Center (NFHTC) were each surgically implanted with an acoustic transmitter and released with 1,900 additional bonytail into Lake Havasu at the Bill Williams River NWR 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 three-month study was high (95%); only one transmitter was recovered by divers from the bottom of the reservoir. All other fish were assumed to be living at the end of the study.

Concurrent to the work in Lake Havasu, a captive fish experiment was implemented at Dexter NFHTC to assess surgical techniques and to monitor fish health and tag retention over a three month period. Twenty bonytail (10 implanted with 3-month acoustic tags and 10 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 Accomplishments: A second acoustic telemetry study was completed and a third telemetry study was initiated during FY11. Twenty-seven Submersible Ultrasonic Receivers (SURs) were deployed throughout the study area. On 3 December 2010, 20 bonytail (mean total length = 390 mm) were implanted with six-month transmitters and released at the Bill Williams River NWR boat ramp along with 2,060 additional bonytail. All stocked fish originated from Achii Hanyo Fish Rearing Facility. Acoustic tagged bonytail were monitored through June 2011 using active and passive tracking techniques to determine survival and dispersal. All individuals were contacted and by the end of the first month fish had dispersed as much as 30-km upstream from their point of release. The maximum distance fish dispersed away from the stocking site became smaller as the study progressed, and by the end of six months most contacts were recorded within or near the Bill Williams River NWR. Three-month post-stocking survival was lower than the previous study (45% vs. 95%, respectively), and by the end of the six month study period 35% of acoustic tagged fish were alive. Twelve of thirteen immobile transmitters were recovered from the bottom of the reservoir using SCUBA. A majority of all fish contacts (~99%) for the first two telemetry studies occurred within or near the Bill Williams River NWR.

FY12 Activities: In order to assess whether bonytail dispersal, habitat preference, and survival was related to stocking location, a third telemetry study was initiated. An additional stocking site was chosen based on the mean maximum linear distance fish dispersed away from Bill Williams River NWR during both previous telemetry studies (7.7 km for the April 2010 study and 10.7 km for the December 2010 study). On 29 November 2011, 1,796 PIT-tagged bonytail originating from Dexter NFH were stocked at the Cattail Cove State Park boat ramp and 2,111 PIT-tagged bonytail were stocked at the Bill Williams River NWR boat ramp. Both of these stockings were accomplished under a dispensation that allowed certain, specific, lots of fish from Dexter NFH to be stocked prior to that facility regaining its level A fish health certification. Fifteen fish from each stocking were implanted with an acoustic tag (five fish from each group received 45-day battery life depth sensing acoustic tags, and ten fish from each group received 6-month battery life acoustic tags). Remote PIT-scanning antennae were utilized throughout Bill Williams River NWR during the first week post-stocking. Acoustic tagged fish were tracked actively and passively with the aid of 27 SURs. Turbidity readings were taken at the exact contact location and depth of each fish containing a depth tag. Additional turbidity measurements were taken throughout the water column at predetermined locations across the study area to assess habitat differences.

Passive and active tracking of acoustic tagged fish stocked in November 2011 will continue through June 2012. Turbidity measurements and habitat association will continue. Annual bonytail and razorback sucker trammel netting surveys will be conducted with USFWS, AZDFG, CDFG, and BLM during February 2012. Remote PIT-scanning stations will be deployed in areas of concentrated habitat use during the annual netting surveys.

Proposed FY13 Activities: A fourth iteration of acoustic telemetry to further determine post-stocking survival, dispersal, and habitat use of bonytail will be initiated during late 2012. The

study design will be based on the results of the November 2011 telemetry work and may include another stocking split between two locations. 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: *Distribution and Post-stocking Survival of Bonytail in Lake Havasu 2010 Annual Report* is posted to the LCR MSCP website.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$100,000	$125,751.99	$127,214.52	$180,000	$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 captured 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, and 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 population dynamics. The study will require multiple years of data collection and analyses; final recommendations are anticipated by 2018. Numbers of samples will be fewest during the first 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 and juveniles from lake-side ponds (B7) were also collected. Adults, larvae and juveniles have been genotyped and preliminary statistical analyses completed.

FY11 Accomplishments: Adult RASU were again selected and stocked into lake-side ponds on Lake Mohave in an attempt to promote spawning and recruitment. Samples collected during FY10 were analyzed, identifying considerable variability in individual reproductive success within and especially among different lake-side ponds. FY11 cost exceeded the proposed estimate due to contracting cost, and labor associated with sample acquisition.

FY12 Activities: Sample collections and analysis similar to FY10 will continue. Samples from Imperial Pond 1 will also be included as it appears to be capable of supporting multiple generations. This will allow us to develop and implement the tools to track the transfer of genetic material from a founding population to any subsequent generations. Funding increased in FY12 to allow for in depth data analysis and reconsideration of the experimental design.

Proposed FY13 Activities: Sample collections and analysis similar to previous years will continue. This will provide replication that will allow us to assess stability of life history parameters across time.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$25,000	$31,150.14	$37,035.81	$25,000	$65,000	$65,000	$0

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

Start Date: FY10

Expected Duration: FY14

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

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

Location: Reach 2, Davis Pond.

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, specifically 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: PIT-tag antennae have been purchased and are being incorporated into artificial habitats. Beal Lake was stocked with 610 PIT tagged RASU in February 2010 and the population was 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 three months post-stocking. The reason for the demise of the stocked fish is unknown, but some possibilities are predation by migratory birds, mortalities associated with stocking and handling, or water quality deficiencies.

FY11 Accomplishments: Site location was moved from Beal Lake to Davis pond due to poor fish survival. Davis pond was stocked with 376 PIT-tagged RASU (<300 mm). Two different habitat types (brush bundles, pipe structures) were constructed within a PVC frame and equipped with PIT-tag antennae. Three habitats at a time were deployed at different locations throughout Davis pond. Each habitat was paired with a single antenna, which was placed without a habitat, approximately 10 to 15 feet away. Scanning occurred in five-day intervals (Monday through Friday) for a total of 12 intervals. Brush bundles were deployed May 9- July 1 (5 intervals), and pipe structures were deployed from July 18 to October 10 (7 intervals). Water quality profiles were taken in conjunction with PIT scanner deployment. Data analysis did not show a statistically significant difference in habitat use versus non-habitat use. This was likely due insufficient scanning intervals caused by equipment malfunction, and the emergence of aquatic vegetation which became the dominant habitat in the pond for much of the scanning period. Upon retrieval of the habitats, it was found that YOY and juvenile bonytail were utilizing the inside of the PVC frames which had pulled apart in some places.

FY12 Activities: PIT-scanning efforts will be similar to those in FY11. Scanning will be initiated earlier in the field season to alleviate the problems with the submergent vegetation. Secondly, we will deploy multiple habitat types at the same time over a longer period for a paired comparison. Water quality will continue to be recorded with each remote sensing equipment deployment.

Based on our observations of YOY BONY, we have increased the funding in an attempt to assess their use of constructed habitats. A variety of small habitats will be deployed for assessing use by YOY and juvenile bonytail, as well as any razorbacks that are spawned. Data will be analyzed and developed into an annual report.

Proposed FY13 Activities: Additional funding is sought as we expect to build upon the results from FY12. We will continue to deploy and then monitor different artificial habitats and determine usage in Davis Pond. Habitat thought to be favorable to RASU and BONY may be deployed throughout reaches 2 and 3.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$100,000	$103,142.42	$81,526.65	$200,000	$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 low quality soils 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. A seed feasibility study was conducted under E24 and outcomes from that research will be used in conjunction with the soil amendment to determine if the amendment will bolster seed production.

Project Description: After a review of soil amendments and their associated costs, availability, and water retention capabilities, 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.

One application is combining seeds with the Lassenite to determine whether better seed production can be accomplished. Seeding will be combined with different concentrations of Lassenite to determine the most efficient and cost-effective means of optimizing seed germination and production in sandy locations.

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. In FY10, laboratory work was completed to test the feasibility of this product for restoration purposes including movement of product through soil profile, application rates and soil moisture retention, and facilitation of water movement.

FY11 Accomplishments: A study plan was written to further test the amendment under field conditions at Beal Riparian Area at Havasu NWR. The purpose is to conduct research to determine whether the addition of Lassenite Pozzolan to sandy soils has a positive effect on germination, survival, and growth of dense willow habitat from seed. Smaller plots will be treated with extra Lassenite to determine whether the product will increase soil moisture retention in small areas. The Lassenite for use in the study in FY12 was purchased in FY11.

FY12 Activities: Two fields in the Beal Riparian Area that have not produced the desired habitat quality will be cleared for field trials of the amendment. The fields will undergo soil testing for salinity, weed seed-bed reduction, and irrigation to remove salts if needed. Seed will be collected and stored following procedures outlined in previous reports (GeoSystems Analysis, Inc. 2007-2010). Cottonwood poles will be collected from Beal and planted to the water table around the perimeter of each field to help block windborne seed from the surrounding area. Additional rock will be placed around the irrigation valve to direct water for furrow irrigation.

Proposed FY13 Activities: Final site preparation including the addition of Lassenite, tilling, leveling, furrowing, and installation of irrigation ditches will be completed in January and February 2012. Seeds collected in 2012 will be planted in March. Monitoring of germination, growth, and survival will begin after planting and continue through 2014.

Pertinent Reports: The report, *Laboratory Testing of Lassenite Pozzolan for Use as a Soil Amendment at Habitat Restoration Sites,* is posted on the LCR MSCP website.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$20,000	$1,099.56	$1,099.56	$40,000	$60,000	$50,000	$0

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

Start Date: FY11

Expected Duration: FY14

Long-term Goal: Determine the population demographics and habitat use of an LCR 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: 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 Accomplishments: Methodology was presented at the Western Bat Working Group Biennial Meeting in Las Vegas, Nevada. Genetic samples were collected during mist-netting at habitat creation areas as part of work task F4. Samples were not processed or analyzed this year due to contracting delays.

FY12 Activities: Genetic sampling will continue in conjunction with F4 surveys. Samples previously collected will be used for microsatellite development and analysis of genetic markers. 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.

Proposed FY13 Activities: Additional samples will be collected and analyzed on both the LCR as well as other locations within the range of the California leaf-nosed bat in order to determine the LCR population's importance to the species as a whole. This project is being extended in order to obtain a robust data set from which management recommendations can be made.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$60,000	$33,542.26	$33,542.26	$100,000	$100,000	$0	$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 determine best management practices 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 B7, B11, C25, C34, F5, and 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 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 successfully manage these habitats, the amounts of zooplankton in these ponds must be optimized. 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 C34, and will be used as a baseline for comparison.

FY11 Accomplishments: At the start of FY11 an extensive literature search was performed to gather information on potential methods for boosting plankton production within fish rearing ponds. Information gathered from this search indicated that a mix of organic and inorganic

fertilizers was likely the best methodology for promoting the desired plankton bloom. Fertilizer quantities and types were selected based on recommendations from the reviewed literature and on the total surface area of the four individual ponds selected. Ponds were fertilized by two different methods, with two of the study ponds receiving inorganic ammonia phosphate and organic alfalfa pellet, and two of the ponds receiving ammonia phosphate and rice bran. A single pond received no fertilizer inputs and acted as a control. Plankton sampling was conducted prior to pond fertilization and then once a month from March through October. Data sets were summarized and interpreted as they became available.

FY12 Activities: Investigation into the effects of pond fertilization on zooplankton communities in native fish rearing ponds will continue. For the second study year, both inorganic and organic fertilizer amounts will be increased to evaluate the effect the increased input has on plankton species composition and abundance. Phytoplankton and zooplankton samples will continue to be collected and analyzed on a monthly basis.

Proposed FY13 Activities: Investigation into the effects of pond fertilization 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: The statement of work for this study is available upon request.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$170,000	$175,342.41	$125,969.16	$200,000	$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.

FY11 Accomplishments: A of group of backwaters (Park Moabi, Pulpit Rock, Sand Dunes, Blankenship, Castle Rock, Clear Bay, and two small unnamed backwaters) was established to study razorback sucker habitat use in Reach 3. Razorback sucker use of these backwaters was quantified through catch per unit effort data (CPUE) of fish captured with trammel nets and electrofishing. Water quality measurements for select backwaters were collected monthly.

Methods were developed to describe the zooplankton, macroinvertebrate, and plant communities within these backwaters. Geo-referenced depth data were collected for use in developing bathymetric maps of these backwaters.

FY12 Activities: Fish sampling will continue in the select group of backwaters to monitor razorback CPUE. Water quality and zooplankton data were collected on a monthly basis. Macroinvertebrate, plant community, phytoplankton, and water chemistry (nutrients) were collected on a quarterly basis.

Proposed FY13 Activities: FY12 activities will continue, including analyzing habitat and environmental data from previous years; additional sampling will be added if needed.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$120,000	$103,992.63	$56,680.51	$120,000	$70,000	$0	$0

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

Start Date: FY11

Expected Duration: FY13

Long-term Goal: To maintain an effective fish augmentation program.

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

Location: Dexter NFH and Achii Hanyo Rearing Facility.

Purpose: Characterize the physiological stress response of BONY and RASU during pond harvest, tagging, and before, during, and after transport, and 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 Achii Hanyo Rearing Station (B3), 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).

FY11 Accomplishments: The handling and hauling portion of this study for BONY has been completed. Initial handling stress responses and subsequent recovery levels are to be obtained through blood plasma cortisol, glucose, lactate, chloride, and osmolality levels. Blood samples were taken from subsets of BONY prior to, immediately after, and 12, 24, and 48 hours post-handling, and prior to, during, and after, 0, 24, and 48 hours, and 7, 14, and 21 days post-hauling. Assays to measure plasma cortisol, glucose, lactate, chloride, and osmolality levels in BONY are being completed.

FY12 Activities: The second year of the study will measure and record levels of plasma cortisol, glucose, chloride, and osmolality in RASU before, during, and after a 12-hour transport from

Dexter NFH to Achii Hanyo Rearing Facility. RASU are to be netted from the truck and held in 500-liter circular tanks for three weeks to monitor for disease and mortality. Assays measuring plasma cortisol, glucose, lactate, chloride, and osmolality levels in BONY will be completed.

Proposed FY13 Activities: Data are to be analyzed and compiled into a final report including recommendations to improve handling and hauling protocols for BONY and RASU.

Pertinent Reports: N/A

Work Task C47: Genetic Monitoring and Management of Recruitment in Bonytail Rearing Ponds

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$220,000	$1,147.88	$1,147.88	$250,000	$250,000	$250,000	$0

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

Start Date: FY12

Expected Duration: FY14

Long-term Goal: To maintain an effective fish augmentation program.

Conservation Measures: BONY3, BONY4, and BONY5.

Location: Off-site rearing stations (Dexter NFH, and Achii Hanyo Rearing Station).

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), Achii Hanyo Rearing Facility (B3), Dexter National Fish Hatchery (B4), 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 fish 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).

FY11 Accomplishments: Due to budget constraints, a decision was made to delay the start to FY12.

FY12 Activities: Tissue samples were collected from young-of-year BONY resulting from inadvertent spawning in rearing ponds at Uvalde NFH in 2010, and Achii Hanyo Rearing Station in 2011. 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. Piscivorous fish are to be obtained and quarantined to accomplish investigations of piscivorous fish as a biological control in FY13.

Proposed FY13 Activities: Biological controls (piscivorous fish) were investigated to reduce or eliminate inadvertent spawns, which may lead to overcrowding and 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.

Tissue samples are to be taken and analyzed from 1,000 bonytail derived from inadvertent spawns. All fish are to be inventoried from the study ponds, total parent versus recruitment biomass recorded, and results compared to determine effects and efficiency of piscivore use. In addition, the initial treatment protocols looking at a biological control will be adjusted for effectiveness based on previous year's results and repeated in FY14.

Pertinent Reports: Scopes of work are available upon request.

Work Task C48: Genetic Characterization of RASU Brood Stock at Dexter NFH

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$60,000	$50,572.34	$50,502.41	$60,000	$0	$0	$0

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

Start Date: FY11

Expected Duration: FY12

Long-term Goal: To maintain an effective fish augmentation program.

Conservation Measures: RASU3, RASU4.

Location: Dexter National Fish Hatchery.

Purpose: To genetically assess RASU captive brood stock.

Connections with Other Work Tasks (past and future): B2, B4, B5, B10, C10, and C31.

Project Description: This two-year study will compare the genetic diversity of captive RASU brood stock 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 B4, B10, C11, and C31.

FY11 Accomplishments: During FY11, the genetic status of RASU broodstocks held at the Dexter NFH was documented by determining their mitochondrial diversity and comparing it to the diversity found in the Lake Mohave RASU population. In addition, the genetic status of captive stocks at Dexter and Grand Valley were characterized using microsatellites. A total of 657 genetic samples were taken from individual RASU from these four locations. Analyses demonstrated that overall the RASU broodstocks were high in genetic diversity and did not show signs of inbreeding as indicated by high heterozygosity. However, diversity was lower in Ouray and Grand Valley stocks than in either the Dexter stocks or the Lake Mohave samples. Dexter NFH and Ouray NFH are responsible for a majority of the spawning activities that provide other facilities with eggs and larvae for grow-out. The genetic analyses performed to date indicate that

these two hatchery stocks are still providing genetically appropriate production fish for restoration activities.

FY12 Activities: Additional analyses will be performed in FY12 and are to include pairwise relatedness analyses of all individuals potentially used for production at the Ouray NFH, and a comparison between relatedness estimates found within hatchery stocks and those found in wild stock to determine if hatchery broodstocks are proportionally more related than the wild stocks. Information obtained during this and the previous study year will be used to update the 2003 *Genetics Management and Captive Propagation Plan*.

Proposed FY13 Activities: Closed in FY12.

Pertinent Reports: The 2011 annual report, *Razorback Sucker Broodstock Evaluation and Genetic Monitoring* has been completed and will be posted to the LCR MSCP website.

Work Task C49: Investigations of RASU and BONY Movements and Habitat Use Downstream of Parker Dam

FY11 Estimates	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$125,000	$0	$0	$150,000	$150,000	$150,000	$0

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

Start Date: FY12

Expected Duration: FY14

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.

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, has been considered for years to be some of the best fish habitat along the lower river. 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: This is a new start in FY11.

FY11 Activities: This work task was postponed until FY12. No work was performed in FY11.

FY12 Activities: An agreement is being formalized with USFWS to perform this work, which is broken into two phases. Phase I will start in FY12 and includes a literature review of previous stocking records and RASU monitoring, and RASU surveys (including electrofishing, trammel netting, and remote PIT tag scanners). Captured native fish will be assessed for size, weight, general health, and genetic similarity to other extant lower Colorado River populations. Data from these RASU surveys will be used to create a population estimate for the study area. General

water quality profiles and other habitat observations will be recorded in conjunction with these surveys.

Proposed FY13 Activities: Phase II is expected to start in FY13. This phase expands the study to incorporate stocking up to 6,000 RASU and 4,000 BONY within the study reach and tracking sonic tagged fish to identify post-stocking dispersal patterns and possibly identify the locations used by any RASU present within the study area. This expanded effort would increase the number of fish contacted and further refine our understanding of where these fish go, and what habitats they use within the study area. Stocking native fish on CRIT lands is dependent upon further negotiations with, and concurrence from, the tribes.

Pertinent Reports: N/A

Work Task C50: Food Habits of Adult RASU Below Hoover Dam

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$60,000	$0	$0	$0	$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).

FY11 Accomplishments: Upon further scientific review, a decision was made to close this work task.

FY12 Activities: Closed in FY11.

Proposed FY13 Activities: Closed in FY11.

Pertinent Reports: N/A

Work Task: C51 Vermilion Flycatcher Detectability and Distribution Study

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$0	$0	$0	$20,000	$150,000	$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 on LCR by conducting species specific, non-random surveys.

Conservation Measures: MRM1, MRM2 (Vermilion Flycatcher).

Location: Various sites from Lake Mead to Yuma, yet to be determined.

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 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 VEFL.

Previous Activities: New start in 2012.

FY11 Activities: New start in 2012.

FY12 Activities: A literature review will be conducted to examine Christmas Bird Count Data and other information. Areas where VEFL have been documented previously will be visited to

determine whether they are still there and if they remain through the breeding season. The information gathered during this period will assist in determining the initial study design and field protocols.

Proposed FY13 Activities: A study design and field protocol will be developed and tested for targeted surveys in FY13. Surveys will take place utilizing the protocol that was developed in FY 2012 at targeted locations that are potential vermilion flycatcher habitat. Locations within the LCR MSCP area that have a potential to support vermilion flycatchers will be surveyed. This is needed so quality distribution and population abundance data can be obtained.

Pertinent Reports: N/A

Work Task C52: Gilded Flicker Detectability and Distribution Study

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$0	$0	$0	$20,000	$150,000	$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 the 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 methods 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 general bird 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 determined.

Previous Activities: N/A

FY11 Accomplishments: New start in FY12.

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. Locations to target within the LCR MSCP project area and in the adjacent upland habitat will be determined.

Proposed FY13 Activities: Surveys will take place utilizing the protocol that was developed in FY 2012 at targeted locations that are potential gilded flicker habitat. Locations within the LCR MSCP project area and adjacent upland habitat that have a potential to support gilded flickers will be surveyed. This is needed so quality distribution and population abundance data is obtained. A genetics study may be conducted in collaboration with the surveys to determine if hybridization is occurring between the gilded flicker and red-shafted flicker.

Pertinent Reports: N/A

Work Task C53: Sonic Telemetry of Juvenile Flannelmouth Suckers in Reach 3

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$0	$0	$0	$120,000	$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 LCR 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 work task C15.

FY11 Accomplishments: Juvenile RASU and FLSU tagging studies were accomplished under D8 in preparation for this project. Larval FLSU were captured near Laughlin, Nevada, and are currently being reared as a potential source of juvenile fish.

FY12 Activities: The first year of this study will consist of the tagging of hatchery reared suckers which will take place in late February when predators are less active. Up to 20 hatchery reared suckers of varying sizes will be selected and tagged with appropriate sized transmitters. We expect to use four different model tags with a battery life ranging from seven days to nine months. 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. Habitat data will be collected throughout the tracking process to determine habitat preferences.

Proposed FY13 Activities: Activities will be similar to those from FY12; specifics may vary depending on FY12 results.

Pertinent Reports: A study plan was developed in FY11 and is available upon request.

Work Task C54: Techniques to Establish Native Grasses and Forbs

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$0	$0	$0	$0	$200,000	$200,000	$200,000

Contact: Dianne Bangle, (702) 293-8220, dbangle@usbr.gov

Start Date: FY13

Expected Duration: FY20

Long-term Goal: Develop techniques to establish native grasses and herbaceous perennial forbs while suppressing establishment of invasive species.

Conservation Measures: MRM2, CRCR2, YHCR2, CMM1.

Location: Cibola NWR Unit #1.

Purpose: The purpose of this study is to develop successful planting techniques and research alternative methods of native grasses and forbs establishment while suppressing weed species establishment. Typically, grass and forb species can be difficult to establish when competition from weed species is high. Additionally, invasive plant species can modify riparian plant communities, degrade wildlife habitat, and increase risk of fire.

Connections with Other Work Tasks (past and future): Post-development habitat monitoring will be conducted at habitat creation sites detailed in work tasks F1-F4.

Project Description: This study addresses several conservation measures that include creation of species habitat, maintenance of existing species habitat, monitoring, and research. The HCP requires the creation of over 8,100 acres of various land cover types to provide habitat for targeted LCR MSCP covered species. The habitat requirements of covered and associated species can be established at each habitat creation site through the design and maintenance of habitat mosaics, especially through manipulation of plant species composition, stand seral stages, tree densities, and water regimes.

Currently groundcover being utilized includes non-natives such as alfalfa. Native herbaceous grass and forb species can be difficult to establish especially in areas with an abundance of weed species. This study will attempt to determine effective planting techniques that may increase the survival of native plantings while testing different methods of weed suppression and control. Once natives are established, they typically become effective competitors and may be able to keep weed presence down to a minimum. In this way, native grasses can be used in place of the

non-native groundcovers, which may provide better habitat for covered species such as cotton rats.

As the LCR MSCP moves forward, it is anticipated that conservation areas planted previously will be managed to improve habitat quality by increasing diversity at all trophic levels. A collection of native herbaceous and shrub seeds is a useful tool to have on hand when there are opportunities for seeding. Seeds of many native species are difficult to obtain from vendors on short notice. They become available based on how abundant each species was at the time of collection, and if there is a market for particular species. Some species are simply not collected because vendors are not aware of a need for them. This work task will also provide funds for seed purchase and/or collection and storage each year, for restoration, research and adaptive management purposes. This funding will also be used to determine the best and most cost effective seeding techniques, storage and handling of native seed.

Previous Activities: N/A

FY11 Accomplishments: N/A

FY12 Activities: N/A

Proposed FY13 Activities: Seeding/watering techniques will be tested to determine which native species might be used as ground cover in lieu of Bermuda grass or alfalfa.

In preparation for plot establishment, half of the field will be tilled and watered then tilled again three times throughout the first year. Soil will be collected before each scheduled tilling cycle to document changes in the seed bank. This will allow comparison of seed bank data between treatment (with tilling cycles) versus control (no tilling cycles) and how "clearing" the seed bank multiple times before planting may increase success of native grass and forb establishment while reducing the success of invasive species. After three tilling cycles, plots will be established and planting/seeding/weed suppression treatments will begin.

Seedling grass plugs will be planted and activated charcoal (i.e. activated carbon) applied to the soil around native plantings as a protective barrier against herbicide application. A pre-emergent herbicide will be sprayed throughout the grass planted areas to discourage weed germination. A post-emergent herbicide may be necessary depending on the lifecycle of local weeds and success of pre-emergent herbicide. Literature will be reviewed and collection and storage methods for seed will be determined.

Pertinent Reports: N/A

Work Task C55: Techniques to Increase Leaf Litter Decomposition Rates

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$0	$0	$0	$0	$125,000	$75,000	$75,000

Contact: Dianne Bangle, (702) 293-8220, dbangle@usbr.gov

Start Date: FY13

Expected Duration: FY17

Long-term Goal: Develop techniques to reduce litter biomass.

Conservation Measures: MRM2, CMM1 (WIFL, YBCU, ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, SUTA).

Location: Palo Verde Ecological Reserve.

Purpose: The purpose of this study is to evaluate methods to reduce litter biomass at habitat creation sites, which contributes to fuel load build up. If reduction is successful, the study will evaluate whether water movement across the field has improved.

Connections with Other Work Tasks (past and future): Post-development habitat monitoring will be conducted at habitat creation sites detailed in work tasks F1-F5; fire management plan under E18; create and manage a mosaic of native land cover types under E4.

Project Description: In many of the LCR MSCP habitat creation sites there is a buildup of dead vegetation and leaf litter that contributes to fuel loads at LCR MSCP habitat creation sites, which could eventually become a fire hazard. Determining an effective method to reduce the accumulated litter is needed. Additionally, the accumulation of litter may impede the movement of irrigation water across the site, thus, another objective of this research is to determine if a reduction in litter improves irrigation efficiency.

At habitat creation sites, cottonwood-willow habitat type is planted in high densities. The canopy closure varies as well as the density and cover of understory shrubs, forbs and grasses. These shrubs, forbs, and grasses have the potential to create a substantial wildfire hazard under certain conditions at LCR MSCP habitat creation sites, reduction of fuel loads, including the accumulation of litter, may be a necessary management action. It is also necessary to determine if water movement across the field is hindered by excesses of litter is important for managing irrigation at habitat creation sites.

The objectives of this study are to 1) determine the effectiveness of adding a biological compost tea to habitat creation areas with excess accumulation of litter, and 2) determine whether a reduction in litter improves irrigation water distribution across the gradient of the field.

Previous Activities: N/A

FY11 Accomplishments: N/A

FY12 Activities: N/A

Proposed FY13 Activities: Biological compost tea (BCT) will be added to PVER in order to test its effectiveness at increasing litter decomposition rates via biological processes provided by microorganisms. In addition to potential fuel reductions and more efficient irrigation, benefits from BCT include, an increase in soil nutrients, organic matter, and microorganisms essential for healthy soil.

This study will include determining the proper BCT recipe, testing at least two application methods (including incorporating the BCT into the litter layer), monitoring plots before and after BCT treatment, and monitoring irrigation water distribution across the field before and after BCT treatment.

Pertinent Reports: N/A

Work Task C56: Characterization of Lake Mohave Backwaters to Evaluate Factors Influencing Spawning Success

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$0	$0	$0	$0	$265,000	$265,000	$265,000

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

Start Date: FY13

Expected Duration: FY15

Long-term Goal: To help inform future design and management of created backwater habitats.

Conservation Measures: RASU3, RASU6, BONY3, BONY5.

Location: Lake Mohave, Reach 3.

Purpose: To characterize two Lake Mohave backwater rearing ponds (Arizona Juvenile and Dandy) where stocked juvenile RASU have been observed to spawn at greatly different rates in order to determine which factors are most influential in promoting spawning and subsequent survival of RASU larvae.

Connections with Other Work Tasks (past and future): C40.

Project Description: Arizona Juvenile (AJ) and Dandy are two disconnected backwater ponds on Lake Mohave which are used for rearing RASU in support of the fish augmentation program. Subadult fish are currently PIT tagged at 300 mm TL, sampled for genetics, and stocked into these ponds during winter or spring. Remote PIT-tag scanners are deployed periodically to monitor survival of stocked fish in these two ponds. The ponds are harvested in the fall, as the backwaters are drawn down with the seasonally declining water level of Lake Mohave.

Over the past two years, genetic analyses of larvae that were volunteer spawned from stocked RASU in these two ponds has revealed significant differences in reproductive success between these two sites from 2010 to 2011. At one pond (AJ), the majority of stocked fish successfully spawned and produced larvae, while at the other (Dandy), larvae were produced by a much smaller proportion of stocked subadults.

This project will provide a detailed characterization of selected Lake Mohave backwaters to determine which factors are most influential towards successful RASU spawning and subsequent larval survival. The research will begin with a narrow focus on AJ and Dandy, two ponds with vastly different spawning success, at Lake Mohave but may be expanded in the future to include other backwaters or other known RASU spawning areas.

Previous Activities: None, this is a new start.

Proposed FY13 Activities: A two-year study will begin in FY13 to examine the physical habitat, physicochemical parameters, and predation dynamics of these two Lake Mohave backwaters (AJ and Dandy) and a summary report will be produced. Based on the findings of this research, this work will either be concluded after two years or expanded to answer new questions with potentially more sites.

Pertinent Reports: N/A

Work Task C57: Sonic Telemetry of Lake Mead Juvenile Razorback Suckers

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$0	$0	$0	$0	$250,000	$250,000	$250,000

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

Start Date: FY13

Expected Duration: FY15

Long-term Goal: Support razorback sucker (RASU) conservation.

Conservation Measures: RASU 6.

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

Purpose: Investigate habitat use of immature RASU and determine conditions that allow for natural recruitment of Lake Mead RASU.

Connections with Other Work Tasks (past and future): This work task is related to the Lake Mead Razorback Sucker Study (C13) and Razorback Sucker and Bonytail Stock Assessment (D8).

Project Description: From 1996 to 2011, 95 sonic-tagged adult RASU have aided researchers in locating spawning populations of RASU in Lake Mead and understanding the habitat use and spawning preferences of the adult population. Trammel-netting efforts during this time also provided valuable information on Lake Mead RASU demographics and included the capture of over 100 juvenile/subadult RASU. To date only limited effort has been expended trying to capture this young life stage, which is an important element in understanding why RASU recruitment is occurring in Lake Mead.

This project will investigate the habitat use of immature razorback sucker by implanting wild caught juvenile/subadult RASU with sonic tags and monitoring their movements. A variety of sampling techniques will also be used in conjunction with tracking efforts to sample specifically for juvenile RASU throughout the year. In addition to these activities, efforts will also be made to identify the physicochemical environment of any identified recruiting habitat.

Previous Activities: This study builds upon work conducted on the Lake Mead adult RASU population (C13 and D8).

FY11 Accomplishments: New start in FY13.

FY12 Activities: New start in FY13.

Proposed FY13 Activities: During the first year of this study considerable effort will be focused on capturing wild juvenile RASU from know spawning locations in Lake Mead. It is anticipated that this effort will be labor intensive due to the relative infrequency of capture for this life stage. Following their capture, juvenile RASU will be implanted with various models of sonic telemetry tags. The tag models used will be dependent upon the size of the fish captured. Sonic tagged fish will be continually tracked from the time of capture through the summer months.

In addition to tracking wild juvenile fish, a small group of hatchery reared juvenile RASU will also be implanted with sonic tags and tracked. All tracking efforts will be accompanied by a variety of sampling methods and will include the use of trammel nets, minnow traps, hoop nets, seines, Fyke nets, and electrofishing. Locations of sonic-tagged fish or other juvenile RASU caught during sampling will be used to identify recruitment habitat. Physicochemical conditions including water quality parameters, substrate types, and vegetation, will then be recorded at these sites to characterize the preferred habitat of this RASU life stage. Information gathered from this study will provide resource managers with recommendations for enhancing juvenile RASU habitat.

Pertinent Reports: N/A

Work Task C58: Investigating Shoreline Habitat Cover for BONY

FY11 Estimates	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$0	$0	$0	$0	$75,000	$60,000	$60,000

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

Start Date: FY13

Expected Duration: FY15

Long-term Goal: To provide qualitative measurements when constructing riprap shoreline habitat for BONY.

Conservation Measures: BONY 5

Location: Reach 3 and 4, Achii Hanyo Native Fish Facility, Parker Dam Pond, and Cibola High Levee Pond.

Purpose: To determine size and depth preference of cavity cover in riprap shoreline habitat for BONY.

Connections with Other Work Tasks (past and future): BONY used in this study would be provided through Willow Beach National Fish Hatchery (B2), Achii Hanyo Rearing Station (B3) and Dexter National Fish Hatchery (B4), and Role of Artificial Habitat in Survival of RASU and BONY (C41), the scope of work will be developed under BONY Rearing Studies (C11).

Project Description: Bonytail have been documented using open water and shoreline cover in Lake Mohave backwater ponds and at Cibola High Levee. Currently the Role of Artificial Habitat in Survival of RASU and BONY (C41) is being investigated for open water. This work task is designed to investigate shoreline habitat, specifically cavities within rip-rap shorelines, for BONY at multiple life stages. Substrate measurements will be taken from the rip-rap shoreline at Cibola High Levee Pond to provide length, width, and depth measurements of the cavities. Cavities of multiple size and depth will be created and BONY preference will be tested at Achii Hanyo Rearing Facility. Investigation of preferred water depth of these cavities is to be completed at Parker Dam Pond. Results may facilitate the design and development of rip-rap shorelines for LCR MSCP backwater habitats.

Previous Activities: This effort builds upon research conducted under Bonytail Rearing Studies (C11).

FY11 Accomplishments: This is a new start for FY13.

FY12 Activities: A study design is being developed under Bonytail Rearing Studies (C11).

Proposed FY13 Activities: Rip-rap shoreline substrate data will be collected from Cibola High Levee Pond. Cavity structures will be designed to investigate cavity opening and depth preference in multiple life stages of BONY.

Pertinent Reports: N/A

Work Task C59: Selenium Monitoring in Created Backwater and Marsh Habitat

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$0	$0	$0	$0	$250,000	$250,000	$250,000

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

Start Date: FY13

Expected Duration: FY15

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

Conservation Measures: MRM2 MRM5 (BONY, RASU, CLRA, BLRA).

Location: Created backwater and marsh land cover types within the LCR MSCP planning area.

Purpose: Monitor selenium levels in created backwater and marsh land cover types and provide information necessary to adaptively manage these sites.

Connections with Other Work Tasks (past and future): Monitoring for selenium will be conducted for habitat created through Section E work tasks (E1, E9, E14, E15, E16, E25, E27, and E28), and will be incorporated into post-development monitoring tasks listed in Section F (F1, F3, F5, and F7).

Project Description: As described in the conservation measures, the LCR MSCP is developing 512 acres of marsh and 360 acres of backwaters as part of its habitat creation goals. These created habitats will be monitored over the term of the LCR MSCP to ensure that they maintain their function for all associated covered species. This study will develop a protocol for evaluating selenium levels within these created habitats. This protocol will then be used to develop a long-term selenium monitoring plan as required by the Habitat Conservation Plan.

Previous Activities: N/A

FY11 Accomplishments: New start in FY13.

FY12 Activities: New start in FY13.

Proposed FY13 Activities: A brief literature review will be conducted in early FY13 to gather background information on selenium sampling for backwater and marsh land cover types.

A study plan and a protocol for gathering and analyzing samples will also be developed in FY13 with the intent of initiating field work by the start of the second quarter.

Pertinent Reports: The study plan and future annual reports will be posted to the LCR MSCP website upon completion.

Work Task C60: Habitat Manipulation

FY11 Estimate	FY11 Actual	Cumulative Accomplishment Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$0	$0	$0	$0	$100,000	$100,000	$100,000

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

Start Date: FY13

Expected Duration: FY17

Long-term Goal: Develop cost-effective management techniques and determine timing and extent of management actions necessary for maintaining structural diversity in riparian habitats.

Conservation Measures: MRM2 (WIFL, YBCU, VEFL, YWAR, CRCR, YHCR).

Location: PVER, CVCA, Cibola Unit 1, Beal Lake.

Purpose: Identify riparian habitat areas in need of structural diversity enhancement and develop protocols to manage portions of LCR MSCP habitat creation sites. The intent is to use the results of this research to appropriately manage these successional stages of riparian habitat that are required by several covered riparian avian species, and thereby meet established management guidelines.

Connections with Other Work Tasks (past and future): Post-development habitat monitoring data obtained in F2 and F3 will be used

Project Description: The LCR MSCP riparian habitat creation sites are planted in phases and use a mass-planting technique in order to reduce invasive species competition with native species and provide dense habitat for covered avian species. Over time, the vegetation in a phase can sometimes mature at the same successional stage, especially in areas with consistent growing conditions and with low riparian tree species diversity.

In natural systems where periodic flooding is a component of the system, portions of the habitat can be periodically disturbed and "reset" to earlier successional stages and increased structural diversity. Several covered avian species require as habitat early to mid-successional stages of native riparian trees. Over time, some of the LCR MSCP riparian habitat creation sites may grow beyond suitable habitat for some covered species unless management actions are taken.

Without the disturbance events that were once more common in the historic river hydrograph, direct manipulation of portions of these conservation areas may be required. This research project will provide information to perform assessments and provide protocols to guide the

deliberate manipulations of these habitats to enhance structural diversity and produce the appropriate serial stages for covered species.

The objectives of this study are to:

1. Provide a protocol for assessing areas for structural diversity and target areas that may require enhancement to meet management objectives. This will typically result in identifying areas have at least eight years of growth and that comprise more monotypic stands of riparian trees; however, the protocols that are developed may indicate longer or shorter durations based on measures of structural diversity.

2. Provide a protocol to guide cost-effective and appropriate manipulations of identified riparian habitats in order to reset portions of these areas to the earlier successional stages. Protocols that may be established could include, but are not limited to: locations within stands for thinning, numbers or percent of trees per stand to be removed, height at which trees should be cut to encourage stump sprouting, and potential for in-planting in thinned areas to encourage species diversity as well as longer-term structural diversity.

3. Determine the timing and extent of manipulation necessary for maintaining multi-successional riparian habitat at the appropriate scale. Based on the collected data from this research, potential areas and extent of manipulation for future areas may be predicted so that proper timing and budgeting for management can be more controlled and proactive. Funds for actual management action for conservation areas will be provided through each specific conservation area's work plan.

Previous Activities: N/A

FY11 Accomplishments: New start in FY13.

FY12 Activities: New start in FY13.

Proposed FY13 Activities: A literature review and preliminary protocol development will be conducted during the first year of the study. Current relevant literature on riparian stand thinning/manipulations will be reviewed to determine the best approaches for achieving the desired habitat structure and determine the measured parameters needed to indicate success. Information from the literature regarding best approaches for assessing habitat diversity in different structure types may also be employed to identify study sites with low structural diversity, and or those with later successional stages of growth.

Pertinent Reports: The study plan is available upon request.

WORK TASKS SECTION D

SYSTEM MONITORING

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Work Task: D1 Marsh Bird Surveys

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$25,000	$18,725.89	$178,401.23	$35,000	$25,000	$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 F7 may also be used in the marsh bird system monitoring program described in D1. The protocol developed for D1 will also be used for F7.

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.

FY11 Accomplishments: Marsh bird surveys were conducted between the I-40 Bridge, near Needles, California, and Lake Havasu during March, April, and May 2011. Total CLRA detections ranged from 38 and 76 to 70 individuals per survey period. The prior highest number of CLRA detected by Reclamation was 71 in May 2004. LEBI detections ranged from 9 in March to 50 in May. This is just under the 2010 number of 51 LEBI during the May survey,

which was the most LEBI detected in Topock Gorge by Reclamation. BLRA detections ranged from 4 and 3 to 7 during the 2011 survey period. The 7 detections in May were the most BLRA detected in Topock Gorge during any survey period. This marks the fourth year out of the last six years and the third year in a row in which BLRA have been detected in Topock Gorge. Data were compiled and entered into the National Marsh Bird database.

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.

Proposed FY13 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.

Pertinent Reports: *Marsh Bird Surveys–2010* and *Marsh Bird Surveys–2011* will be posted to the LCR MSCP website.

Work Task D2: Southwestern Willow Flycatcher Presence/Absence Surveys

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$675,000	$655,142.92	$4,823,204.20	$675,000	$600,000	$575,000	$575,000

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 Pahranagat NWR. Life history study sites are located at 1) Pahranagat 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 under D3 provides 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 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.

FY11 Accomplishments: Presence/absence surveys were conducted at 64 sites in 15 study areas along the LCR and its tributaries in 2011. Life history studies were conducted at the following sites: Pahranagat 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 2009, 2010, or 2011 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.

Activities included banding, nest monitoring, extensive vegetation analysis, and microclimate analysis. Brown-headed cowbird trapping was discontinued after 2007, but information from life history studies was utilized to determine effectiveness of post-trapping.

Willow flycatchers were detected on at least one occasion at 47 sites. Resident or breeding SWFLs were detected at 13 sites within the following six study areas: Pahranagat 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 20, 2011, 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 with 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 demonstration was conducted to monitor the hydrology closely underneath the stand and to place additional water underneath a portion of the stand to determine the affects this would have on increasing nesting pairs and potentially successful nests. This was originally scheduled to take place in 2010 but was postponed until 2011. The site was monitored for hydrological conditions as well as SWFL presence and breeding in 2011. Water was kept on two areas where breeding had occurred in the past, but not on other areas in the marsh. At Topock Marsh, six resident or breeding birds were detected, but no birds successfully fledged.

A total of 26 adult flycatchers were captured in 2011; 15 were new captures, and 11 were banded in previous years and were recaptured at the four life history study areas and at Muddy River, and Bill Williams River NWR. An additional 31 adults banded in previous years were resighted. A total of 40 nestlings from 17 nests were banded. Flycatchers were banded opportunistically at St. George. Two new adults and one nestling were color banded at St. George. A total of 50 territories were recorded with 36 territories consisting of paired flycatchers and 14 consisting of unpaired individuals. Of the 96 adult flycatchers identified to individuals in 2010, 55 (57%) were located in 2011; 5 (9%) were detected at a different study area from where they were last detected in 2010. Of the 51 banded juveniles from 2010, 2 (4%) were identified in 2011. Sixteen individuals originally banded as nestlings in previous years were identified for the first time in 2011.

Nest success was calculated for 43 SWFL nests. Eighteen (42%) nests were successful and fledged young, and 25 (58%) failed. Depredation was the major cause of nest failure, accounting for 52% of all failed nests and 65% of nests that failed after flycatcher eggs were laid. Brown-headed cowbird brood parasitism was observed in 7 of 37 (19%) nests with eggs.

Reclamation finished the study of the effects of tamarisk beetles on nesting willow flycatcher habitat in the areas of St. George, Utah and Mormon Mesa, Nevada. This was a cooperative study between the Utah Department of Natural Resources, USGS, Reclamation, and the LCR MSCP. All data has been collected and the data will be analyzed and a final report will be submitted in 2012. Beetles continued to defoliate saltcedar at St. George and reached the Mormon Mesa site in 2011. Defoliation at Mormon Mesa did not occur until breeding activities were mostly completed and likely did not affect success.

FY12 Activities: Presence/absence SWFL surveys will be conducted at approximately 70-90 sites, in 16 study areas, along the Virgin River, Pahranagat NWR, and the LCR to the Southerly International Boundary. Grand Canyon below Separation Canyon will not be surveyed in 2012.

Life history studies are being conducted at Pahranagat 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.

Hydrologic monitoring will be continued at Topock Marsh to determine whether increased water levels in the marsh will also increase standing water and saturated soil within SWFL breeding habitat. The hydrologic data will be compared to surveys and nest monitoring for SWFL within the marsh.

A scope of work for the next five-year contract will be written and awarded in FY12.

Proposed FY13 Activities: A new five-year contract will be implemented in FY13. The scope will be similar to previous years. SWFL presence/absence system-wide and post-restoration surveys, along with banding and nest monitoring will be conducted.

Pertinent Reports: *Southwestern Willow Flycatcher Surveys, Demography, and Ecology along the LCR and Tributaries, 2011* is posted on the LCR MSCP website.

Work Task D3: Southwestern Willow Flycatcher Habitat Monitoring

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$90,000	$120,009.76	$523,988.23	$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. Discussions are being held with the USFWS regarding this task, which may be discontinued due to lack of significant evidence of groundwater and habitat relationships during the last six years of surveys.

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 correlations between piezometer water level and soil moisture/vegetation within the habitat monitoring sites.

FY11 Accomplishments: Each site was monitored for temperature, relative humidity, soil moisture, vegetation, and groundwater. In 2011, data was compiled for all years since 2005 and compared across this period. Results were similar to those found in 2010. Comparisons of microclimate characteristics among years in 2005-2011 at the habitat monitoring sites indicated hotter and more humid conditions in 2006, cooler conditions in 2009, and less humid conditions in 2010 and 2011. These inter-annual changes were similar between test and control sites, suggesting that these changes were regional, rather than being influenced by local conditions. The inter-annual changes in soil moisture were not similar between test and control sites, with soil moisture declining more sharply at the control sites from 2005 to 2008 and then rising sharply after 2009. 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 and 2011 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.

FY12 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.

Reclamation is in discussions with the USFWS to determine whether further studies are necessary, given the variability and no correlation of data. If it is determined that these studies are no longer needed, this work task will be closed in FY13.

Proposed FY13 Activities: With approval of the USFWS, Reclamation will close this work task after FY12. If it is determined that monitoring is still required, Reclamation will continue to conduct habitat monitoring by collecting and analyzing microclimate data, groundwater monitoring, and vegetation monitoring utilizing similar protocols as those in place for the life history studies.

Pertinent Reports: *Southwestern Willow Flycatcher Surveys, Demography, and Ecology along the LCR and Tributaries, 2011* is posted on the LCR MSCP website.

Work Task D5: Monitoring Avian Productivity and Survivorship

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$275,000	$289,547.70	$1,782,355.83	$250,000	$250,000	$250,000	$250,000

Contact: Joe Kahl, (702) 293-8568, jkahl@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: System monitoring for avian covered species by conducting intensive monitoring of habitat creation sites and sites that typify current conditions along the LCR.

Conservation Measures: MRM1, MRM2 (WIFL, YBCU, ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, SUTA).

Location: Cibola NWR, Cibola Valley Conservation Area 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.

FY11 Accomplishments: During the summer, banding was conducted at 3 sites using the MAPS protocol. An additional MAPS site at the Cibola Valley Conservation Area (CVCA) was added in May. 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 179 captures at the Cibola site, 181 total captures at the Beal site and 233 captures at the Cibola Valley site.

Three LCR MSCP listed species were captured, including yellow warbler (two captures at Cibola Valley, and nine captures at the Beal site), summer tanager (two each at the Cibola Valley and the Beal sites), and Bell's vireo (three captures at the Beal site). All of the yellow warblers, summer tanagers, and Bell's vireos were colored banded. Two Bell's vireos were target netted and color banded at the Beal site during the MAPS season. 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 and the Cibola Valley site on May 18 and 25 and on June 8. One migrant willow flycatcher was banded at the Cibola site on May 24. A yellow-billed cuckoo was heard at the Cibola site on July 12; several at the Cibola Valley site from June 8 thru August 3. At the

Beal site, yellow-billed cuckoos were heard or seen on June 16, and July 8, 14 and 28. Winter banding was discontinued.

FY12 Activities: The MAPS banding stations will be continued at all three sites during the 2012 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. Restoration sites such as PVER will be reviewed as potential banding stations.

Proposed FY13 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: The 2011 MAPS Summary Banding Report will be posted to the website.

Work Task D6: System Monitoring for Riparian Obligate Avian Species

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$210,000	$237,749.92	$1,056,575.11	$280,000	$400,000	$400,000	$400,000

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 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 five evaluation species, including nine 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. Beginning in FY2013 elf owl systemwide monitoring will be under a separate work task.

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 2007-2010 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 breeding within the LCR MSCP Planning area. Non-breeding gilded flickers and family groups were detected foraging at the Bill Williams NWR and Cibola NWR.

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. The USGS submitted a final report on the sampling plan for Riparian Birds of the lower Colorado River. Power analysis was conducted utilizing BBS survey data. Based on the power analysis the plan recommended 80 rapid area search plots be surveyed annually. New plots should be selected each year. A software program (DS) to automate the calculation of the detection ratios was developed by the USGS. A power program to conduct power analyses was developed by the USGS. These programs were specifically developed to be used with Lower Colorado Riparian Bird sampling design, but can also be used for similar sampling designs. User manuals for the DS program and the GIS tools were finalized by USGS. A Sampling Large Landscape Workshop was held to educate others on the double sampling method, and to receive feedback on the survey methods.

In 2010, a final project report was written for systemwide monitoring from 2008-2010 during the study plan and field protocol development stage.

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 2008-2010. Suitable habitat was defined as historical locations, incidental sightings, and HMIII, CWI, and CWII habitat. Surveys were conducted from 27 March to 1 May of each year, and used a tape-playback presence-absence survey protocol. One elf owl was detected near Blankenship Bend.

FY11 Accomplishments:

Multi-Species Bird Surveys. In 2011, post-development monitoring on habitat conservation areas (F2) and habitat modeling (C24) continued. System wide surveys were conducted according to the final sampling plan and following the same sampling field protocol used in 2007-2010. In 2011, 80 plots were randomly selected, using the new GIS plots layer. Each rapid

area search plot was surveyed twice in 2011; 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 2011. 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 2011.

During system-wide rapid surveys in 2011, 155 species were recorded. Of these, 88 species were breeders and 67 were migrants or non-breeders. There were 2841 breeding territories detected during the rapid surveys. During system-wide intensive surveys, 90 species were recorded. Of these, 46 species were breeders and 44 were migrants or non-breeders. There were 416 breeding territories detected during the intensive surveys. The population estimates for the number of territories of focal species in the LCR MSCP planning area from 2011 were: 1) Arizona Bell's vireo (1941), 2) Sonoran yellow warbler (1166), 3) Gila woodpecker (425), 4) summer tanager (222), and 5) vermilion flycatcher (567). The vermillion flycatcher population estimates are skewed due to difficulties in detections of this species. There was one breeding gilded flicker detected at the eastern edge of Lincoln Ranch, in the Bill Williams River. The bird's territory was mostly outside the plot in upland habitat. This was the first gilded flicker detected breeding within the LCR MSCP project area since surveys began in 2007. Population size estimates for covered species were generally lower in 2011 than in previous years. This may be due to the random plot selection representing a lower proportion of covered species, to annual variation in migration arrival times, reproductive schedule, or population variation.

In 2011, a more extensive data management protocol was implemented to improve the management and quality of the data for the systemwide bird monitoring. A three year study was initiated to test the assumption of unbiased estimation during intensive area search surveys. The three goals of the project were: 1) evaluate the assumption that unbiased estimates are being obtained during intensive area search surveys; 2) estimated the average error rate being made during intensive area search surveys and determine if differences in error rate exist between species or habitats; 3) suggest improvements to intensive area search survey methods to achieve higher accuracy, if any are needed. Eight plots will be surveyed each year for a total sample size of 24 plots. Three surveys will be conducted on each plot; a rapid survey (2 visits), intensive survey (8 visits) and enhanced intensive survey (16 to 24 visits). The last year of this project is FY 2013.

Elf Owl Surveys. No systemwide surveys for elf owls were conducted in 2011.

FY12 Activities:

Multi-Species Bird Surveys. Area searches will be conducted during the breeding season of 2012 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.

A data management plan and quality assurance plan will be written for the systemwide bird survey data. Improvements will be made to the DS program. The second year of the study to test the assumption of unbiased estimation during intensive area search surveys will be implemented.

Elf Owl Surveys. All suitable habitat for the elf owl within and adjacent to the LCR MSCP project area will be defined. A monitoring plan for long term elf owl population monitoring will be developed for use in FY13 under a new work task, D13, Elf Owl System-wide Surveys. More intensive and targeted surveys will be conducted for the vermilion flycatcher and gilded flicker under work task C51 and C52, respectively.

Proposed FY13 Activities: System-wide area search surveys for riparian obligate species including the six focal species will continue in 2013. Area searches will be conducted during the breeding season of 2013 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. The last year of the study to test the assumption of unbiased estimation during intensive area search surveys will be implemented.

Bird surveys will be in SWFL breeding habitat at sites such as Mormon Mesa, Mesquite West, and Overton WMA in order to determine potential effects of beetles on breeding populations of LCR MSCP species before the beetles arrive in the lower river valley. The surveys would be conducted using the same methodology used for system-wide riparian surveys. In order to minimize excess disturbance of any breeding taking place at the sites we would limit surveys to rapid surveys within SWFL habitat so that only 2 surveys would be conducted. The rapid survey data from the SWFL sites could then be compared to the data collected as part of the system-wide effort to calculate a density estimate of the riparian bird species present at SWFL breeding sites. This information could then be compared to our estimates for the restoration sites and for the lower river.

Pertinent Reports: *Report on the Lower Colorado River Riparian Bird Surveys 2011,* and *A Sampling Plan for Riparian Birds of the Lower Colorado River—Final Report* are posted on the LCR MSCP website.

Work Task D7: Yellow-billed Cuckoo Presence/Absence Surveys

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$550,000	$543,056.20	$2,909,512.33	$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): Work Task C37 is intended to measure the hydrologic conditions preferred by southwestern willow flycatcher and yellow-billed cuckoo. 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.

FY11 Accomplishments: In FY11, 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 sites within the LCR MSCP area in potentially suitable habitat. Surveys were conducted at 50 sites including LCR MSCP restoration sites that contained appropriate habitat. Cuckoos were detected 292 times during the breeding season, representing an estimated 66 breeding pairs. Twenty-eight confirmed breeding territories were located at the following sites: 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 Crane Roost site at Cibola National Wildlife Refuge Unit #1. Twenty-nine nests were found and monitored.

FY12 Activities: Activities in FY12 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. 2012 is the final year for the project under the existing contract.

Proposed FY13 Activities: Solicitation for further work will begin in FY12. Activities in FY13 will be similar to what was done in previous years of this project. Surveys will be conducted system-wide and at all restoration sites that are suitable habitat for yellow-billed cuckoos. Nest searching will be conducted and nests found will be monitored. Vegetation and microclimate data will be collected.

Pertinent Reports: *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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$575,000	$614,086.24	$2,816,169.85	$575,000	$675,000	$675,000	$675,000

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 C8, C12, C13, C15, C23, F5, and 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 one of two strategies: 1) gleaning information from ongoing fish monitoring and fish research activities, and 2) direct data collection through field surveys within the LCR MSCP planning area not covered by other work tasks.

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 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 2008.

FY11 Accomplishments: Accomplishments for this work task have been summarized by river reach.

Reach 1 (Lake Mead). Reclamation, in cooperation with the AGFD, NDOW, and NPS, conducted annual fall surveys of Lake Mead. Participating agencies were responsible for sampling Boulder Basin, Virgin Basin, Gregg Basin, and the Overton Arm. Techniques employed in this lake wide effort included gill netting and electro-fishing and resulted in the capture of over 2,000 fish including 13 different species. No native species were captured during this effort.

Collection of wild-born RASU larvae took place at all major spawning sites (Las Vegas Bay, Echo Bay, and the Muddy River/Virgin River inflow) over the course of the spawning season. This effort yielded 449 larvae from Las Vegas Bay, 3,818 larvae from Echo Bay, and 21 larvae from the Muddy River/Virgin River inflow area for a lake wide total of 4,288 larvae. Larvae were subsequently delivered to Lake Mead State Fish Hatchery (B6) for rearing.

Monitoring of the Lake Mead RASU population also continued. Tracking of sonic-tagged fish continued to gather information on habitat use and movement patterns of RASU, and data obtained from monitoring sonic-tagged fish provided valuable information including the general location of RASU populations, the location of spawning sites, and the movement patterns of RASU within and between spawning areas. Trammel netting surveys conducted during the spawning season resulted in the capture of 86 total RASU, with 15 coming from Echo Bay, 9 from Las Vegas Bay, and 62 from the Muddy River/Virgin River inflow area. Five of the RASU collected were subadult fish, and 14 were recaptures. Aging information was obtained from 73 RASU during the 2011 study year, and evaluation of fin-ray sections removed from captured fish suggests continued, recent recruitment in Lake Mead.

The second year of monitoring in the Colorado River inflow (CRI) area of Lake Mead was also completed in FY11. Using sonic-tagged RASU to locate potential spawning sites, larval sampling was conducted on 39 nights and resulted in the capture of 65 larval RASU and 11 larval FLSU. Trammel netting was used to capture adults where concentrations of RASU were suspected, and fin ray specimens were obtained from appropriate adult RASU for aging purposes. From 187 net-nights, 9 wild RASU, 7 RASU × FLSU hybrids, and 112 FLSU were captured. Of these fish, 2 RASU, 1 hybrid, and 39 FLSU were recaptures from 2010. Three of the wild RASU were males expressing milt; the other six were females showing signs of spawning, which helped confirm spawning activities. Ages from the seven new wild RASU ranged from 6–11 years.

Reach 2 (Lake Mohave). Reclamation successfully repatriated 7,687 RASU into Lake Mohave in calendar year 2011. This is a slight decrease from the number of RASU stocked in 2010 (9,203), but still well above the targeted 6,000.

Lake-wide surveys for native fish were conducted using both trammel netting (43 net nights, 41 RASU contacted) and electro-fishing (6,640 seconds, 87 RASU contacted) techniques. Remote sensing was expanded in 2011 to include the lotic portion of Lake Mohave upstream of Willow Beach. New advances in remote PIT tag antennae design allowed for sampling in the high flow conditions of that reach, thereby contacting a significant number of RASU that had been previously undetected through other sampling methodology. A total of 9,241 remote sensing contacts were recorded lake-wide with 3,134 contacts representing 730 RASU coming from the reach above Willow Beach (1,987 hours of scan time) and 6,107 contacts representing 321 RASU (1,275.5 hours of scan time) throughout the rest of Lake Mohave for a total of 1,044 individual RASU contacted (7 RASU were contacted in both the lentic and lotic sections of the lake). Netting and electro-fishing 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 2,979 adult RASU compared with the population estimate for 2010 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 25,018 RASU larvae were collected and delivered to Willow Beach National Fish Hatchery (B2) for rearing.

Reach 3 (Lake Havasu). A total of 10,551 RASU and 4,380 BONY were released into Reach3 during calendar year 2011, all of the fish were released with a PIT tag. The PIT tagging of BONY is new this year and is a result of the increase in BONY captures during annual surveys.

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, a total of 68 RASU were collected. A total of 124 RASU and 68 BONY were contacted during the annual Lake Havasu roundup. In the past BONY captures from annual surveys have been less than ten. All but one of the BONY were captured near the Bill Williams Refuge and fisherman continue to report accidental BONY captures in this same area. Large numbers of RASU continue to be contacted in the riverine portions and Park Moabi of Reach 3. Younger, recently released RASU dominate the trammel net catch from the backwaters within the reach, while more mature RASU are contacted during electro fishing surveys of the numerous spawning aggregations. This is the first year gizzard shad were present in the annual surveys; the majority of these were captured near the Bill Williams River delta. The remainder of the non-native fish community did not show any significant changes.

The RASU population estimate was refined in an effort to meet the necessary assumptions of the modified Peterson method. The annual single-census population estimate was determined for repatriated razorback suckers by applying census data gathered between January and March in consecutive years (FY10 and FY11). A population estimate of 1,400 RASU was generated. This estimate is substantially lower than previously reported estimates (FY09 = 4,376), but this decrease is a direct result of refining our methods and is not an indication of a decrease in abundance. These refined methods were applied to previous years data and those estimates were

also substantially lower (FY09 = 1,008). In general this population has maintained an upward trend, and has more than doubled in the past 5 years.

Reach 4 and 5 (Parker Dam to Imperial Dam). Under the Fish Augmentation Program, 7,360 RASU and 2,742 BONY were stocked into Reach 4. A total of 6,303 RASU were stocked into the LCR between Parker Dam and Headgate Rock Dam, 550 RASU were stocked into High Levee Pond, and 507 RASU were stocked into Palo Verde Oxbow Lake. All BONY were stocked into the LCR between Parker Dam and Headgate Rock Dam.

A permit for sampling within the Colorado River Indian Tribes Reservation (CRIT) on Reach 4 was obtained in November. Field sampling of fish within Reach 4 was limited due to the 1 year delay associated with the start of Work Task C49. However, the USFWS was able to conduct some cursory investigations which included parts of the CRIT. These investigations resulted in the collection of numerous BONY shortly following their release, as well as a small population of RASU which are assumed to be spawning downstream of Parker Dam. All fisheries surveys in Reach 5 were restricted to Imperial Ponds Native Fish Research (C25).

FY12 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 trammel netting, electro-fishing, remote sensing of PIT-tagged fish, and active and passive tracking of sonic-tagged fish.

Proposed FY13 Activities: Monitoring will continue in all reaches as previously outlined, and LCR MSCP staff will continue to participate in multi-agency field surveys. The funding increase beginning in FY13 will support monitoring efforts in Lake Mohave which were previously covered under Demographics and Post-Stocking Survival of Repatriated Razorback Sucker in Lake Mohave (C12).

Pertinent Reports: The *Razorback Sucker Studies on Lake Mead, Nevada and Arizona 2010-2011 Final Annual Report,* the *Razorback Sucker Investigations at the Colorado River Inflow Area Lake Mead, Nevada and Arizona 2011 Final Annual Report,* the *Demographics and Post-Stocking Survival of Repatriated Razorback Sucker in Lake Mohave Final Report,* and the *Movements of Sonic Tagged Razorback Suckers Between Davis and Parker Dams (Lake Havasu) Final Report* are available upon request and will be posted to the LCR MSCP website.

Work Task D9: System Monitoring and Research of Covered Bat Species

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$150,000	$147,131.56	$694,529.69	$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.

FY11 Accomplishments: The four permanent Anabat monitoring stations continued to operate to provide year-round data. One of the stations was damaged due to a fire at Cibola NWR. This station will be repaired and be operational once new equipment is purchased. Outflight counts were conducted at various mines along the LCR, including surveys of mines within the vicinity of Planet Ranch 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. A total of 441,550 usable bat call files were collected. The station at Mittry Lake Wildlife Area recorded a total of 134,493 (23%) files, Picacho State Recreation Area recorded 73,640 (13%), Bill Williams River National Wildlife Refuge recorded 200,592 (34%), and Cibola National Wildlife Refuge recorded 177,834 (30%). All four LCR MSCP covered species were recorded at all locations, with the Bill Williams River NWR recording the most call minutes.

FY12 Activities: The four permanent Anabat monitoring stations will continue to operate. Data will be collected and analyzed. Outflight counts will be conducted at various mines along the LCR including surveys of mines within the vicinity of Planet Ranch 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 continue to 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 FY13 Activities: The four permanent Anabat monitoring stations will continue to operate. Data will be collected and analyzed. Outflight counts will be conducted at various mines along the LCR including surveys of mines within the vicinity of Planet Ranch 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 added to a single database.

Pertinent Reports: *Monitoring of Covered and Evaluation Bat Species for the Lower Colorado River Multi-Species Conservation Program, Annual Report, 2010* is posted to the LCR MSCP website. A final mine survey summary report for years 2002-2010 will be posted to the website. An FY11 report for the analyses of data from the four long-term acoustic stations and an FY11 report for mine surveys will be prepared and posted to the website.

Work Task D10: System Monitoring of Rodent Populations

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$65,000	$33,659.04	$85,489.71	$40,000	$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 LCR 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: Surveys were conducted within previously known locations to determine the stability of those populations. Areas surveyed included in the Yuma Area, along the bench habitat by PVER, and areas within Havasu National Wildlife Refuge. We have yet to discover a large source population for YHCR.

FY12 Activities: 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, Laughlin area, and northern Lake Mead for DPMO.

Proposed FY13 Activities: Continue surveying areas throughout the LCR system to determine the extent of each species' range and determine potential source populations for colonization of habitat creation areas.

Pertinent Reports: Annual reports will be posted on the LCR MSCP website.

Work Task D12: Lowland Leopard Frog and Colorado River Toad Surveys

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$120,000	$117,017.13	$52,885.88	$150,000	$125,000	$0	$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, CRTO1.

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: 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 Accomplishments: The first year of the project was implemented and an annual report was completed. Both species were surveyed using multiple methods (e.g., visual encounter surveys, call surveys, larval funnel traps). Surveys began in January and were repeated once each month through August. Over 1,740 locations were identified through GIS analysis. With many overlapping areas identified as potential sites, 139 individual locations were visited. Locations reviewed were considered promising areas and in many cases were a centralized point for a cluster of backwater sites. Of those 139 sites, 69 localities were given a ranking of three or

better, with no localities receiving a ranking of five which indicates ideal habitat. Only localities with a ranking of three or better were visited on subsequent surveys and trapping efforts. No lowland leopard frogs were found in 2011. Three Colorado River toads were found and marked with toe clips at Planet Ranch on June 29. Three additional toads were found and marked on a return visit to Planet Ranch on August 14. This location on Planet Ranch was highly impacted by human activities and atypical of much of the habitat found within the study area. The vegetation at the site consisted of grass with patches of bare soil.

FY12 Activities: The second year of the surveys will be implemented and an annual report will be completed based on data collected during the two years. An additional field crew will be added this year to increase the chance of finding either species. Due to the apparent low abundance of both species within the study area, there may be insufficient data to determine populations and presence/absence of the species. If this is the case, then the project may be extended.

Proposed FY13 Activities: Surveys will focus on areas with the highest likelihood of occupancy for either species. A final report will then be submitted including recommendations for completing additional conservations measures for these species.

Pertinent Reports: An annual report for FY11 will be posted on the website.

Work Task D13: Elf Owl System-Wide Surveys

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$0	$0	$0	$0	$60,000	$60,000	$60,000

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

Start Date: FY13

Expected Duration: FY55

Long-term Goal: To detect trends in population estimates and distribution of elf owls within the LCR MSCP project area and adjacent upland area and on LCR MSCP Habitat Conservation Areas until FY55 (end of LCR MSCP program).

Conservation Measures: ELOW1, ELOW2, MRM1, MRM2, AMM1, AMM3.

Location: Habitat within and adjacent to the LCR MSCP Project area and LCR MSCP Habitat Conservation Areas.

Purpose: The purpose of the project is to provide information on trends in elf owl population and distribution within the LCR MSCP project area and adjacent areas and on LCR MSCP habitat conservation areas. This data can be used for a variety of purposes: 1) to determine location of new habitat conservation areas; 2) to assess effectiveness of habitat conservation areas in providing habitat for the elf owl; 3) to determine if there is an increase in the elf owl population within the project area as the LCR MSCP program progresses in time; 4) to identify populations of elf owls that can be used for the habitat modeling study (2014-2016) and 5) to contribute information to status assessments for the species across its range.

Connections with Other Work Tasks (past and future): Baseline exploratory surveys for elf owls were implemented in 2008-2010 under D6. A long term monitoring plan for the elf owl is being developed in FY2012 under D6. A field protocol based on quantitative data is being developed under C36.Information obtained through this work task will be used in conjunction with data collected during post-development monitoring of habitat conservation areas (F2).

Project Description: Single-species surveys for the elf owl are necessary due to the nocturnal nature of this species and its rarity along the LCR. Species specific surveys for elf owls will be implemented in FY2013 following the standardized monitoring plan and field protocol that will be finalized in FY2012. Surveys will continue until FY2055 on an incremental basis. Surveys will not necessarily need to be conducted every year but they will need to be conducted periodically throughout the program until FY55. The monitoring plan finalized under C36: Elf Owl Detectability Study in FY12 will determine how often surveys need to be conducted.

Previous Activities: New start in FY13.

FY11 Accomplishments: New start in FY13.

FY12 Activities: New start in FY13.

Proposed FY13 Activities: System-wide surveys will be implemented for the elf owl according to the field protocol and monitoring plan finalized under C36: Elf Owl Detectability Study. Surveys will take place in habitat within the LCR MSCP project area and adjacent upland habitat.

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

FY11 Estimate*	FY11 Actual Obligations*	Cumulative Expenditures Through FY11*	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$320,000	$400,976.55	$3,190,318.59	$950,000	$300,000	$300,000	$300,000

*Includes E2

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, FUTA1, MNSW2, CLNB2, PTBB2, MNSW2, BONY2 and RASU2.

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): Vegetation and species monitoring are being addressed under F1-F4. Monitoring of native fish is being addressed under F5. Portions of restoration research at Beal Lake have been funded under G3.

Project Description: Beal Lake was 225 acres of shallow, low-quality aquatic habitat that was dredged in 2001 to create a functioning backwater dedicated to native fish. The Beal Lake restoration project is a continuation of the commitment to construct habitat for protected native fish under the 1997 Biological Opinion. 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.

The development of the Beal Lake Riparian Area was initiated to research effective ways of using dredge material. The plan called for blending sediment dredged from Beal Lake with adjacent soils and replanting the mixed substrate with native vegetation. The project area, which is divided into fields that can be independently irrigated and managed, was designed to provide a location for testing various riparian restoration methods and techniques for site preparation, planting, irrigation, monitoring, and managing.

After various planting techniques were tested at the site, many of the fields developed into habitat that attracted LCR MSCP covered species. The riparian restoration site currently provides approximately 107 acres of cottonwood, willow, and mesquite habitats, as well as contributes valuable information about restoration techniques and management practices.

As of FY12, annual funding for Beal Lake Riparian (E1) and Beal Lake Native Fish (E2) were folded into a single work task called the Beal Lake Conservation Area (E1).

Previous Activities: Dredge material from Beal Lake (work task E2: Beal Lake Native Fish) was leveled in 2001 to create the substrate for planting adjacent riparian habitat. 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.

FY11 Accomplishments:

Maintenance/Restoration/Management.

Riparian Fields. Irrigation, maintenance, and on-site management were conducted on the riparian fields as well as performing basic maintenance duties, such as cleaning the Beal Lake screen system. A combination of Nitrogen, Phosphorous, Potassium, Zinc, and Manganese liquid fertilizers were applied to the fields in two, lower-concentration applications via the fertigation system.

Beal Lake. A gauging station to monitor the water surface elevation was installed on either side of the rock structure. The data collected from this station allowed the project manager to compare elevations of Beal Lake to those of Topock Marsh, determine when the screen system required cleaning, as well as evaluate the effectiveness of the current cleaning/maintenance regime.

Monitoring.

Riparian Fields. Post-development vegetation monitoring was conducted in 17 fields (A, B, C, D, F, G, H, I, Q, K, L, M, N, O, P, FF, and JJ). Thirty-five intensive plots were evaluated for density, vegetation structure, and community composition.

Microclimate stations were established in three fields which measured temperature, relative humidity and photosynthetically active radiation. A study of sulfur content in insects was initiated at Beal Lake. Results may indicate if particular spiders or insects are more nutritious for insectivorous birds by providing more sulfur.

Small mammal monitoring was conducted in field K and three *Sigmodon arizonae* 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 (13 territories), yellow warbler (9 territories) and summer tanager (2 territories) were confirmed breeding. Single species surveys were conducted for the southwestern willow flycatcher and western yellow-billed cuckoo during their respective breeding seasons. Yellow-billed cuckoos were confirmed breeding at Beal with one nest successfully fledging 2 young. The site was surveyed five separate times for willow flycatchers. Two 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 1 May to 6 August. Sonoran yellow warblers, Arizona Bell's vireos, and summer tanagers were color banded to better monitor their breeding activities at Beal Lake.

Beal Lake. Beal Lake was stocked with 400 PIT-tagged RASU; these stockings were monitored bi-weekly using remote PIT scanning to detect changes in the population. The population declined over the first three months until it stabilized around 90 individuals. All future stockings were terminated to allow for additional habitat assessment. The annual fall survey resulted in the capture of many non-natives, in addition to 64 RASU (avg. 468 mm TL); 50 of these were released into the main stem river near Needles, California. Larval surveys were conducted in late winter and none were captured. Zooplankton was collected quarterly as part of work task C44 and initial results show lower than average mean zooplankter biomass. Water quality was constantly monitored throughout the backwater via four mulit-parameter water quality loggers; low levels of dissolved oxygen and high temperatures were observed locally but not lake wide.

FY12 Activities:

Riparian Fields. After securing the proper permits, implementation of the design to convert 14 acres within the Beal Lake Conservation Area into a combination of willow and marsh land cover types began in November 2011. Site preparation involved clearing, grubbing, removing extremely saline soils from the surface, and contouring the acreage to match the seasonal hydrologic patterns of ground and surface water. Planting is scheduled for March 2012.

Four fields that did not respond well to the original plantings have been cleared and will be used to demonstrate the feasibility of using the soil amendment Lassenite Pozzolan. Two of the fields are currently being use to determine whether the product can increase the irrigation efficiency in sandy soils, as well as increase the retention of soil moisture. These fields will be planted with cottonwood and willow during the same effort as the willow marsh project. The two remaining fields will be used to test whether Lassenite Pozzolan can influence seeding success of Gooding's willow under C42: Experiments and Demonstration of Soil Amendments for Use in Restoration Sites.

Beal Lake. Throughout 2011, the USFWS installed a new water delivery system at the Havasu National Wildlife Refuge. During construction of the new canal the water elevations of Topock Marsh and Beal Lake were much lower than previous years, as water was not being diverted from the river into the marsh. With the new water delivery system complete and now functioning, it was decided that the effect of the new infrastructure on marsh and lake levels should be established before other management activities are undertaken.

Maintenance/Restoration/Management.

Riparian Fields. Irrigation, maintenance, and on-site management are anticipated to be similar to actions taken in FY11.

Beal Lake. The permanent gauging station installed last year continues to be maintained and calibrated. Maintenance on the boat ramp at the south end of Beal Lake was conducted to allow

boat trailers in and out of the launch site. A culvert at the south end of the lake, which was previously covered with gravel, is exposed and will either be permanently filled in or removed.

Monitoring.

Riparian Fields. Temperature, photosynthetically active radiation, and relative humidity will be monitored. Vegetation will continue to be monitored for density, vegetation structure and community composition. Small mammal monitoring will be conducted annually. Acoustic bat surveys will be conducted four to five times a year and acoustic data will be collected from the permanent bat monitoring station. General avian surveys utilizing intensive and rapid area searches will be conducted from mid-April to mid-June. Single species surveys for the southwestern willow flycatcher and yellow-billed cuckoo will be conducted during their respective breeding seasons. A study to determine if using Lassenite Pozzolan will increase germination and survival of seeded Goodding's willow in sandy soils will be initiated.

Beal Lake. The monitoring activities for Beal Lake will continue at a level similar to FY11. Searches for larval fish and other signs of reproduction and recruitment will be conducted. Food resource assessments (zooplankton/phytoplankton) will be increased and results compared with data from C34. Non-native fish abundance will be attempted during the annual fall survey at Beal Lake. The water quality at Beal will continue to be monitored to evaluate the impacts of the new water delivery system for Topock Marsh.

Proposed FY13 Activities:

Maintenance/Restoration/Management.

Riparian Fields. Management through irrigation and fertilization will continue. No new projects are anticipated within the riparian fields of the Beal Lake Conservation Area during FY13.

Beal Lake. In cooperation with the U.S. Fish and Wildlife Service different artificial habitat types will be constructed, deployed, and monitored. This effort attempts to determine if providing cover within Beal Lake increases the survival rate of stocked fish, and whether certain cover types are used more than others.

Monitoring.

Riparian Fields. Temperature, photosynthetically active radiation, and relative humidity will be monitored. Vegetation will continue to be monitored for density, vegetation structure and community composition. Small mammal monitoring will be conducted annually. Acoustic bat surveys will be conducted four to five times a year and acoustic data will be collected from the permanent bat monitoring station.

General avian surveys utilizing intensive and rapid area searches will be conducted from mid-April to mid-June. Single-species surveys for the southwestern willow flycatcher and yellow-billed cuckoo will be conducted during their respective breeding seasons.

A study to determine whether using Lassenite Pozzolan will increase germination and survival of seeded Goodding's willow in sandy soils will continue.

Pertinent Reports: *Beal Lake Riparian Restoration Development and Monitoring Plan* and *2010 Beal Lake Riparian Annual Report* will be posted to the website.

Work Task E4: Palo Verde Ecological Reserve

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$1,950,000.00	$1,483,727.80	$5,471,988.26	$1,950,000	$990,000	$830,000	$900,000

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, BEVI1, 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. 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. 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: Through FY10, 750 acres of cottonwood-willow and mesquite land cover types have been established in phases 1-5 and are being managed for the LCR MSCP covered species.

FY11 Accomplishments:

Maintenance/Restoration/Management. At PVER, 211 acres of cottonwood-willow were planted. Prior to planting, an initial application of fertilizer consisting of NO3-N (nitrogen), and PO3-P (phosphorus) was applied. An application of 10-34-0 was added in a later irrigation cycle.

In March, 2011, trees and shrubs were planted in Phase 6, Checks 2-12 and 16-26, utilizing mass transplanting. Checks 1, 14, 15, 28 were hand planted with mesquite. Over 340,000 trees and shrubs were planted within an 11-day period. The checks were planted according to the design *(Palo Verde Ecological Reserve: Restoration Development Plan Phase 6, 2010)*. The 2011 planting contained the following averaged percentages of plants and trees: 18.9% cottonwood, 5.2% *Baccharis*, 43% Goodding's willow, and 31.1% coyote willow and 0.05% mesquite. The average number was 1,659 plants per acre. Checks 13 and 27 were left fallow and will be planted in March of 2012.

The Palo Verde Ecological Reserve Development Plan: Phase 7 document was reviewed and approved by CDFG.

A study on the implications of plant genetic diversity and vegetation density on habitat elements within southwestern willow flycatcher habitat was completed at PVER.

Monitoring. Vegetation data is collected each year in the fall after the completion of the breeding season for avian species. Data from Fall of 2010 (beginning of FY11) indicates that average tree heights for PVER 2 was 9.5 meters, PVER was 8.7 m, PVER 4 was 5.1 m, and PVER 5 was 1.4 m. Average canopy closure was 79.9% for PVER 2, 61.6% for PVER 3, 64.8% for PVER 4, and 2.6% for PVER 5.

Three plots at Palo Verde Ecological Reserve (PVER), totaling 35 acres, were sampled for MacNeill's Sootywing in PVER 3, 4, and 5. Results indicate low numbers of adults in 2011. Eight sootywings were seen at Phase 4, one at Phase 5, and none at Phase 3. Sootywings are rare or absent within *Atriplex* plots at PVER.

During fall 2010 and spring 2011, three Colorado River cotton rats and one desert pocket mouse were captured in PVER 4; none were captured in PVER 5. The bench along the river below

PVER continues to support a population of Colorado River cotton rats; 20 rats were captured during the fall 2010 trapping effort.

Anabat bat acoustic detectors were deployed across the site quarterly to determine bat activity across habitat types and acoustic surveys were also conducted during a driving survey. A long term acoustic monitoring station was constructed in 2010. Data in FY11 was collected from Oct 1-May 24, June 22-August 5, August 23-September 24. PVER was mist-netted for bats once per month during the summer season from May-September. LCR MSCP species captured included Western Yellow Bat (9), Western Red Bat (5), and California Leaf-Nosed Bat (5).

General avian surveys of habitat creation sites with more than two years growth were conducted using an intensive area search method. Eight Sonoran yellow warbler (*Dendroica petechia sonorana*) pairs were confirmed breeding.

Five surveys for yellow-billed cuckoos were conducted in each of PVER phases 1, 2, 3, and 4 in appropriate habitat between 17 June and 8 August 2011. Cuckoos were detected in all four areas, with breeding occurring in PVER 2 (3 nests), PVER 3 (2 nests), and PVER4 (6 nests). A total of nine nestlings were banded prior to fledging.

Willow flycatchers were detected in phases 2 and 3 in 2011. One bird detected on 9 June was confirmed as a southwestern willow flycatcher; it was color banded previously in Southern Nevada. This is the first confirmed southwestern willow flycatcher detected at PVER. The bird was not detected or re-sighted again after 9 June and other birds detected in Phase 3 were assumed to be migrants.

FY12 Activities:

Maintenance/Restoration/Management. The development of Phase 7 (241 acres) is the focus in FY12. The ground will be prepared for Phase 7 planting, which includes disking, laser leveling, and plowing as needed for mass transplanting the trees and shrubs. Soil samples will be taken, analyzed for fertilizer needs and applied prior to planting. Since the dense matting of cover crop was successful with reducing weed infestations in Phase 2, 3, 4, 5 and 6, this method will continue to be utilized in Phase 7. 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 221 acres of riparian species (approximately 400,000 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 will also be hand planted on the remaining 21 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.

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. When applicable, pesticides may be used.

Irrigation will continue on the same schedule until data become available that indicate adjustments are needed.

The plan and design for Phase 8, development of approximately 38 acres, will be drafted and is expected to establish this phase with honey mesquite.

Monitoring. All monitoring that was conducted in FY11 are being conducted in FY12.

Proposed FY13 Activities: Field preparation and planting of Phase 8 will be conducted to create as much mesquite habitat as practical. Previous phases will be monitored and adaptively managed for the targeted species. Site preparation for hand planting of mesquite trees on approximately 38 acres will be conducted. Monitoring will continue in FY13.

Pertinent Reports: The *Palo Verde Ecological Reserve Restoration Development Plan: Overview*, which outlines the general development of the property, the *Palo Verde Ecological Reserve Restoration Development Plan: Phase 1*, which described the restoration activities planned for FY06, *Palo Verde Ecological Reserve Restoration Development Plan: Phase 2*, which described the restoration activities planned for FY07,the *Palo Verde Ecological Reserve Restoration Development Plan: Phase 3*, the *Palo Verde Ecological Reserve Restoration Development Plan: Phase 4*, *Palo Verde Ecological Reserve Restoration Development Plan: Phase 5, Palo Verde Ecological Reserve Restoration Development Plan: Phase 6*, and the *Palo Verde Ecological Reserve Restoration Development Plan: Phase 7*, which described the restoration activities planned for FY12 are posted on the LCR MSCP website.

Work Task E5: Cibola Valley Conservation Area

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$1,100,000	$451,820.04	$9,817,043.22	$650,000	$650,000	$700,000	$1,100,000

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.

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 FY10, 618 acres of cottonwood-willow, honey mesquite, and buffer-stabilized ground have been established in phases 1-5 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 grass, desert bluebells, and desert Indian wheat. A sprinkler system was rented for four months to provide irrigation water for initial plant germination.

FY11 Accomplishments:

Maintenance/Restoration/Management. Phase 6, consisting of 89 acres, was planted in March 2011 in accordance with the restoration development plan. This planting effort established approximately 14,000 honey mesquite trees 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 salt cedar 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.

Field crews continued to control morning-glory, volunteer cotton, and salt cedar as necessary, with hand tools, throughout all the phases. This method of using crews proved to be an effective method of controlling invasive plants as they germinate. The crews remove invasive plants from the fields in the late spring or early summer.

Mechanical disking occurred between the mesquite-planted furrows in Phases 4, 5 and 6. The invasive grasses/weeds and volunteer cotton created a dense presence. This disking practice between the furrows may occur annually.

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 Quechan Tribe. 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.

The Cibola Valley Irrigation and Drainage District hosts monthly meetings with its water users. The LCR MSCP is represented at each meeting. All topics are discussed ranging from irrigation issues, to maintenance, to upcoming events and activities.

A small portion of Phase 5, honey mesquite, appears to have suffered mortality over the last winter. Based on laboratory results, the cause appears to be a canker caused by a fungus. An

aerial application of a fungicide was applied to control the fungus. During the late summer, aphids (mesquite psyllids) were detected on younger mesquites in Phase 6. These insects were eating the green leaves on the younger mesquites, causing significant stressors to the trees. An insecticide called "Intruder" was applied with positive results.

Monitoring. Vegetation monitoring for FY2011 was conducted between September and December 2010. Average tree heights were 10.9m in Phase 1, 6.8m in Phase 2, 9.5m in Phase 3, 1.9 in Phase 4 East, 2.2 in Phase 4 West, and 1.9 in Phase 5. Average canopy closure was 89.9% in Phase 1, 66.4% in Phase 2, 83.0% in Phase 3, 5.4% in Phase 4 East, 16.7% in Phase 4 West, and 0.7% in Phase 5. In April 2011, the mesquite trees in CVCA5 check 1, showed signs of stress. LCR MSCP biologists collected mesquite density data in check 1 at the existing vegetation rapid plots to asses if there had been significant loss of trees since October of 2010 when last years' monitoring was conducted. Although there was a decline in number of mesquite trees over the 5 month period there was no significant difference between mean density of mesquite in October 2010 and April 2011.

Nine yellow-billed cuckoo nests were found at CVCA between July and August 2011. Of these, five nests fledged a total of 13 young. All 13 fledglings from CVCA were banded with USFWS numbered bands and color bands.

Southwestern willow flycatchers were detected at CVCA. Phase 1 had 12 detections all before June 9th. Phase 2 had 29 detections all before June 1. Breeding was not detected, therefore all are presumed as migrants. As part of our MAPS operations, we banded one flycatcher on May 25th.

General bird surveys were conducted at CVCA Phase 1 through 5 from 15 April to 15 June 2011. Covered species detected were 7 pairs of yellow warblers and 2 pairs of summer tanagers.

Bat acoustic driving transects were conducted at CVCA in May, July, and September. No covered species were detected during acoustic surveys. A long-term acoustic station was deployed in March of 2011. Data are currently being analyzed for the station. Capture surveys were conducted once per month from May to September.

Colorado River cotton rats were located at CVCA phases 1, 2, and 3 during 2011.

MacNeill's sootywings largely disappeared from CVCA during 2011. Restoration plots containing the butterfly's host plant, *Atriplex lentiformis*, were sampled six times during 2011 on 27 April, 19 May, 23 June, 20 July, 24 August, and 14 September. A total of 11 sootywings were observed, mostly at Phases 4-West and 4-East. For comparison, approximately 1,430 sootywings were counted on eight dates at the same CVCA plots during 2010.

FY12 Activities:

Maintenance/Restoration/Management. Planting and field preparation operations will cease until 2015, when Phase 7 will be planted with riparian trees. The intent of this planting delay is to determine if additional irritation water might become available. However, normal irrigation and maintenance activities will continue.

Monitoring. Monitoring activities conducted in 2011 will continue in 2012. Locations of surveys will be adjusted based on the growth and development of the planted phases.

Proposed FY13 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 FY13. Locations of surveys will be adjusted based on the growth and development of the planted phases.

Pertinent Reports: N/A

Work Task E9: Hart Mine Marsh

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$500,000	$738,284.20	$5,241,049.31	$300,000	$750,000	$250,000	$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 was a decadent marsh located on Cibola NWR that was restored and expanded to create functional habitat for covered species. This was accomplished by the installation of control structures to manage water levels, providing sources of higher quality surface water flows, making physical changes to the site's topography, and by planting and supporting native wetland and marsh vegetation. The basic approach was to remove a substantial amount of existing saltcedar from the site, deepen areas of existing open water and contour areas adjacent to those deeper areas, and manage water at the higher elevations to promote and sustain marsh cover type vegetation and wetland functions. The creation of habitat included both the establishment of native plants and management of water levels to meet performance standards for integrating emergent vegetation and open water at varying depths into a mosaic of marsh habitats.

Previous Activities: In FY08, NEPA compliance activities, cultural surveys, topographic surveys, and pre-development surveys for marsh birds and riparian obligate birds were conducted. Engineering designs were finalized, and all regulatory permitting required for construction was completed including NEPA, ESA, sections 401 and 404 of the CWA, and Section 106 of the NHPA. In FY09, the first phase of construction was completed and resulted in 92 acres of marsh. In FY10, phase 2 of construction created an additional 163 acres of marsh.

FY11 Accomplishments:

Maintenance/Restoration/Management. The third and final construction phase at HMM was completed in FY11. These activities included additional grading, contouring, and water control structure installation. A new 40 cfs pump was partially purchased with funds from FY10; the pump replaced the existing 40 cfs pump which suffered irreparable damage in late FY10. Additional funds for this procurement as well as for the installation of the pump were provided by FY11 funds. A portion of the FY11 budget overage was justified by these additional actions.

As part of an effort to increase vegetation species diversity at HMM, supplemental planting occurred in FY11. Saltgrass plugs were planted along the margin of the north side of cell 1 at elevation 217 feet. Three-square bulrush, great bulrush, and California bulrush were also planted on the eastern side of cell 2 (table 1).

Table 1. 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
Schoenoplectus californicus	California bulrush	10,000
Scirpus tabernaemontani	Great bulrush	10,000
Scirpus olneyi	Three-square bulrush	30,000
Distichlis spicata	Inland saltgrass	70,000
Total		120,000

In addition, alkali sacaton (*Sporobolus airoides*) seed was 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.

The saltgrass and emergent marsh species planted in 2011 had high establishment and survival. By the end of the season, the planted marsh species had noticeably filled in and expanded from the planted areas. The seeded alkali sacaton, however, was completely unsuccessful. We expect that this was due to the inability to create suitable germination conditions (low enough salinity, wet enough surface soil, etc.) at the site. Due to the success of the saltgrass establishment and its effectiveness at inhibiting the colonization of invasive saltcedar at the margin of the marsh, an additional 500,000 saltgrass plugs were purchased in FY11 for planting in early spring of FY12. This purchase also contributed to the budget overage in FY11. The continued establishment of saltgrass is expected to reduce long-term weed management costs at HMM.

Monitoring. Marsh birds were surveyed three times following the North American Marshbird Protocol. Yuma clapper rail and least bittern were both detected within the marsh.

FY12 Activities:

Maintenance/Restoration/Management. The majority of the activities that will occur in 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. Invasive and nonnative vegetation control will continue to be performed. Monitoring of abiotic and biotic parameters is also conducted.

Only minor construction activities will occur in FY12. These include: improving access to one of the large islands in cell 1 to permit more efficient vegetation management and, the expansion of one of the parking areas in the north east corner of cell 1. The vegetation maintenance contract will be modified to include controlling weedy species on the islands in HMM. Up to this point, little attention was paid to the islands, mainly due to accessibility issues. Controlling invasive and nonnative species on these islands is considered extremely important to reduce nonnative seed sources throughout the marsh and to keep nonnative invaders from completely colonizing the islands within the marsh. This increase in effort is expected to increase costs for FY12 and FY13 budgets.

Planning and procurement of materials for future infrastructure repairs and upgrades will also take place in FY12. To account for the time requirements of the procurement process and to avoid potential schedule problems during the short time window when installation of the new unit 2 water supply lines would occur, the decision was made to purchase the materials and supplies needed for the infrastructure repair in FY12 for installation in winter of FY13. Although necessary to insure minimal system down-time these purchases are expected to cause a substantial increase in cost for the FY12 budget.

Monitoring. Marshbird surveys will be conducted again in FY12. Marsh vegetation monitoring will begin in FY12.

Proposed FY13 Activities: Major infrastructure repair is planned for FY13. This will involve the replacement of the leaking water delivery lines from the Unit 2 pumps and the installation of a dedicated water line for HMM. The water delivery infrastructure for the Unit 2 management area on Cibola NWR (that also supplies HMM) needs to be replaced to handle the water demands of HMM and the water volume generated by the newly installed 40 cfs pump. 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 are being 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.

Regular management and monitoring activities will continue in FY13. Water management, including the maintenance of water levels and water delivery activities on the site will continue. Invasive and nonnative vegetation control will continue. Monitoring of marsh vegetation and marshbirds will be conducted.

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 and 2011* will be posted when available.

Work Task E14: Imperial Ponds Conservation Area

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$610,000	$508,610.43	$7,939,916.59	$525,000	$395,000	$395,000	$950,000

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.

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 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 FY14.

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.

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.

FY11 Accomplishments:

Maintenance/Restoration/Management. Onsite maintenance, utility payments, and water management for the site continued. E14 was used to support the dewatering, evaluations, maintenance of each pond. Vegetation management was an ongoing action that keeps the pond shorelines clear of excessive growth of undesired *Phragmites*.

Several infrastructure maintenance tasks were conducted in FY11. The overflow pipe in pond 1 was replaced, the ponds drainage ditch was excavated to facilitate water movement, the boat ramp in pond 3 was repaired, and the air burst system which keeps the wedge-wire screen clean for the 200 hp pump resumed automated daily operation.

Pond. In April 2011, additional non-native fish entrainment studies were conducted, to test secondary filtering of LCR surface water to a size capable of excluding all non-native fish eggs and larvae. This research was intended to supplement the primary wedge wire screen system, by providing secondary filtration in the form of sand filters. In preparation for this study a

temporary line from the existing well into pond one using left over pipe material was constructed and native fish were captured from ponds 2-6 and released into pond 1. Results from this study were promising with 100% exclusion of eggs and larvae through the sand filter but presence in collections taken before filtration and in sand backwash.

In May 2011, the addition of LCR surface water for management of water surface elevation (WSE) on ponds 2 – 6 was stopped. WSE and water quality monitoring was conducted on all the ponds 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 channel (south channel). Monitoring will continue for the next 2 years, at which time, 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 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 FY14. During the spring of FY11 the fields were fertilized with a high nitrogen fertilizer (to increase nutrients) and humic acid to help mobilize salts and facilitate salt flushing. Fertilizer was not applied in the fall of 2011, based on high nitrogen levels detected in water samples taken from the adjacent well feeding pond 1.

Marsh. The 12 acre marsh created in Field 18 in the southeast corner of Imperial NWR was managed for marsh covered species.

Monitoring.

Ponds. 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 larva and 11 RASU larvae were collected in Pond 2.

Riparian. Surveys for WIFL were conducted five times in the area immediately to the north of Pond 1 from May to July. Four birds were detected on 22 May and two birds were detected on 5 June. These birds were all considered migrants, and no signs of breeding SWFL were found. Bat acoustic driving transects were conducted in May, July and September. The western red bat was detected in July, the western yellow bat was detected in May, and the Townsend's big-eared bat was detected in July. Capture surveys were conducted five times as part of the red/yellow bat roosting study being conducted by AGFD. The California leaf-nosed bat was the only LCR MSCP species captured. YBCU surveys were conducted at the area and one bird was detected on 21 June, 2 birds were detected on 8 July and one bird was detected on 16 July. No nests were found but a possible breeding pair was detected at the site.

Marsh. Marsh bird surveys were conducted at the Imperial Ponds and at Field 18 over three survey periods from March to late April. One least bittern was detected in Pond 2 during the second survey period. In Field 18, black rails, clapper rails, and least bitterns were detected in all three surveys periods. An average of 1.7 black rails, 4 clapper rails, and 1.3 least bitterns were detected per survey period.

FY12 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*.

Ponds. No LCR surface water was supplied to ponds 2-6. WSE and water quality monitoring will be conducted monthly on all ponds 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 south channel. 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 mapping and sampling was conducted on the 34 acres of the future cottonwood-willow field areas to evaluate salt concentrations and nutrient levels. Crop rotation in fields to alfalfa is anticipated. Changing the cover crop to alfalfa is expected to reduce nitrogen levels and assist in nutrient levels in the field.

Marsh. The 12-acre marsh created in Field 18 in the southeast corner of Imperial NWR will continue to be managed for marsh covered species.

Monitoring. Monitoring that was conducted in FY11 will continue in FY12.

Proposed FY13 Activities:

Maintenance/Restoration/Management. Onsite maintenance, utility payments, and water management for the site will continue.

Ponds. Monitoring of ponds WSE and water quality will be conducted monthly to answer questions regarding the similarity or contrast of the natural WSE and water quality parameters

between the ponds, the LCR, and the south channel. Methods to reduce or simplify water delivery to the ponds and enhance water quality will be implemented and monitored.

Riparian. Soil sampling will continue on the 34 acres of the future cottonwood-willow field areas to evaluate salt concentrations and nutrient levels.

Marsh. The 12-acre marsh created in Field 18 in the southeast corner of Imperial NWR will continue to be managed for marsh covered species.

Monitoring. Monitoring will continue in FY13.

Pertinent Reports: *Imperial Ponds Conservation Area Development Plan, Evaluation of the Cylindrical Wedge-Wire Screen System at Imperial NWR 2009* and *Evaluation of Secondary Filtration Technology for Nonnative Fish Exclusion at Imperial NWR 2011* are posted on the LCR MSCP website. *Imperial Ponds Conservation Area 2011 Annual Report* will be posted when available.

Work Task E15: Backwater Site Selection

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$20,000	$17,255.29	$1,282,479.86	$20,000	$550,000	$100,000	$100,000

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.

Previous Activities: The inventory of existing backwaters within Reaches 3-6 has been completed. Three backwaters are currently being managed under the LCR MSCP: 1) Beal Lake, 2) Big Bend Conservation Area, and 3) Imperial Ponds. Beal Lake was created under the 1997 Biological Opinion and does not count towards the 360 acres required under the LCR MSCP. Big Bend represents 15 acres of connected backwater within Reach 3 and Imperial Ponds represents 80 of disconnected backwater within Reach 5.

FY11 Accomplishments: Discussions were held with representatives from the USFWS, CDFG, AGFD, NDOW, and Reclamation to clarify the goals of the backwater creation conservation measures and allow the program to continue to select and implement additional backwaters. As discussed with our Steering Committee, the focus of the new backwaters is on development in California.

The key discussion items and decisions addressed both the type of backwater to be created (disconnected and connected) and the location of these backwaters (Reach and State). First, although disconnected backwaters are the preference for the program a mix of connected and disconnected is expected to provide benefit to native fishes and therefore is acceptable. Second, backwaters within Reach 3 should be open to river to allow flannelmouth suckers access to the slackwater. Based on these clarifications, a five-year backwater strategy is not longer necessary.

FY12 Activities: With all parties in agreement, that backwaters in Reach 3 should be open to the river, we have begun the evaluation of potential backwater sites within California. An opportunity to partner with the City of Needles to maintain an open backwater at Bureau Bay has arisen and is being evaluated. Design and implementation of a plan to maintain the connection to the river, which would include excavation of material, is being developed. The actual implementation would follow the normal Work Task process and is included as a new start in FY13 under Work Task E32: Bureau Bay. Five other potential areas, within Reach 3 and the state of California, are also being investigated.

Another potential backwater project within Reach 4, located on an area referred to as PVER-South, is being evaluated with CDFG and would consist of both connected and disconnected backwaters. The actual implementation would follow the normal work task process and be tracked under a new work task.

Evaluating and implementing secondary filtration at the Imperial Ponds is now being addressed under E14: Imperial Ponds Conservation Area since the application will be site specific. 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.

Proposed FY13 Activities: The evaluation of potential disconnected backwaters within Reach 3 and in the state of California is expected to be completed. Upon completion, we will begin identification of potential connected backwaters within Reach 3, but located in Nevada or Arizona. Implementation of any actions at Bureau Bay would be addressed under Work Task E32.

Drilling of exploratory production wells at PVER-South is anticipated. The intent is to determine the quantity and quality of water that could be delivered to disconnected ponds within the site. At the conclusion of the well drilling, drafting of a Restoration, Development, and Monitoring Plan, and signing of a land use agreement, costs for implementation at PVER-South would be addressed under a new work task.

Pertinent Reports: N/A

Work Task E16: Conservation Area Site Selection

FY11 Estimate	FY11 Actual Obligations	Cumulative Accomplishment Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$375,000	$259,346.35	$1,184,867.65	$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: Habitat creation.

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: Request, identify, prioritize, visit, and recommend potential conservation areas to the Steering Committee for development under the habitat creation requirements of the LCR MSCP.

Connections with Other Work Tasks (past and future): The process developed under this work task will guide the selection of future conservation area sites to be developed under 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.

FY11 Accomplishments: FY11 activities were focused on building partnerships with resource agencies and identifying properties for future development. 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. We also conduct quarterly meetings with USFWS representatives from all four 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 USFWS.

Two development plans were drafted and sent to the California Department of Fish and Game for evaluation and approval. The first was the establishment of honey mesquite on lands adjacent to the Palo Verde Ecological Reserve and owned by the Palo Verde Irrigation District. This plan was entitled "Horse's Head Conservation Area Development and Monitoring Plan." Based on discussions with PVID, due to its small size the project will not be moving forward at this time. The second included the development of over 500 acres located on Cibola National Wildlife Refuge into primarily honey mesquite. This plan is titled *Shark's Tooth Conservation Area Restoration, Development and Monitoring Plan*. The property, if developed, would satisfy over one-half of the program's honey mesquite goal for the state of California.

A site visit to the Bard Irrigation District/Yuma Island area was conducted and concepts for potential habitat creation were identified.

FY12 Activities: Coordination with resource agencies and attendance at planning meetings is expected to be similar to those in FY11

The two development plans submitted in FY11, were not approved by the California Department of Fish and Game. Recent discussions with both CDFG and the USFWS appear to have resolved these issues. The development plan for the "Horses Head" is not being pursued at this time. The plan for honey mesquite on Cibola Refuge is being redrafted to address these concerns and will now be referred to as the "Sharks Tooth Conservation Area". When approved this development of primarily honey mesquite at Cibola NWR is expected to provide over 500 acres of honey mesquite habitat.

Additional discussions with CDFG, USFWS, and Reclamation have centered on the development of PVER-South, of which the majority of lands are owned by CDFG. As discussed, the restoration would include both connected and disconnected backwater as well as cottonwood-willow and honey mesquite. Upon completion and comment on a development plan, drilling of groundwater wells as discussed in Work Task E15: Backwater Site Selection, and signing of a land use agreement for the property any development would be tracked under a new Work Task. Because development of marsh and backwater projects require the collection of significantly more site-specific data than projects targeting honey mesquite, their development plans will take longer to be drafted.

Restoration concepts for the Bard Irrigation District-Yuma Island area will be discussed with interested parties. However, development of any habitat would need to address multiple issues such as land ownership, water rights, and long-term management.

Proposed FY13 Activities: Coordination with resource agencies and attendance at planning meetings is expected to be similar to those in FY12. FY13 activities will focus on the identification and evaluation of potential conservation areas, primarily in California.

Pertinent Reports: N/A

Work Task E17: Topock Marsh Pumping

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$270,000	$41,359.94	$768,490.29	$2,550,000	$70,000	$70,000	$70,000

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 covered impacts 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): None

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.

Previous Activities: In early 2010, the LCR MSCP committed $1 million toward the construction of the Firebreak Canal, which improved the delivery of water to Topock Marsh by greatly reducing transmission losses that occurred when using the old, unlined inlet canal. In return for the LCR MSCP's contribution, the USFWS rendered correspondence stating that the LCR MSCP had met its construction obligations under AMM2.

At the LCR MSCP Steering Committee Meeting on April 28, 2010 the decision was made to provide the USFWS with all the Operation and Maintenance funds, required under the second part of AMM2, in a lump sum of $2.55 million during Fiscal Year 2012. It was agreed that upon USFWS's receipt of the funds a second letter would be rendered to the LCR MSCP affirming that all Operation and Maintenance commitments under AMM2 had been fulfilled.

FY11 Accomplishments: Upon investigating how the transfer of $2.55 million would occur, it was found that moving appropriated funds from Reclamation to USFWS for long-term operation and maintenance is not permissible. Therefore, through an interagency agreement, the USFWS will use a portion of the operation and maintenance funds to construct the Topock Marsh Pump Station at the western terminus of the Firebreak Canal.

The funds remaining after construction of the pump station will be transferred over a period of years through utility charges until the original agreement amount of $2.55 million is reached. It is currently anticipated that these funds will be fully expended by 2025.

FY12 Activities: The interagency agreement for the pump station is finalized and the USFWS has access to the funds. The USFWS will take full responsibility for administering the contract to complete the pump station.

Proposed FY13 Activities: Construction of the pump station by the USFWS is scheduled to begin in the fall of 2012. The only costs associated with this work task after FY12 will be utility charges from the USFWS. The annual charges are estimated; however, when joined with the cost of the pumping station they shall not exceed the amount of $2.55 million agreed upon in FY12.

Pertinent Reports: N/A

Work Task E18: Law Enforcement and Fire Suppression

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$250,000	$205,944.26	$577,817.38	$325,000	$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 and law plans will be drafted.

Previous Activities: The BLM Colorado River District office based in Lake Havasu, Arizona provides fire management support services to the LCR MSCP. BLM is responsible for fire related activities and is the lead wildland fire agency for Conservation Areas on both state and Reclamation lands.

The BLM also conducts patrols on the site, outreach to land owners, site mapping and identification of critical infrastructure. The inspections are intended to proactively identify and address potential wildland fire management issues. Recommendations are discussed with the land owner and the LCR MSCP project manager. These recommendations help identify high risk areas, areas in need of fuels reduction, and management of visitor use areas.

FY11 Accomplishments: A pre-fire season meeting was conducted in February 2011 at both the Palo Verde Ecological Reserve (PVER) and the Cibola Valley Conservation and Wildlife Area (CVCA). The meetings were attended by the federal wildland firefighters from BLM, USFWS, and BIA; wildlife wardens, irrigation district staff, local fire departments, LCR MSCP project managers and local residents who live near the conservation areas. These meetings are intended to familiarize the wildland firefighters with the conservations area and share with stakeholders their concerns or recommendations for each site. A complete driving tour with the group and a wrap-up session at each site was held that allowed for questions and answers by firefighters and stakeholders.

Fuels reduction tools and techniques were researched in FY11 in anticipation of conducting reduction activities at conservation areas in later years. Methods such as road side mowing, boom spraying and mechanical excavation were identified. The use of a portable debris incinerator was also researched and analyzed for compatibility with conservation areas.

GIS maps were created identifying adjacent land owners at the PVER and the CVCA. Riverside, Imperial and La Paz County assessor records were retrieved and land ownership determined using assessor parcel numbers. This information can be used for fire management activities as well as outreach to adjacent land owners.

The BLM drafted a fire management plan for both the PVER and CVCA. The plans are incorporated into the BLM's Colorado River District FMP that is updated annually. The Plan goes into detail regarding existing habitat, threatened and endangered species, suppression tactics, constraints, site infrastructure, land ownership, fuel types, access routes, supporting fire agencies, radio frequencies, dispatch locations, etc.

FY12 Activities: A post-fire season meeting similar to the pre-season meeting held in February was conducted in November.

The BLM will continue to be funded and site recommendations submitted to the land owners and LCR MSCP project managers. Signage available for Conservation Areas consistent with federal and state fire restrictions will be researched and purchased for conservation areas.

The BLM will draft two fire management plans for LCR MSCP conservation areas and incorporate the new plans into the BLM's FMP. Plans will be drafted for the Yuma East Wetlands and the Hunters Hole Conservation Areas. Annually the BLM's FMP is updated and formally adopted by the agencies department managers.

A conservation area-specific LCR MSCP fire and law enforcement plan that documents land owners, federal and state regulations, habitat phases planted, wildlife agencies, local law enforcement and fire agencies, resource advisors, etc. will be developed for Hart Mine Marsh located on Cibola NWR, possibly Yuma East Wetlands located on City of Yuma and Quechan Tribal lands and Hunters Hole located on Reclamation owned land.

The pre-fire season and post-fire season meetings will be expanded to include LCR MSCP conservation areas located on federal refuges, state, and city lands. The USFWS Wildland Fire

Fighting Office will be approached in FY12 and asked to actively participate in LCR MSCP fire management services at conservation areas located on federal refuges.

Fuel load reduction may occur on or adjacent to conservation areas. Chemical treatments, manual, mechanical and chipping of invasive species are all generally accepted fuels reduction techniques. The BLM, USFWS, and supporting fire management offices will help advise the LCR MSCP on implementation of new fire breaks, vehicle turn-arounds, and associated fire management actions.

Proposed FY13 Activities: The BLM will continue to be funded and site recommendations submitted to the land owners and LCR MSCP project managers.

The BLM will draft one fire management plan for the Laguna Division Conservation Area and add the plan to the BLM Colorado River District's FMP. The Laguna plan will be drafted in FY13 to help familiarize wildland fire fighters with the site, and the plan finalized when the site is completely built out.

The BIA Wildland Fire Fighting Office will be approached in FY13 and asked to actively participate in LCR MSCP fire management services at conservation areas located on tribal lands.

Fuel load reduction may occur on or adjacent to conservation areas. Chemical treatments, manual, mechanical and chipping of invasive species are all generally accepted fuels reduction techniques. The BLM, USFWS, and supporting fire management offices will help advise the LCR MSCP on implementation of new fire breaks, vehicle turn-arounds, and associated fire management actions.

Pertinent Reports: N/A

Work Task E21: Planet Ranch, Bill Williams River

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$8,900,000	$34,019.70	$162,956.07	$1,500,000	$40,000	$40,000	$40,000

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 (owned by Freeport-McMoRan), 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*.

FY11 Accomplishments: Negotiations to secure the land and water resources for the project continued. 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. In addition, state regulatory compliance from the Arizona Department of Environmental Quality ADEQ is being coordinated by the City of Scottsdale. These activities are expected to include an Environmental Assessment with a public comment period. Native American consultation and a Class I Cultural Survey as prescribed in section 106 of the National Historic Preservation Act was completed in FY11. Planet Ranch was not purchased during FY11. Expenditures were far below the projected budget in FY11, which reflects the absence of this large procurement, the ongoing negotiations, and completion of the Class I cultural survey.

Proposed FY12 Activities: Negotiations to secure the land and water resources for the project will continue with Freeport McMoRan. Once an agreement has been reached, a land and water resolution will be presented to the Steering Committee. The budget has been reduced to $40,000 to allow for continued involvement and negotiations.

Proposed FY13 Activities: Negotiations to secure the land and water resources for the project will continue with Freeport McMoRan. Once an agreement has been reached, a land and water resolution will be presented to the Steering Committee. The budget has been reduced to $40,000 to allow for continued involvement and negotiations.

Pertinent Reports: N/A

Work Task E24: Cibola NWR Unit #1

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$636,000	$639,675.70	$2,737,024.70	$1,000,000	$1,100,000	$1,200,000	$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 pre-cursor 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.

FY11 Accomplishments:

Maintenance/Restoration/Management. 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 FY11. Site maintenance including irrigation, weeding, and other associated farm services were conducted on the existing planted acres using contracted services through FY11.

The Fremont cottonwood genetic study, initiated in FY07, was completed and a final report was posted to the LCR MSCP website.

Monitoring. Post-development vegetation monitoring was conducted at Nature Trail, Mass Planting, Crane Roost, and the seed feasibility study site. Vegetation monitoring was conducted in the fall of 2010 (beginning of FY11). Vegetation heights averaged 8.1m at the Nature Trail, 9.0m at the Mass Planting and 5.0m at the Crane Roost. Average canopy closure was 82.7% at the Nature Trail, 78.6% at the Mass Planting and 29.3% at the Crane Roost.

Small mammal trapping was conducted at the Nature Trail and cotton rats were documented again in 2011. Bat acoustic driving transects were conducted in May, July and September. No covered species were detected during acoustic surveys. A long term acoustic station was deployed in March of 2011. Data are still being analyzed for the station. 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, Crane Roost, and the LCR MSCP research and demonstration fields 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.

Bird banding was again conducted at the Nature Trail, following the MAPS protocol. Ten surveys were conducted between May and August. The Gila woodpecker was the only LCR MSCP species captured.

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. One bird was detected and the site was surveyed five separate times.

Yellow-billed cuckoos were detected at the Nature Trail, Mass Planting and Crane Roost fields. One nest was found at the Crane Roost in a honey mesquite.

Proposed FY12 Activities:

Maintenance/Restoration/Management. The purchase of trees for approximately 80 acres of fields available in the Hippy Fire Area will occur in FY12. These riparian trees will be planted in March of 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. Using the data from FY11, the number of vegetation plots will be increased at Nature Trail and reduced in all other areas.

Monitoring. Monitoring will continue at the FY2011 levels, and include vegetation, general bird surveys, SWFL Surveys, YBCU surveys, small mammal trapping, and bat surveys.

Proposed FY13 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. Monitoring will continue for all sites.

Pertinent Reports: *Cibola NWR Unit #1 Conservation Area Annual Report 2010,* and *2011* will be posted to the LCR MSCP website when available. *2010 Cibola National Wildlife Refuge Field 51 Vegetation Monitoring Report,* and *Fremont Cottonwood Genetics Study: Final Report, 2011,* will also be posted on the LCR MSCP website when available.

Work Task E25: Big Bend Conservation Area

FY11 Estimates	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$500,000	$446,293.25	$1,083,687.69	$30,000	$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, NV, 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 (BBCA). The conservation area includes approximately 15 acres of backwater within the Nevada portion of the Colorado River that will be protected, and approximately 15 acres of upland area adjacent to the backwater. The dry upland area is planned to be enhanced for education and outreach purposes by 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 BBCA, 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.

Previous Activities: The land use agreement documents the roles and responsibility of each party pertaining to continual management of the BBCA.

In FY09, SNWA assumed the responsibility of restoring the upland portion of BBCA 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.

In FY10 SNWA was reimbursed for approximately one half of the funding used to secure the Boy Scout Camp property through an in-kind contribution. SNWA continued their effort to establish native plants on the upland property and ensure compatibility with the goals of backwater protection with the support of the LCR MSCP.

In FY10, NDOW received approval from the Nevada Wildlife Commission to install two buoys at the entrance of the backwater.

FY11 Accomplishments:

Maintenance/Restoration/Management. The SNWA was reimbursed the remaining balance for approximately one half of the funding used to secure the Boy Scout Camp property through an in-kind contribution. Through coordination between NDOW and the LCR MSCP, permits for the buoy placements were completed in spring 2011 and the two buoys were installed in June 2011. The buoys provide a no-wake restriction in the backwater to decrease disturbance to wildlife. 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.

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 2011 were conducted during February through May as part of the ongoing flannelmouth sucker activities associated with work task C15. Two LCR MSCP covered species were contacted. Two razorback suckers (351 and 470 mm TL) were contacted during March and May sampling (one during each period), and a single sub-adult flannelmouth sucker (365 mm TL) was captured during the April survey.

FY12 Activities:

Maintenance/Restoration/Management. Selective clearing of non-native vegetation, to reduce the risk of fire, will be conducted using youth conservation crews funded by the Commissioner's

Office. 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. Marsh bird surveys will be conducted during March, April and May using the National Marsh Bird Monitoring Protocol at the four established survey points.

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 FY13 Activities:

Maintenance/Restoration/Management. Selective clearing of non-native vegetation and general maintenance activities will be conducted using youth conservation crews funded by the Commissioner's Office. 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. Marsh bird surveys will be conducted during March, April and May using the National Marsh Bird Monitoring Protocol at the four established survey points.

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, and Site Improvement Plan* is posted to the website.

Work Task E27: Laguna Division Conservation Area

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$1,375,000	$3,060,556.46	$1,106,462.55	$6,290,000	$5,000,000	$3,000,000	$2,000,000

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 was 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 Gila Gravity Canal sluicing gates. 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 through flooding.

To support the concept described above, inlet modifications to the point of diversion at the Gila Settling basin will be made to allow for up to 100 cfs capacity. The diversion pipe system will be engineered to allow for maximum management flexibility including diverting the entire flow to Mittry Lake Wildlife Area, LDCA, or the historic river channel. The Water Accounting Agreement will be used to support LDCA.

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 was used to determine the project's implementation.

LDCA was 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.

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 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. Surveying of marshbirds continued until work began at the site. The EA for the site includes provisions for protecting these species and the adjacent Mittry Lake Wildlife area provides an alternative habitat for the species displaced by the construction at LDCA.

FY11 Accomplishments:

Construction, Maintenance/Restoration/Management. Continued analysis/design refinements occurred between the Laguna Planning team, local stakeholders, state and federal agencies, and Reclamation.

In February 2011, a Finding of No Significant Impact (FONSI) was signed by Reclamation, after review of the final EA prepared for LDCA.

At the direction of the U.S. Army Corps of Engineers, soils were sampled within LDCA. The results from the samples can be found in *The Laguna Division Conservation Area Wetland Restoration Project Site and Soil Salinity Analysis Report* dated April, 2011. The soil samples confirmed expected conditions and therefore no changes to the draft planting and restoration activities are being made. Soil sample results were incorporated into the submittal of the Section 404 permit application of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. Approval of the application was received in September 2011.

Procurement and delivery of approximately 2,300 feet of 48-inch HDPE pipe was completed in early 2011. Fusion and installation of the pipeline began in summer of 2011 and was completed in winter 2011. Clearing of Reach 1 began and is expected to be completed by spring 2012.

Monitoring. Monitoring commenced to create a baseline of wildlife presence and general vegetation information prior to construction and as a prerequisite for compliance requirements. Vegetation data were collected in the fall and are still being analyzed as of this report. Six Anabats were set out during three different periods across the site for acoustic monitoring of bats. Dates of deployment were: January 24-31, May 18-31, and August 19-September 8 for a total of 43 nights. Results are still being analyzed as of this report. Four surveys were conducted for yellow-billed cuckoos between June 25 and July 27, 2011. One cuckoo was detected, but no nesting was confirmed and this bird was reported as a migrant. Three LCR MSCP species were confirmed as breeders: black rail, Yuma clapper rail and Bell's vireo. No willow flycatcher habitat was present at the site.

FY12 Activities:

Construction, Maintenance/Restoration/Management. As construction progresses, further analysis/design refinement will occur between the Laguna Planning team, local stakeholders, state and federal agencies, and Reclamation.

Pipeline installation will be completed in FY12. Clearing activities will continue in Reach 1 and Reach 2 and procurement of infrastructure will take place in FY12 with anticipated construction in FY13.

Site maintenance, irrigation, and hand planting will occur. Site maintenance will include weed maintenance, which is expected to be on-going throughout clearing, construction and for the first 3-5 years of plant establishment.

Monitoring. There will be no monitoring of species during construction. Once vegetation has been established monitoring will commence.

Proposed FY13 Activities: Continued analysis/design refinement will occur between the Laguna Planning team, local stakeholders, state and federal agencies, and Reclamation.

Construction of infrastructure is expected to commence in FY13. Infrastructure for LDCA includes water control structures, headworks and outlet works, and pinch valve assembly. Clearing will continue into Reach 3 after completion of Reach 2. Weed maintenance will

continue. There will be no monitoring of species during construction. Once vegetation has been established monitoring will commence.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$250,000	$258,521.17	$487,194.94	$400,000	$450,000	$450,000	$450,000

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 and trash dumps. 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 Yuma Crossing National Heritage Area (YCNHA) and Reclamation biologists is ongoing.

The project is located in Yuma, Arizona, on City of Yuma, Quechan Tribal, and Arizona Game and Fish Commission lands. 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.

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 analysis, and adoption of LCR MSCP species monitoring protocols.

Additionally, the LCR MSCP has drafted a long term land use agreement amongst the land owners and interested parties. The YCNHA is the lead agency working with land owners to complete the land use agreement scheduled for signatory in 2012.

FY11 Accomplishments: The second year of funding was transferred for maintenance and management activities associated with operating a 350 acre marsh complex. Maintenance of habitat, irrigation infrastructure upkeep and project coordination constituted the majority of FY11 activities. Management activities included: LCR MSCP coordination meetings amongst biologists, stakeholder meetings determining upcoming habitat maintenance activities, attendance of budget meetings, review of progress and financial reports, fertilizer regime and scheduling was researched and applied, access roads and irrigation canal up-keep, irrigation system operating procedures documented and the development of a site safety plan.

LCR MSCP staff also presented at the Yuma Re-vegetation Workshop that focuses on the YEW. Presentations consisted of native tree mass planting techniques, site maintenance, standard operating procedure development, safety plan development and law and fire agency identification.

Discussions on a Land Use Agreement with the Quechan Tribal Council were delayed in FY11 due to the Quechan Tribal Elections being held later than normally scheduled. The delayed elections postponed the introduction of the agreement to the Tribe by LCR MSCP senior staff until a new Tribal Council was elected and put in office. The LCR MSCP Program Manager met with the new tribal council late in September.

FY12 Activities: Habitat maintenance activities will continue throughout FY12 and mainly consist of: removal of non-native species, application of herbicide, re-planting of native species as required, maintenance of irrigation systems, fuel delivery, access road maintenance, fertilizer ordering and application, vehicle maintenance, safety meetings and ensuring the site meets Arizona occupational safety and health work standards.

Management activities in FY12 will consist of: administration of the federal agreement, implementing the LCR MSCP vegetation monitoring for the habitat, irrigation and fertilizer documentation, 2012 Safety Plan update, installation of required signage, water accounting data submitted to Reclamation; attendance at the Yuma Re-vegetation Workshop, coordination meetings with stakeholders and ensuring the site meets or exceeds LCR MSCP covered species habitat standards.

The land use agreement is scheduled for signatory in 2012 and if necessary, approved by the Steering Committee. If either of the three land owners is unable to accept the terms and conditions of the land use agreement, the subject land owner and their property will not be included from the agreement. If at a later date the land owner decides to work with the LCR

MSCP the land use agreement will be amended to include their property. Funding under the federal cooperative agreement for habitat maintenance will be proportionally reduced based on the amount of land being subtracted from the agreement.

Proposed FY13 Activities: Habitat maintenance activities will continue throughout FY13 and mainly consist of: removal of non-native species, application of herbicide, re-planting of native species as required, maintenance of irrigation systems, fuel delivery, access road maintenance, fertilizer ordering and application, vehicle maintenance, safety meetings and ensuring the site meets Arizona Occupational Safety and Health work standards.

Management activities in FY13 will consist of administration of the federal agreement, continued use of LCR MSCP covered species and vegetation monitoring protocols, irrigation and fertilizer documentation, 2013 Safety Plan update, installation of required signage, water accounting data submitted to Reclamation coordination meetings with stakeholders, and ensuring the site meets LCR MSCP covered species habitat standards.

Pertinent Reports: N/A

Work Task E29: Desert Tortoise

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$50,000	$59,667.12	$233,179.69	$0	$0	$0	$0

Contact: Jed Blake, (702) 293-8165, jblake@usbr.gov

Start Date: FY10

Expected Duration: Closed in 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, 12 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.

The first acquisition, 200 acres of occupied desert tortoise habitat from one landowner, was completed in 2010. 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.

FY11 Accomplishments: The final two parcels were purchased from the landowners and transferred to the BLM for permanent species protection. Confirmation was received from the BLM that all grant deeds have been recorded in the name of the United States of America. The LCR MSCP Program Manager sent official correspondence to the USFWS demonstrating that 260 acres of occupied but unprotected desert tortoise habitat has been acquired by the LCR MSCP and transferred to an appropriate management agency.

On August 18, 2011 a memo was received from the USFWS confirming that the LCR MSCP has completed conservation measure DET01. All project information will be archived in the LCR MSCP files and this work task will closed in FY11.

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$195,000	$88,884.93	$88,884.93	$50,000	$0	$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 Yuha 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. Yuha Desert ACEC, East Mesa ACEC, and West Mesa ACEC are all suitable alternatives.

Previous Activities: N/A

FY11 Accomplishments: In November 2010 in consultation with staff from the BLM's El Centro Field Office, the LCR MSCP targeted acquisition to the Yuha Desert Area of Critical Environmental Concern (ACEC). The Yuha Desert ACEC is one of three management areas for the flat-tailed horned lizard managed by the BLM. The BLM requested the LCR MSCP focus acquisition in the Yuha based on its smaller total acreage and contiguous flat-tail habitat remaining undisturbed.

A total of 13 land owners were contacted in the Yuha ACEC. To reduce the numbers of potential properties to be surveyed and federally appraised a minimum acreage of 69 was chosen. Two willing land owners signed and returned the right-of-entry permit allowing the LCR MSCP to access their land. Access is required for administering a hazardous materials inspection, a species survey by walking transects, and a federal appraisal conducted. One parcel totals 160 acres and the second totals 80 acres.

A preliminary title review conducted by the BLM shows no issues with legal ownership and the lands are minimally disturbed, free of any hazardous materials. Both parcels had species surveys conducted in May and June 2011. The parcels were divided into 24 (4-ha) plots and each plot was surveyed once. Two flat-tailed horned lizards (male) were detected in the 160 acre parcel and one flat-tailed horned lizard (female) was detected in the 80 acre parcel. Two desert horned lizards were detected on the 160 acre parcel and eight desert horned lizards were detected on the 80 acre parcel. Horned lizard scat was present in 22 of the 24 plots.

The BLM El Centro Field Office has agreed to accept the two parcels and manage the lands for permanent species protection when the LCR MSCP acquisitions are completed. Unfortunately the project was not completed in FY11 as originally scheduled. Consequently, the expenditures in FY11 were less than anticipated due to delays in acquisition. Acquisition of both properties and transfer to the BLM is expected in mid-FY12. The FY11 budget was expended on coordination meetings, federal appraisals, conducting species surveys and completing due diligence on the properties before acquisition.

FY12 Activities: Acquisition of the larger 160-acre parcel was completed in December 2011, and acquisition of the second parcel of 80 acres is expected to also occur in FY12. The FY12 budget reflects the cost of both properties and minimal administrative work. Once Reclamation receives confirmation from the BLM that both grant deeds have been 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. It is expected that the USFWS will return a concurrence letter to the LCR MSCP which will officially close-out this work task.

Proposed FY13 Activities: Closed in FY12.

Pertinent Reports: N/A

Work Task E31: Hunters Hole

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$20,000	$21,979.16	$16,115.11	$30,000	$150,000	$50,000	$50,000

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 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 and honey mesquite. The result is anticipated to achieve 36 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 2008 YCNHA approached Reclamation with a request to complete the project which would be located on federal lands. In response, the 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 San Luis, the City of Somerton, 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.

FY11 Accomplishments: The YCNHA is providing coordination amongst stakeholders. Multiple stakeholder coordination meetings allowed for input from all parties and address any potential concerns. Safety, fire and law enforcement identification was conducted in preparation of developing a site safety plan in 2012. The YCNHA, using funds provided by the Arizona Water Protection Fund, contracted with a local vendor for the clearing, contouring and installation of irrigation infrastructure.

FY12 Activities: Site contouring and installation of infrastructure was completed in December 2011. Funding is being used for project coordination, electrical costs, groundwater well upgrades, and site maintenance.

A preventative maintenance service and retrofit to the existing groundwater well and pump was performed. While servicing the well it was discovered that the well was not designed to meet the demands of the 36 acre site and additional upgrades would be necessary to ensure a long service life for the project. Upgrades to the ground water well and related apparatuses was completed in early 2012 with additional upgrades scheduled in FY13. The increase in budget for FY12 and FY13 are for the unplanned groundwater well upgrades.

The site was divided into four flood-managed cells and a deep slough cell. The five cells were planted in February-March 2012 with bulrush, cottonwoods, willows, and mesquite.

Proposed FY13 Activities. The site will be maintained and operated by the LCR MSCP, utilizing the YCNHA, to meet covered species habitat requirements and support adaptive management activities to improve site conditions. Maintenance, monitoring and project coordination will be conducted. Groundwater well upgrades, which includes automation of the water control valves are scheduled to be completed in early 2013. The automation is expected to reduce future operational costs. Monitoring of the site will begin.

Pertinent Reports: N/A

Work Task E32: Bureau Bay

FY11 Estimates	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$0	$0	$0	$0	$200,000	$30,000	$30,000

Contact: Ashlee Rudolph, (702) 293-8178, arudolph@usbr.gov

Start Date: FY13

Expected Duration: FY55

Long-term Goal: Habitat protection

Conservation Measures: BONY2, RASU2, and FLSU1.

Location: Reach 3, CA, River Mile 244.

Purpose: Excavation and maintenance of an existing connected 6 acre backwater.

Connections with Other Work Tasks (past and future): The backwater was identified under Work Task E15: Backwater Site Selection. Marsh bird surveys are conducted under D1 while fish surveys have been conducted under multiple Work Tasks in section C and F5.

Project Description: Bureau Bay is a backwater directly connected to the lower Colorado River on the California side within Reach 3. Formerly the launch site for Reclamation's dredge equipment, the backwater and majority of the adjacent lands are currently leased to the City of Needles, California. Reclamation maintains a small acreage to the west, a private landowner has title to lands to the south, and the Colorado River is to the east. The City of Needles has leased the property from the Federal Government since 1973 as a community recreational facility known as Jack Smith Park. The City's lease was renewed in 2007 for a 25-year term.

Little maintenance has been performed on the backwater in the past few decades and subsequently the mouth of the backwater is filling with sediment. If no action is taken Bureau Bay will eventually be disconnected from the main stem of the river and 6 acres of connected backwater habitat will be lost. LCR MSCP monitoring efforts have contacted native fishes in and adjacent to Bureau Bay. Additionally, Reach 3 maintains the only self-sustaining population of flannelmouth sucker and has very few undeveloped backwaters, which make protection and maintenance of existing backwaters a priority for the LCR MSCP. Discussions with the USFWS and the CDFG indicate that maintaining a connection to the main stem of the Colorado River to allow passage of native fishes is consistent with habitat creation requirements of both the LCR MSCP HCP and the CESA 2081 permit.

Previous Activities: This is a new start in FY13.

FY11 Accomplishments: This is a new start in FY13.

FY12 Activities: This is a new start in FY13. Work completed in FY12 will be tracked under Work Task E15: Backwater Site Selection. Investigation of current site conditions, including surveying cross sections and estimating the amount of material to be removed is anticipated. Based on the needs of the targeted native fish species and discuss the minimum and maximum dimensions of the channel to be excavated and maintained with both the City of Needles and California Department of Fish and Game a decision to excavate and maintain the channel would be performed. If appropriate, a restoration development and monitoring plan would be drafted prior to excavation.

Proposed FY13 Activities: If the LCR MSCP decides to proceed with the project, permitting and excavation would occur in FY13. Because the rate of sedimentation is currently unknown, permanent cross-sections and a monitoring plan would be established to determine the rate of sedimentation, which would allow long-term maintenance costs to be estimated. Based on this sedimentation estimate, the decision would be made to maintain the backwater for perpetuity, as required by the CESA 2081 permit, would be made. The roles and responsibilities of all parties would be addressed in a site specific land use agreement. No compensation for land and water resources is anticipated.

Fisheries surveys will continue. Electro-fishing, larval light trapping, and trammel nets will occur monthly from February through May at locations which are dictated by water level or at locations where native fish have previously been found. Water quality profiles will be performed during each monitoring event and quarterly outside of the monitoring period. Marsh bird surveys will also be conducted during the breeding season.

Pertinent Reports: N/A

Work Task E33: Shark's Tooth Conservation Area

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$0	$0	$0	$0	$200,000	$600,000	$700,000

Contact: Gregg Garnett, (702) 293-8347, ggarnett@usbr.gov

Start Date: FY13

Expected Duration: FY55

Long-term Goal: Habitat creation.

Conservation Measures: VEFL1, WRBA 2, WYBA3, ELOW1, BEVI 1.

Location: Reach 4, Cibola National Wildlife Refuge, River Miles 95-97, 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): This work task was identified under Work Task E16: Conservation Area Site Selection.

Project Description: The Shark's Tooth Conservation Area consists of approximately 550 acres on Cibola National Wildlife Refuge, located in California between river miles 95 and 97. On July 17, 2006, lightning ignited a fire on Cibola NWR and burned approximately 4, 600 acres of salt cedar intermixed with mesquite in both California and Arizona. This Conservation Area seeks to restore a burned section primarily with honey mesquite with a small cottonwood-willow component as described in the Sharks Tooth Conservation Area, *Restoration, Development, and Monitoring Plan*. Development of the project is intended to satisfy both the LCR MSCP and a portion of the California Endangered Species Act (CESA) Incidental Take Permit No. 2081-2005-008-06. The intent is to create the large honey mesquite bosque, which will be managed for LCR MSCP covered species.

Previous Activities: This is a new start in FY13.

FY11 Accomplishments: This is a new start in FY13.

Proposed FY12 Activities: This is a new start in FY13. Finalization of the restoration and development plan, submittal to CDFG for approval, as well as drafting a signing of land use agreement is anticipated in FY12 and funded though work Task E16: Conservation Area Site Selection.

Proposed FY13 Activities: Upon signature of the land use agreement, final design, NEPA compliance, and permitting will be initiated. Due to the size of the project, restoration would likely occur in phases (approximately 100 acres per year) over several years. Mobilization, clearing, and restoration are not expected to begin until FY14. Pre-monitoring of the site will be initiated.

Pertinent Reports: N/A

Work Task E34: Groundwater and Soil Salinity Monitoring Network

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$0	$0	$0	$0	$250,000	$400,000	$400,000

Contact: Ashlee Rudolph, (702) 293-8178; arudolph@usbr.gov

Start Date: FY13

Expected Duration: FY18

Long-term Goal: Restoration research

Conservation Measures: CLRA1, WIFL1, BONY2, RASU2, WRBA2, WYBA3 CRCR2, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, FLSU1, MNSW2, CLMB2, PTBB2

Location: Conservation Areas.

Purpose: Understand interactions of groundwater with planted riparian species in order to effectively manage long-term health and survival.

Connections with Other Work Tasks (past and future): This work task was initiated with funds from G3, E24, and E4.

Project Description: Monitoring soil and groundwater water conditions provides essential information about why some restoration sites establish and develop more successfully than others. Therefore, the soil and groundwater salinity monitoring network, established as research under Work Task G3: Adaptive Management Research Projects, is being expanded into a groundwater and soil salinity monitoring network. Eventually, all LCR MSCP conservation areas will be part of the monitoring network, but this effort will occur over a period of years. Monitoring soil and groundwater salinity at restoration sites allows us to track changes in salinity levels over time, and helps inform management actions that ensure the long term viability of LCR MSCP conservation areas.

Previous Activities: Research from previous studies funded by G3 has suggested that riparian obligate trees will utilize groundwater when they have reached sufficient maturity. Studies have also suggested that this water source may be more important than applied surface water for long-term health and survival of the trees.

Soil sampling and installation of groundwater monitoring wells was conducted at three Conservation Areas in FY10. An extensive review of the literature regarding the role that quality

and quantity of available groundwater can play with riparian tree health and survival was prepared in FY11 and is available on our website. In FY12, under Work Tasks E4 and E24, a salt balance model to evaluate salt accretion/loss in soils and groundwater was developed.

FY11 Accomplishments: This is a new start in FY13.

FY12 Activities: This is a new start in FY13

Proposed FY13 Activities: Soil and ground water will be monitored at three Conservation Areas with established networks. A fourth network will be established and monitored at the Cibola Valley Conservation Area. These collected data will be used to formulate preliminary management strategies for maintaining or reducing soil and groundwater salinity.

Pertinent Reports*: Cibola NWR Unit 1 Conservation Area 2010 Annual Report*
Review of Salinity and Sodicity, Monitoring, and Remediation for Riparian Restoration Areas, and, *Groundwater and Soil Salinity Monitoring Network in Support of Long-Term Irrigation* and *Salt Management of MSCP Restoration Areas: Well Installation and Preliminary Monitoring Data Report*, will be posted to the website.

WORK TASKS SECTION F

POST-DEVELOPMENT MONITORING

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Work Task F1: Habitat Monitoring

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$350,000	$480,326.82	$2,035,578.55	$425,000	$650,000	$650,000	$650,000

Contact: Dianne Bangle, (702) 293-8220, dbangle@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Pre- and 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; Hart Mine Marsh, Cibola NWR, Cibola, Arizona, Imperial Ponds, Imperial NWR, Arizona; LDCA, Yuma, 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 LCR 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 (such as vegetation growth and density, microclimate, and soil moisture and nutrients) 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. In FY10, the new double sampling protocol was used to monitor habitats and included density, species richness, vegetation structure, ground cover, canopy closure, distance to nearest standing water, and distance to nearest open space. Temperature and relative humidity were also collected.

FY11 Accomplishments: Habitat monitoring continued in FY11 at Beal Lake, Cibola National Wildlife Refuge Unit #1, Cibola Valley Conservation Area, and Palo Verde Ecological Reserve using 2010 monitoring protocols. A statistical power analysis was performed using 2010 data to determine the amount of sampling units (i.e. resources) necessary to state with confidence that an impact or change in measured parameters has or has not occurred while maintaining an acceptable level of variability in the data and thus addressing our management objectives. Where reductions in numbers of plots were necessary, 2011 plots were randomly selected from the existing 2010 intensive plots. As a result, data were collected at 352 intensive plots in 2011; data included density, species richness, vegetation structure, ground cover, canopy closure, distance to nearest standing water, and distance to nearest open space within 30 meters of plot center. Temperature and relative humidity data were collected at 90 locations across the four habitat creation sites.

Vegetation monitoring plots were added at the Bill Williams River NWR to assess habitats occupied by LCR MSCP covered species. The purpose for establishing plots at this site was to establish baseline conditions prior to potential creation efforts at Planet Ranch, and use Bill Williams River NWR as a reference site for comparisons of habitat parameters between habitat creation sites and existing habitat that supports breeding for some LCR MSCP covered species.

Proposed FY12 Activities: Post-development monitoring will continue using a reduced number of plots. New phases will be monitored annually for 3 years and then every other year in subsequent years. All existing sites (listed above) were monitored in FY10 and FY11; rotation of sites will begin in FY12. Data collection occurs from September through December. Temperature and relative humidity data will continue at 90 locations across the four habitat creation sites in FY12. Marsh monitoring will take place in FY12 at Hart Mine Marsh and Imperial NWR field 18. Soil moisture monitoring will begin in FY12 with a test of protocols and equipment to determine the most efficient and effective way to monitor. Tests will be conducted at PVER.

Proposed FY13 Activities: Habitat monitoring including vegetation, microclimate, and soil moisture monitoring will continue in FY13 at habitat creation sites. Vegetation monitoring will continue at Bill Williams River NWR. A full-scale soil moisture monitoring protocol will be developed and implemented based on test design in FY12 and encompass the objectives of 1) determine plant available water across site and soil type, 2) determine rate of infiltration of irrigation water; measured throughout the site, 3) determine movement of irrigation water across fields, and 4) Determine the presence of surface water and near-surface moist soil conditions in areas of >50% canopy closure available for SWFL habitat.

Pertinent Reports: Monitoring methods are described in *LCR MSCP Post-Development Habitat Monitoring Methods—2011,* to be posted on the LCR MSCP website, and summaries are included in site development plans for CVCA, PVER, Beal Lake, and Cibola Unit #1 on the website.

Work Task F2: Avian Use of Conservation Areas

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$170,000	$185,177.77	$782,538.87	$210,000	$220,000	$220,000	$220,000

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

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Conduct pre- and post-development monitoring for avian species.

Conservation Measures: MRM1, MRM2 (ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, SUTA)

Location: Beal Lake Havasu NWR, Arizona; PVER, California; CVCA, Arizona; Cibola Unit #1, Cibola NWR, Cibola, Arizona; Laguna Division Conservation Area, 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. To collect pre-development data on areas that will be converted to more favorable habitat to compare number of LCR MSCP covered bird species and non covered bird species between existing low quality habitat to created high quality habitat.

Connections with Other Work Tasks (past and future): Post-development and pre-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 (D6).

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 the same sampling plan and field protocol as in system wide surveys; the double sampling area search method using intensive and rapid area search surveys. 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 Cibola Unit #1, PVER, Beal Lake, and CVCA. Avian pre-development monitoring has been conducted at CVCA, Hart Mine Marsh, Cibola Unit #1, Imperial Ponds and PVER. Avian use has been summarized and evaluated for each conservation area and compared between conservation areas.

FY11 Accomplishments: Avian post-development monitoring was conducted at existing habitat conservation areas in 2011. The following habitat conservation and demonstration areas were surveyed: 1) Beal Lake, 2) Cibola NWR Unit #1, 3) CVCA, and 4) PVER. A double sampling technique utilizing rapid and intensive area searches was used in 2011 and will be used in 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, and surveying all habitat using intensive area searches will no longer be feasible.

Post-development monitoring on habitat conservation areas and habitat modeling (C24) continued in 2011. Avian post-development monitoring was conducted using the same sampling plan and field protocol as in system wide surveys. Each conservation area or phase surveyed was divided into area search plots approximately 9 to 15 ha in size. The plots were stratified by conservation area and habitat type (tall woody and low woody). Sixty area search plots were created which encompassed all existing habitat at all habitat conservation areas. Rapid area search surveys were conducted on all 60 plots and intensive area search surveys were conducted on a random subsample of four of the plots.

There were 130 pairs of breeding birds comprising 25 species detected at Beal Lake. This included nine pairs of Sonoran yellow warblers, 13 pairs of Arizona Bell's vireos, and two summer tanager pairs. There were 152 pairs of breeding birds comprising 25 species detected at Cibola Unit#1. This included seven pairs of Sonoran yellow warblers and two Arizona Bell's vireo pairs. There were 229 pairs of breeding birds comprising 30 species detected at CVCA. This included 10 pairs of Sonoran yellow warblers and 3 pairs of summer tanagers. There were 117 pairs of breeding birds comprising 24 species detected at PVER. This included eight pairs of Sonoran yellow warblers.

Pre-development surveys were conducted within the Laguna Division Conservation Area (LDCA). Thirty five area search plots were randomly selected from the 57 available area search plots. Rapid area search surveys were conducted on all 35 plots and intensive area search surveys were conducted on a random subsample of four of the plots. There were 577 pairs of breeding birds comprising 45 species detected at the LDCA. The only LCR MSCP species detected breeding was one Arizona Bell's vireo pair partially within the boundaries of LDCA. The species richness and bird abundance was relatively high within the conservation area. The most productive areas for birds included the marsh on the eastern edge of the site, as well as several small wet areas with legacy Fremont cottonwood and Goodding's willow trees and snags in the center of the site.

FY12 Activities: Avian post-development monitoring will be conducted at conservation and demonstration areas, including Beal Lake, Cibola Unit #1, CVCA, and PVER. Surveys will be conducted using the same sampling plan and field protocol used in previous years. A data management plan and quality assurance plan will be written for the post-development bird survey data.

Proposed FY13 Activities: Avian post-development monitoring will be conducted conservation and demonstration areas, including Beal Lake, Cibola Unit #1, CVCA, PVER, Laguna Division Conservation Area, and additional pre-development areas where needed. Surveys will be conducted using the same sampling plan and field protocol used in previous years.

Pertinent Reports: The following reports are posted on the LCR MSCP website: *Summary Report on the Lower Colorado River Riparian Bird Surveys, 2008-2010; Report on the Lower Colorado River Riparian Bird Surveys 2011;* and *A Sampling Plan for Riparian Birds of the Lower Colorado River—Final Report.*

Work Task F3: Small Mammal Colonization of Conservation Areas

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$60,000	$53,952.06	$255,071.98	$55,000	$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, Laguna Division Conservation Area.

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 aide 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 and 2010 surveys detected cotton rats at the Cibola NWR Unit #1 and the bench population near PVER.

FY11 Accomplishments: Surveys were conducted at PVER, CVCA, Cibola NWR Unit #1, and pre-development surveys were conducted at the Laguna Division Conservation Area. Cotton rats were captured within all four areas.

FY12 Activities: Presence/absence live trapping surveys will continue as part of the post-development monitoring efforts at LCR MSCP habitat creation sites. In the fall of 2011, a grassy area was discovered within the Beal Lake Conservation Area. Thirty traps were set during a single night of trapping which produced three cotton rats. This is the first time since 2006 that cotton rats have been found at the site. Previously, no grassy areas large enough to support a population were found within the habitat creation area.

Proposed FY13 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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$110,000	$119,649.91	$489,153.16	$100,000	$125,000	$125,000	$125,000

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; PVER, California; CVCA, Cibola NWR Unit 1, Cibola, Arizona; Imperial Ponds, Imperial NWR, Arizona; Laguna Conservation Area, Arizona.

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 (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 includes both acoustic and capture methods. Acoustic monitoring will be conducted at habitat creation and demonstration sites, including CVCA, PVER, Cibola NWR Unit #1, Beal Lake, and Imperial Ponds. These surveys will utilize either active or passive 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 FY10 using acoustic and/or capture techniques.

FY11 Accomplishments: Acoustic surveys were modified in 2011 to switch from the habitat comparison study to more wide-scale sampling using driving transects, in addition to adding long-term stations at CVCA and Cibola NWR. Driving transects were conducted three times (May, July, and September) at each site. These driving transects were not statistically robust and were therefore discontinued after the FY11 field season.

Pre-development acoustic surveys were conducted at Laguna Conservation Area using six Anabat bat detectors deployed across the site during three different survey periods (January 24-31, May 18-31, and August 19-September 8) for a total of 43 nights. The four long-term acoustic stations at Beal, PVER, CVCA, and Cibola NWR all had some technical malfunctions at different times throughout the year. All issues appear to be resolved. Acoustic data is still in the process of being analyzed.

Capture surveys were conducted at three LCR MSCP habitat creation areas (PVER, CVCA, and Cibola NWR), and also at the 'Ahakhav Tribal Preserve because of the high diversity of bats found at the site. A total of 737 bats of 13 species were captured across the four sites. Western red bats, western yellow bats, and California leaf-nosed bats were captured at PVER and CVCA. Western yellow, California leaf-nosed bats, and one Townsend's big-eared bat were captured at 'Ahakhav. California leaf-nosed bats were the only LCR MSCP species captured at Cibola NWR. This was the first year that the Townsend's big-eared bat has been captured at a habitat creation site. Some of the red and yellow bats captured under this work task were radio-tracked for the roosting characteristics study under C35.

FY12 Activities: The two types of detectors being used in long term stations will continue to be evaluated while awaiting a southwestern regional version of Sonobat 3, which promises to automate much of the analysis process. Capture surveys will also continue with the possible addition of PIT tagging all red and yellow bats captured.

Proposed FY13 Activities: An alternate broadscale acoustic survey will be developed and tested. The two types of detectors used for the long term stations will also be evaluated. If the full spectrum detector that uses Sonobat 3 proves to reduce analyzing time, the other stations may be converted to the full spectrum detector. Additional long term stations will be added to new conservation areas as needed. Capture surveys will also continue.

Pertinent Reports: *Post-Development Bat Monitoring of Habitat Creation Areas along the Lower Colorado River – 2011 Acoustic Surveys,* and *Post-Development Bat Monitoring of Habitat Creation Areas along the Lower Colorado River – 2011 Capture Surveys* will be posted on the LCR MSCP website.

Work Task F5: Post-Development Monitoring of Fish at Conservation Areas

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$175,000	$153,930.06	$662,159.60	$175,000	$250,000	$250,000	$250,000

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, C31, C33, C34, C40, 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 large BONY (an additional 27,000 YOY BONY have also been released); 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. Closer order monitoring via remote sensing was initiated in FY09 and continued through FY10. Populations of stocked RASU

declined rapidly within the first several months post-release and eventually leveled off at 130 individuals. Water quality has been monitored constantly with multi-parameter water quality loggers and all parameters have remained within the known ranges of acceptability for native fish. Annual netting and electro-fishing surveys have been coordinated with the USFWS and have resulted in the capture of numerous RASU, as well as large numbers of non-natives.

Research and monitoring of Imperial Ponds is being accomplished under C25.

FY11 Accomplishments: In early FY11 Beal Lake was again stocked with 400 PIT tagged RASU, these stockings were monitored bi-weekly using remote sensing to detect changes in the population. The population declined over the first three months until it stabilized around 90 individuals. All future stockings were terminated to allow for additional habitat assessment. The annual fall survey resulted in the capture of large amounts of non-natives, in addition to 64 RASU (avg. 468 mm TL); 50 of these were released into the main stem river near Needles, CA. Larval surveys were conducted in late winter and none were captured. Water quality was constantly monitored throughout the backwater; low levels of DO and high temperatures were observed locally but not lake wide. Current water management at Beal Lake is highly dependent on the management of Topock Marsh. Beal Lake and Topock Marsh observed lower than normal water levels while a new water delivery system was being completed for Topock Marsh. Zooplankton was collected quarterly as part of work task C44 and initial results show lower than average mean zooplankter biomass.

Monitoring of Big Bend Conservation Area was accomplished through monthly monitoring from February through May. This monitoring included 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 were conducted during each monitoring trip and at least quarterly the remainder of the year. The monitoring resulted in the capture of 3 RASU and 1 FLSU adult/subabults, and more than 30 FLSU larvae. Water quality was exceptional, as was expected for a habitat with a direct connection to the river.

FY12 Activities: The monitoring activities for Beal Lake and BBCA will continue at a level similar to FY11. Searches for larval fish and other signs of reproduction and recruitment will be conducted in all developed habitats. Food resource assessments will be increased and results compared with data from C34. Non-native fish abundance will be attempted during the annual fall survey at Beal Lake. The water quality at Beal will continue to be monitored to evaluate the impacts of the new water delivery system for Topock Marsh.

Proposed FY13 Activities: The activities from FY12 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 is in development.

Work Task F6: Monitoring MacNeill's Sootywing in Habitat Creation Sites

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$70,000	$88,758.78	$147,042.69	$70,000	$80,000	$80,000	$80,000

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

Start Date: FY09

Expected Duration: FY55

Long-term Goal: Pre- and 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, and 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 Work Task C7, Survey and Habitat Characterization for MacNeill's Sootywing.

Project Description: Results from Work Task C7 determined that sootywings require quailbush host plants 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 for nectar such as heliotrope and western sea-purslane. Both host and nectaring plants 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 be surveyed.

Previous Activities: Habitat created for MacNeill's sootywing at CVCA and PVER was surveyed for adult sootywings during April-September 2009-2010. In 2009, four plots were surveyed at CVCA, and one plot was surveyed at PVER. Five plots were surveyed at CVCA, and three plots were surveyed at PVER, during 2010. Sootywings were most abundant during both years at CVCA Phase 4, with > 200 adults counted during September along a dirt road bisecting the plot. Sootywings also were abundant at a detached CVCA Phase 4 plot. Sootywings were rare (< 5 adults per date) or absent at the other CVCA plots and at all of the PVER plots.

FY11 Activities: We monitored populations of sootywings at five restoration plots at CVCA and three restoration plots at PVER. Plots were monitored monthly during April-September. The large population of sootywings at CVCA Phase 4-west during 2009-2010 disappeared during

2011. The decrease in abundance was most-likely due to low leaf-water contents that were exasperated by the large sizes of *A. lentiformis* shrubs (requiring more water). Removal of plants providing nectar, primarily *Heliotropium,* for fire control may also have been a factor. The most-successful sootywing plot at PVER is Phase 4. Sootywing populations were low (< 5 adults per date) but increasing late in the season. Sootywing populations at the other CVCA and PVER plots were low or absent.

FY12 Activities: The following nine restoration plots, totaling 280 acres, will be monitored for sootywings every two to three weeks during April to September: CVCA Phases 2, 3, 4 (west), 4(east), and 5 for a total of 233 acres; and portions of PVER phases 3-6 for a total of 47 acres.

Activities during this fiscal year also will begin examining causes of different sootywing abundances among restorations sites. Potential causes include: 1) host-plant water content, 2) availabilities of nectar sources, and 3) plot size and isolation in relation to sootywing dispersal. Other factors such as predation or parasitization may need to be examined if created habitat fails to become sufficiently colonized.

Proposed FY13 Activities: The plots listed above will continue to be monitored. Additional plots will be monitored as they are planted during FY10-12. This may include Hart Mine Marsh and possibly Laguna Division Conservation Area. Activities during this fiscal year also will continue examining causes of different sootywing abundances among restorations sites as delineated in FY11.

Pertinent Reports:

2009-2010 Annual Reports for MSCP Work Task F6: Monitoring MacNeill's Sootywing in Habitat Creation Sites.

Pratt, G.F. and W.D. Wiesenborn. 2011. Geographic distribution of MacNeill's sootywing (Hesperopsis gracielae) (Lepidoptera: Hesperiidae) along the lower Colorado River floodplain. Proceedings of the Entomological Society of Washington 113:31-41.

Work Task F7: Post-Development Monitoring of Marsh Birds

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$30,000	$1,403.06	$1,403.06	$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 including Hart Mine Marsh, Cibola NWR, Cibola, Arizona, Imperial NWR, Arizona, and Big Bend Conservation Area, Nevada.

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

FY11 Accomplishments: Marsh bird surveys were conducted in cooperation with the USFWS on conservation areas once the marsh vegetation has developed in sufficient acreage, vegetation

type, and suitability. These sites include, Hart Mine Marsh (Cibola NWR) Field 16 and the Imperial Ponds (Imperial NWR) and Big Bend Conservation Area.

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 (Havasu NWR), Hart Mine Marsh (Cibola NWR), Field 16 and the Imperial Ponds (Imperial NWR), Big Bend Conservation Area, and the Laguna Division Conservation Area. An internal database module will be created to house and analyze post-development marsh bird surveys.

Proposed FY13 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. Data will be inputted into the database and analyzed, comparing pre and post development.

Pertinent Reports: Results of surveys will be reported in the annual reports for each associated restoration site.

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WORK TASKS SECTION G

ADAPTIVE MANAGEMENT PROGRAM

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Work Task G1: Data Management

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$700,000	$678,848.47	$1,749,315.36	$700,000	$950,000	$950,000	$950,000

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

Start Date: FY07

Expected Duration: FY55

Long-term Goal: Data management will be an ongoing task for species research, system monitoring, habitat creation, post-development monitoring, and habitat maintenance programs.

Conservation Measures: All.

Location: 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: 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.

Database design and implementation of a centralized Database Management System (DBMS) is completed. The planning, acquisition, and data modules for the LCR MSCP centralized database

have been completed. 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. On an annual phased approach all project and species projects will be incorporated into the database.

FY11 Accomplishments: Document processing for the Minckley Library continued throughout FY11 and is now nearing completion. Approximately 10,000 library documents have been digitized and organized using bibliographic software, and error checking has been performed to ensure consistency and accuracy. Development of the online archive, which will include a comprehensive bibliography of all library holdings and instructions on how to access, search, download, save, and print individual documents continues along a trajectory for a timely and successful completion. It is anticipated that all work will be completed by March 2012.

The new LCR MSCP website was completed. The native fish database continued to be maintained. The LCR MSCP data management requirements document was developed to provide standards in handling and processing data for contractors. Analysis of existing data models (MS Excel or MS Access) has been completed and a test DBMS had been created in SQL Server 2008. Key features of the LCR MSCP DBMS are development of standard naming conventions, program reference tables, project reference tables and data flows. To this end a data flow design has been developed that serves as a template for designing new data models within the LCR MSCP DBMS.

Design of a Work Order process that links LCR MSCP HCP work tasks and conservation measures to the data has been developed and initial programming has begun. A set of input forms has also been programmed for vegetation monitoring. These forms now serve as a template for future input form design. Some design and software testing has been done to provide access to the SQL Server 2008 DBMS via SharePoint.

The intranet/document/calendar management system (SharePoint 2010) was upgraded. The development of remote data collection from field data loggers will continues.

FY12 Activities: The native fish database continued to be maintained. Work will continue on Minckley Library document processing 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.

Database and software development continues. Database implementation will continue for all projects. The southwestern willow flycatcher, yellow-billed cuckoo, system-wide bird and vegetation monitoring 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 modified to work with all data modules. The development of remote data collection from field data loggers will

continue. The new LCR MSCP website was launched during FY12, and maintenance work for the site has begun. Development of a new internet web interface for the fish database will also begin and will be linked to LCR MSCP's website.

Proposed FY13 Activities: The native fish database will continue to be maintained. Database and software development will continue. Database design and implementation of a centralized DBMS will continue in an annually phased approach for all projects. The planning, acquisition, and data modules for the LCR MSCP centralized database development will continue. The development of remote data collection from field data loggers will continue. Update and maintenance of the LCR MSCP website will continue. Development of a new internet web interface for the fish database will also continue and will be linked to the LCR MSCP's website. The development of the LCR MSCP Data Management plan will commence.

Pertinent Reports: *Draft LCR MSCP Database Management Framework Requirements Analysis* is available upon request.

Work Task G3: Adaptive Management Research Projects

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$300,000	$54,339.42	$1,649,688.10	$200,000	$300,000	$300,000	$300,000

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

Start Date: FY06

Expected Duration: FY55

Long-term Goal: Effective conservation of native species and their habitats.

Conservation Measures: 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: All previous activities were moved to other work tasks after initial year of funding.

FY11 Accomplishments: Analysis of the data collected for the Tamarisk Beetle Study (conducted under D2) will be used to determine future potential conservation and management recommendations in the adaptive management portion of the program. Data analysis has been

completed and result show that there is the potential for decreased nest success for SWFL nest in defoliated stands of tamarisk. The report will be completed and made available in FY12.

A demonstration project was conducted at Topock Marsh to place additional water in a portion of the tamarisk WIFL habitat to determine the effects this may have on increasing the number of nesting pairs and potentially increasing nest success. The results were found to be inconclusive due to only one year of data and the low abundance of WIFLs.

FY12 Activities: Efforts will be initiated in Lake Mead, AZ-NV with the goal of determining the types of habitat frequently used by juvenile/subadult razorback sucker. These efforts will be accomplished through tracking wild, immature razorback sucker that have been captured from Lake Mead and implanted with sonic or radio telemetry tags. In addition to locating the general area(s) of Lake Mead used by this life stage of razorback sucker, the physicochemical environment of all utilized habitat, including any identified recruitment or spawning habitat, shall also be determined. It is anticipated that efforts to capture juvenile/subadult fish will be conducted throughout the known razorback sucker spawning season (approximately February – April) with additional, less intensive monitoring occurring from May through November.

Vegetation typing of new aerial photos has been cost-shared with Reclamation's Lower Colorado River Accounting Systems group. This product will provide Reclamation with additional tools for determining vegetation structure changes over time.

Proposed FY13 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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$125,000	$137,434.07	$355,342.14	$125,000	$250,000	$250,000	$250,000

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 five 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 five-year planning cycle, and second, annual work plans covering a three-year cycle.

Every five 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 five-year cycle, the accumulated data from ongoing research and monitoring will be reviewed, along with existing species accounts. Highest priority for the next five-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 evaluation of 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. Colorado River Terrestrial and Riparian Ecosystem (CRTR) and CRAB meetings were attended. The first *Five-Year Monitoring and Research Priorities* report was drafted in FY07.

A draft procedure was developed for tracking conservation measure accomplishment pertaining to the habitat creation conservation measures in FY10.

FY11 Accomplishments: Research activities were reviewed in accordance with the priorities established in the current five-year plan. The draft procedure for tracking conservation measure accomplishment was peer reviewed by outside agencies, species experts, experts in the management of large scale projects, and ecologists with a background in riparian systems.

FY12 Activities: Research activities are being reviewed in accordance with the priorities established in the current five-year plan. The Final Habitat Creation Conservation Measure Accomplishment Tracking Process was approved by the Steering Committee on October 31, 2011. The 2013-2017 Research and Monitoring Accomplishment and Priorities Report, and the Big Bend and Beal Lake Conservation Area Management Plans have been initiated.

Proposed FY13 Activities: Research activities are being reviewed and evaluated in accordance with the priorities established in the current five-year plan. Work will continue and is expected to be completed on the 2013-2017 Research and Monitoring Accomplishment and Priorities Report, and the Big Bend and Beal Lake Conservation Area Management Plans. Other site Management plans for existing conservation areas may be initiated. External peer review of research and monitoring activities will be initiated in FY13.

Pertinent Reports: The *Final Science Strategy,* the *LCR MSCP Five-Year Monitoring & Research Priorities—2008-2012,* and the *Final Habitat Creation Conservation Measure Accomplishment Tracking Process* 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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$5,359,500	$5,359,500.00	$8,307,500.00	$5,445,000	$7,460,400	$5,629,500	$3,798,600

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, and YBCU2

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 FY10.

FY11 Accomplishments: A total of $5,359,500 was deposited into interest-bearing accounts among the Arizona, California, and Nevada partners. The total dollar value of the fund at the end of FY11, with interest, was $9,474,028.54. A process for requesting, reviewing, selecting, disbursing, and tracking of dollars from the Habitat Maintenance Fund was drafted in consultation with the USFWS.

FY12 Activities: A total of $5,445,000 will be deposited into interest-bearing accounts among Arizona, California, and Nevada partners. A process for requesting, reviewing, selecting, disbursing, and tracking dollars from the Habitat Maintenance Fund was acknowledged as final by the Steering Committee.

Proposed FY13 Activities: Required funding for the Habitat Maintenance Fund is $5,629,500. An additional $1,830,900 of future Habitat Maintenance Funding will be contributed and deposited into the three non-Federal interest-bearing accounts.

Pertinent Reports: N/A

Work Task H2: Remedial Measures Fund

FY11 Estimates	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$0	$0	$0	$0	$998,298	$332,766	$332,766

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

Start Date: FY13

Expected Duration: FY55

Long-term Goal: Remedial measures for changed circumstances.

Conservation Measures: CLRA1, WIFL1, BONY2, BONY3, RASU2, RASU3, WRBA2, WYBA3, CRCR2, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, FLSU1, MNSW2.

Location: Lower Colorado River (reaches 1-7)

Purpose: Implement remedial measures to respond to changed circumstances, as necessary.

Connections with Other Work Tasks (past and future): Any B and E Section work tasks that may be affected by changed circumstances.

Project Description: To address the potential for changed circumstances, a contingency fund will be established to implement remedial measures identified in the HCP. A process for setting aside contingency funds will be formalized and funds will be allocated through 2030. Total funding allocated to remedial measures is $13,270,000 in 2003 dollars indexed to inflation. The first five year funding period has been set at $1,330,000 in 2003 dollars indexed to inflation.

In the event that changed circumstances occur, the Program Manager will implement remedial measures identified in the HCP. Remedial measures will be implemented within the available LCR MSCP budget, including contingency funds allocated through this work task. The Program Manager will administer the remedial measures fund. In order to effectively manage this contingency fund, a formalized process must be established and approved by the Steering Committee. If additional funding becomes available, these funds could be added to meet future obligations.

Previous Activities: N/A

FY11 Accomplishments: New start in FY13.

FY12 Activities: A remedial measures fund process was established and approved by the Steering Committee. `

Proposed FY13 Activities: A total of $998,298 is expected to be deposited into the three non-Federal interest-bearing accounts. This amount includes FY11, FY12, and FY13 funding.

Pertinent Reports: N/A

WORK TASKS SECTION I

PUBLIC OUTREACH

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Work Task I1: Public Outreach

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
$70,000	$76,251.83	$172,687.65	$70,000	$100,000	$100,000	$100,000

Contact: Nathan Lenon, (702) 293-8015, nlenon@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: To increase education and support for the LCR MSCP.

Conservation Measures: N/A

Location: N/A

Purpose: To communicate, coordinate, and educate LCR MSCP Steering Committee members, internal and external stakeholders, and the general public about LCR MSCP implementation activities.

Connections with Other Work Tasks (past and future): All LCR MSCP work tasks

Project Description: This work task provides a budget to implement an outreach program for the LCR MSCP. Activities are widely varied, and include creating educational materials, participation at conferences and other public events, interaction with some school events, and coordination with youth conservation corps groups. Outreach may be specific to a project, but more typically addresses the overall focus of the LCR MSCP and general conservation issues.

Previous Activities: The program has sponsored two regional science meetings for several years now, CRTR (Colorado River Terrestrial and Riparian) and CRAB (Colorado River Aquatic Biologists), which provide centralized forums for scientists and resource managers to discuss current research and monitoring projects taking place on the lower Colorado River. Both of these annual meetings have web space within the LCR MSCP website.

A wide range of printed materials, videos, and reports have been created to explain various program features, in both summary (fact sheet) format as well as more lengthy reports. Several banner displays have been created; these materials have been used extensively to promote the program at conferences, conservation area dedications, and other events.

The program has been able to leverage non-program funding through DOI's "Youth Initiative" for several years, to hire local youth conservation corps to work 80 hour "shifts" on LCR MSCP projects. These projects have included pole planting of cottonwood/willow, vegetation/wildlife

monitoring, native fish harvesting, and general hatchery maintenance at program partnering facilities. The projects provide the corps members valuable job experience and firsthand knowledge of local conservation issues; the program receives the physical labor from these young people at little to no cost.

FY11 Accomplishments: During FY11, additional emphasis was placed on creating program-branded promotional items to distribute and conferences and educational events. These items included recycled tote bags, water bottles, rulers; these items adorn the program logo, website, and tag line "balancing resource use with conservation". Species specific fact sheets were created and printed to expand the range of hand outs.

The program submitted multiple funding proposals for DOI "Youth Initiative" funding, however due to limited available funding was only able to secure funding for one youth conservation corps project. An eight person corps group was employed at Yuma East Wetlands for 80 hours, assisting with irrigation ditch cleanout and maintenance, vegetation removal, and transplanting wetland plugs, while having daily discussions about conservation and conservation-related careers.

The program sponsored and participated in numerous science conferences, including Colorado River Water Users Association, Desert Fishes Council, CRAB, CRTR, the Yuma Birding and Nature Festival, the Las Vegas Science Festival, a Binational Colorado River Restoration workshop, and more. We partnered with two schools to conduct ecology related field trips in Las Vegas, NV and Blythe, CA, as well as Boy Scout troops in southern Nevada. Finally, the program hosted a week-long bus tour with Steering Committee members to multiple conservation areas throughout the program area in March. An annual report has been completed, highlighting FY11 outreach efforts in detail.

FY12 Activities: We have created a new four-panel banner display emphasizing the content published in the highlights report. A portable TV/DVD player was also purchased to provide the ability to display multimedia (photos, videos) at conferences.

During FY12, we will develop a template and several conservation area-specific outreach plans. These plans will provide guidelines and procedures for conducting field trips at specific conservation areas, based on input from the appropriate land managers.

We plan to conduct one field trip each in the Blythe, CA and Las Vegas, Nevada areas during the year. The Yuma Birding and Nature Festival was cancelled due to lack of funding; we may increase our involvement with the Las Vegas Science Festival, or some other event as a result of that cancellation. We also plan to continue involvement with "World Wetland Day", "Earth Day", and several other special events.

Funding has been secured from DOI's "youth initiative" to hire at least three youth conservation corps, at Yuma East Wetlands, Big Bend Conservation Area, and Bubbling Ponds State Fish Hatchery. These projects involve site maintenance, nonnative vegetation management, native plantings, and pond harvests.

Proposed FY13 Activities: Public outreach actions identified in the FY13 Outreach Action Plan will be implemented. The FY14 Outreach Action Plan will be developed.

Pertinent Reports: The FY11 Annual Report is complete and will be posted to the website.

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APPENDICES

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Appendix A. Letter from Central Arizona Water Conservation District

CAP
CENTRAL ARIZONA PROJECT

June 19, 2012

Joseph A. Vanderhorst
Deputy General Counsel
Metropolitan Water District of Southern California
P.O. Box 54153
Los Angeles, CA 90054-0153

Christopher S. Harris
Acting Executive Director
Colorado River Board of California
770 Fairmont Avenue, Suite 100
Glendale, CA 91203-1035

Jason L. Thiriot
Natural Resource Analyst
Colorado River Commission of Nevada
555 E. Washington Ave., Suite 3100
Las Vegas, NV 89101

Gentlemen:

The Multi-Species Conservation Program (MSCP) Non-Federal share for the Federal Fiscal Year 2013, both annually and quarterly, are shown by state below. The inflation index used is 1.251.

Remedial measures funding represents the cumulative amount for years 6-8 of the plan ($798,000 in 2003 dollars) inflated by the FY2013 index. Existing Habitat Maintenance represents $5,629,500 for FY13 (year 8) and an accelerated amount of $1,830,900 which will reduce future year contributions.

FY 2013 Non-Federal Share (2003 $)	$13,770,000
FY 2013 Inflation Index	1.251
FY 2013 Non-Federal Share (Escalated $)	$17,226,270

FY 2013 Non-Fed	Existing Habitat Maintenance	Remedial Measures	Other Work Tasks	Total Non-Fed Payment Due
Arizona (25%- EHM&RM) (15%-Total Payment)	$1,865,100.00	$249,574.50	$ 469,266.00	$ 2,583,940.50
Nevada (25%-EHM&RM) (30%-Total Payment)	1,865,100.00	249,574.50	3,053,206.50	5,167,881.00
California (50%-EHM&RM) (55%-Total Payment)	3,730,200.00	499,149.00	5,245,099.50	9,474,448.50
Totals	$7,460,400.00	$998,298.00	$8,767,572.00	$17,226,270.00

P.O. Box 43020 – Phoenix, AZ 85080-3020 · 23636 North Seventh Street – Phoenix, AZ 85024 · 623-869-2333 · www.cap-az.com

FY 2013 Quarterly Payments		Existing Habitat Maintenance	Remedial Measures	Other Work Tasks	Total Non-Fed Payment Due
Arizona	Q1	$ 466,275.00	$ 62,393.62	$ 117,316.50	$ 645,985.12
	Q2	466,275.00	62,393.62	117,316.50	645,985.12
	Q3	466,275.00	62,393.63	117,316.50	645,985.13
	Q4	466,275.00	62,393.63	117,316.50	645,985.13
	FY Totals	$1,865,100.00	$249,574.50	$ 469,266.00	$2,583,940.50
Nevada	Q1	$ 466,275.00	$ 62,393.62	$ 763,301.63	$1,291,970.25
	Q2	466,275.00	62,393.62	763,301.63	1,291,970.25
	Q3	466,275.00	62,393.63	763,301.62	1,291,970.25
	Q4	466,275.00	62,393.63	763,301.62	1,291,970.25
	FY Totals	$1,865,100.00	$249,574.50	$3,053,206.50	$5,167,881.00
California	Q1	$ 932,550.00	$124,787.25	$1,311,274.87	$2,368,612.12
	Q2	932,550.00	124,787.25	1,311,274.87	2,368,612.12
	Q3	932,550.00	124,787.25	1,311,274.88	2,368,612.13
	Q4	932,550.00	124,787.25	1,311,274.88	2,368,612.13
	FY Totals	$3,730,200.00	$499,149.00	$5,245,099.50	$9,474,448.50

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
Linda Carbone, MSCP Management & Program Analyst
Douglas Dunlap, Manager-Finance and Accounting, CAP
Dana Sedig, Supervisor-Financial Operations, CAP

Section 8.1.1 - Fiscal Year 2013 Inflation Calculation for Lower Colorado River Multi-Species Conservation Program (Actual Indices through September 2011)

Item		Description / Formula		Values		Result
FY	=	Federal Fiscal Year Being Adjusted for Inflation		2013		2013
FY-2	=	Federal Fiscal Year for 2 years prior to Federal Fiscal Year Being Adjusted for Inflation		2011		2011
PPI Inflation Index for FY	=	Producer Price Index for Materials and Components for Const Sept FY-2 / Producer Price Index for Materials and Components for Const Sept 2002	=	214.5/ 152.1	=	1.410
GDPIP Inflation Index for FY	=	Gross Domestic Product Implicit Price Deflator September 30, FY-2 / Gross Domestic Product Implicit Price Deflator September 30, 2002		113.836 / 104.243	=	1.092
Inflation Index for FY	=	(PPI Inflation Index for FY + GDPIP inflation Index for FY)/2		(1.410+1.092)/2	=	1.251
Non-Federal Funding Obligation for FY	=	(5 - year Amount from Table 7-1 of HCP 2003 dollars adjusted to yearly amount)/2	=	$137,700 / 5 = $27,540 $27,540 / 2	=	$13,770
Federal Funding Obligation for FY	=	(5 - year Amount from Table 7-1 of HCP 2003 dollars adjusted to yearly amount)/2	=	$137,700 / 5 / 2	=	$13,770
Non-Federal Indexed Funding Obligation for FY	=	(Non-Federal Funding Obligation for FY) X (Inflation Index for FY)		$13,770 X 1.251	=	$17,226.270
Federal Indexed Funding Obligation for FY	=	(Federal Funding Obligation for FY) X (Inflation Index for FY)		$13,770 X 1.251	=	$17,226.270

All $ are in thousands

Individual State's share in $			
California Share - 50%		50%	$8,613,135.00
Arizona Share - 25%		25%	$4,306,567.50
Nevada Share - 25%		25%	$4,306,567.50
Total Non-Federal Share			$17,226,270.00

Adjusted Split in Individual State Shares		
California - 55%	55%	$ 9,474,448.50
Arizona - 15%	15%	2,583,940.50
Nevada - 30%	30%	5,167,881.00
Total Non-Federal Share	100%	$ 17,226,270.00

Fiscal Year 2013 Lower Colorado River Multi-Species Program Funding, Indexing and Inflation Adjusted Changes in Funding (Actual Indices through September 2011)

									Program in 9/2002 $ (Table 7-1 of HCP)			Program in Indexed $		
	Sept/FY	Estimated Annual Inflation GDP	Estimated Annual Inflation PPI	Gross Domestic Product Index	GDP Inflation Index	Producer Price Index	PPI Inflation Index	Composite Inflation Index	Total	Federal	Non-Federal	Indexed Total	Indexed Federal	Indexed Non-Federal
row	col (a)	col (b)	col (c)	col (d)	col (e)	col (f)	col (g)	col (h)	col (i)	col (j)	col (k)	col (l)	col (m)	col (n)
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	1.083						
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	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	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	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	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	7,255
11	2011	Actual	Actual	113.836	1.092	214.500	1.410	1.251	27,540	13,770	13,770	32,800	16,400	16,400
12	2012	3.0%	3.5%	117.251	1.125	222.008	1.460	1.293	27,540	13,770	13,770	33,323	16,662	16,662
13	2013	3.0%	3.5%	120.769	1.159	229.778	1.511	1.335	27,540	13,770	13,770	34,453	17,226	17,226
14	2014	3.0%	3.5%	124.392	1.193	237.820	1.564	1.379	27,540	13,770	13,770	35,609	17,805	17,805
15	2015	3.0%	3.5%	128.123	1.229	246.144	1.618	1.424	27,540	13,770	13,770	36,766	18,383	18,383
16	2016	3.0%	3.5%	131.967	1.266	254.759	1.675	1.471	22,164	11,082	11,082	30,564	15,282	15,282
17	2017	3.0%	3.5%	135.926	1.304	263.675	1.734	1.519	22,164	11,082	11,082	31,562	15,781	15,781
18	2018	3.0%	3.5%	140.004	1.343	272.904	1.794	1.569	22,164	11,082	11,082	32,603	16,302	16,302
19	2019	3.0%	3.5%	144.204	1.383	282.456	1.857	1.620	22,164	11,082	11,082	33,667	16,834	16,834
20	2020	3.0%	3.5%	148.530	1.425	292.341	1.922	1.674	22,164	11,082	11,082	34,775	17,388	17,388
21	2021	3.0%	3.5%	152.986	1.468	302.573	1.989	1.729	19,982	9,991	9,991	32,371	16,185	16,185
22	2022	3.0%	3.5%	157.576	1.512	313.164	2.059	1.786	19,982	9,991	9,991	33,450	16,725	16,725
23	2023	3.0%	3.5%	162.303	1.557	324.124	2.131	1.844	19,982	9,991	9,991	34,549	17,274	17,274
24	2024	3.0%	3.5%	167.172	1.604	335.469	2.206	1.905	19,982	9,991	9,991	35,688	17,844	17,844
25	2025	3.0%	3.5%	172.187	1.652	347.210	2.283	1.968	19,982	9,991	9,991	36,847	18,423	18,423
26	2026	3.0%	3.5%	177.353	1.701	359.362	2.363	2.032	8,144	4,072	4,072	15,514	7,757	7,757
27	2027	3.0%	3.5%	182.673	1.752	371.940	2.445	2.099	8,144	4,072	4,072	16,027	8,014	8,014
28	2028	3.0%	3.5%	188.154	1.805	384.958	2.531	2.168	8,144	4,072	4,072	16,549	8,274	8,274
29	2029	3.0%	3.5%	193.798	1.859	398.431	2.620	2.240	8,144	4,072	4,072	17,094	8,547	8,547
30	2030	3.0%	3.5%	199.612	1.915	412.377	2.711	2.313	8,144	4,072	4,072	17,656	8,828	8,828
31	2031	3.0%	3.5%	205.600	1.972	426.810	2.806	2.389	7,500	3,750	3,750	16,800	8,400	8,400
32	2032	3.0%	3.5%	211.768	2.031	441.748	2.904	2.468	7,500	3,750	3,750	17,348	8,674	8,674

33	2033	3.0%	3.5%	218.122	2.092	457.209	3.006	2.549	7,500	3,750	3,750	17,918	8,959	8,959
34	2034	3.0%	3.5%	224.665	2.155	473.212	3.111	2.633	7,500	3,750	3,750	18,510	9,255	9,255
35	2035	3.0%	3.5%	231.405	2.220	489.774	3.220	2.720	7,500	3,750	3,750	19,118	9,559	9,559
36	2036	3.0%	3.5%	238.347	2.286	506.916	3.333	2.810	7,173	3,587	3,587	18,887	9,443	9,443
37	2037	3.0%	3.5%	245.498	2.355	524.658	3.449	2.902	7,173	3,587	3,587	19,511	9,755	9,755
38	2038	3.0%	3.5%	252.863	2.426	543.021	3.570	2.998	7,173	3,587	3,587	20,156	10,078	10,078
39	2039	3.0%	3.5%	260.449	2.498	562.027	3.695	3.097	7,173	3,587	3,587	20,816	10,408	10,408
40	2040	3.0%	3.5%	268.262	2.573	581.698	3.824	3.199	7,173	3,587	3,587	21,505	10,752	10,752
41	2041	3.0%	3.5%	276.310	2.651	602.057	3.958	3.305	7,173	3,587	3,587	22,215	11,107	11,107
42	2042	3.0%	3.5%	284.599	2.730	623.129	4.097	3.414	7,173	3,587	3,587	22,946	11,473	11,473
43	2043	3.0%	3.5%	293.137	2.812	644.939	4.240	3.526	7,173	3,587	3,587	23,707	11,853	11,853
44	2044	3.0%	3.5%	301.931	2.896	667.512	4.389	3.643	7,173	3,587	3,587	24,489	12,244	12,244
45	2045	3.0%	3.5%	310.989	2.983	690.875	4.542	3.763	7,173	3,587	3,587	25,292	12,646	12,646
46	2046	3.0%	3.5%	320.319	3.073	715.055	4.701	3.887	7,173	3,587	3,587	26,131	13,066	13,066
47	2047	3.0%	3.5%	329.928	3.165	740.082	4.866	4.016	7,173	3,587	3,587	26,992	13,496	13,496
48	2048	3.0%	3.5%	339.826	3.260	765.985	5.036	4.148	7,173	3,587	3,587	27,881	13,941	13,941
49	2049	3.0%	3.5%	350.021	3.358	792.794	5.212	4.285	7,173	3,587	3,587	28,807	14,403	14,403
50	2050	3.0%	3.5%	360.522	3.458	820.542	5.395	4.427	7,173	3,587	3,587	29,754	14,877	14,877
51	2051	3.0%	3.5%	371.337	3.562	849.261	5.584	4.573	7,173	3,587	3,587	30,736	15,368	15,368
52	2052	3.0%	3.5%	382.477	3.669	878.985	5.779	4.724	7,173	3,587	3,587	31,755	15,877	15,877
53	2053	3.0%	3.5%	393.952	3.779	909.750	5.981	4.880	7,173	3,587	3,587	32,802	16,401	16,401
54	2054	3.0%	3.5%	405.770	3.893	941.591	6.191	5.042	7,173	3,587	3,587	33,885	16,943	16,943
55	2055	3.0%	3.5%	417.943	4.009	974.547	6.407	5.208	7,173	3,587	3,587	35,004	17,502	17,502
	Total								626,180	313,090	313,090	1,270,948	635,474	635,474

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	56,070,000	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	$ 13,568,940.00	$ 14,510,916.00
X Existing Habitat Percentage Above	4.458712323880860%	4.458712323880860%	4.458712323880860%	4.458712323880860%	4.458712323880860%
Existing Habitat Maintenace 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	$ 34,452,540.00		
X Existing Habitat Percentage Above	16.339869281045800%	16.339869281045800%	16.339869281045800%	16.339869281045800%	16.339869281045800%
Existing Habitat Maintenace Cost	$ 5,359,500.00	$ 5,445,000.00	$ 5,629,500.00	$ -	$ -
Arizona - 25%	$ 1,339,875.00	$ 1,361,250.00	$ 1,407,375.00	$ -	$ -
Nevada - 25%	1,339,875.00	1,361,250.00	1,407,375.00	-	-
California - 50%	2,679,750.00	2,722,500.00	2,814,750.00	-	-
Total Existing Habitat Maintenance Cost	**$ 5,359,500.00**	**$ 5,445,000.00**	**$ 5,629,500.00**	**$ -**	**$ -**

Accelerated Payment	$ 1,830,900.00
Arizona - 25%	457,725.00
Nevada - 25%	457,725.00
California - 50%	915,450.00
Total Existing Habitat Maintenance Accelerated Payment	**$ 1,830,900.00**

TOTAL PAYMENT	
Existing Habitat Maintenace Cost-2013	$ 5,629,500.00
Accelerated Payment	1,830,900.00
TOTAL PAYMENT	**$ 7,460,400.00**
Arizona - 25%	$ 1,865,100.00
Nevada - 25%	1,865,100.00
California - 50%	3,730,200.00
TOTAL PAYMENT	**$ 7,460,400.00**

(Established FY 2012-Cumulative Funding for years 6-8 in FY13)

Per Table 7-1 of the HCP		
	Years 1-5	Years 6-10
Remedial Measures Cost (2003 dollars)	-	1,330,000
Amount per Year (2003 dollars)		266,000

	FY 2011 - YR 6	FY 2012 - YR 7	FY 2013 - YR 8	FY 2014 - YR 9	FY 2015 - YR 10	Total
Cumulative Funding for (FY11 - FY13) 2003 dollars	$ -	$ -	$ 798,000.00			
X Inflation Factors	1.191	1.210	1.251			
Remedial Measures Cost (inflated)	$ -	$ -	$ 998,298.00			$ 998,298.00
Arizona - 25%	$ -	$ -	$ 249,574.50			$ 249,574.50
Nevada - 25%	-	-	249,574.50			249,574.50
California - 50%	-	-	499,149.00			499,149.00
Total Remedial Measures Cost	$ -	$ -	$ 998,298.00	$ -	$ -	$ 998,298.00

Appendix B. Description of Take

B-1. LCR MSCP Federal Flow-Related Covered Actions and Accomplishments, Calendar Year 2011

2.2 BUREAU OF RECLAMATION				
2.2.1 Ongoing Flow-Related Actions				
2.2.1.1 Flood Control (page 2-3; Table 2-1, page 2-5)	• Prescribed flood control releases per Field Working Agreement and *Water Control Manual for Lake Mead/Hoover Dam*	• Timing of required releases may be varied within the month • Anticipatory flood control releases • Available flood control space in Lake Mead can be reduced to 1.5 maf August 1 to January 1 if prescribed space is available in upstream reservoirs • Management of target elevations for Lake Mohave (Davis Dam) and Lake Havasu (Parker Dam)	• None	No flood control releases were made from Lake Mead. The hourly elevation of Lake Mead provided for flood control space that was well above that required. In 2011, the Lake Mead elevation varied between 1086.24 and 1132.83 feet above mean sea level. Elevations at Lake Mohave and Lake Havasu were managed to target elevations.
2.2.1.2 State Apportionment and Water Contracts (page 2-5; Table 2-2, page 2-6)	• Delivery of water to water users in the United States pursuant to applicable Federal law, including the Boulder Canyon Project Act (BCPA) and the Supreme Court Consolidated Decree of 2006 in Arizona v. California, 547 U.S. 150 (Decree) • Delivery of a state's unused entitlement to a junior entitlement holder within that state on an annual basis	• Determinations and delivery of post-2016 unused apportionment water from one state to another within the Lower Basin on an annual basis	• Delivery of water to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree	Water deliveries were made to water users in Arizona, California, and Nevada to satisfy the basic entitlements for delivery of Colorado River water. Unused entitlement water within a state's apportionment was delivered to junior priority holders in that state.

2.2.1.3 Annual Operations Normal, Surplus, Shortage, and Unused Apportionment (page 2-6; Table 2-3, page 2-9)	• Issuance of an annual operating plan • Delivery of water to water users in the United States pursuant to applicable Federal law, including the Boulder Canyon Project Act (BCPA) and the Supreme Court Consolidated Decree of 2006 in Arizona v. California, 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	• Revision of annual operations through the *Annual Operating Plan* (AOP), pursuant to the Long-Range Operation of Colorado River Reservoirs (LROC) within the year to reflect current hydrologic conditions • Determinations and delivery of post-2016 unused apportionment water from one state to another within the Lower Basin on an annual basis • Execution of agreements and the delivery of surplus water pursuant to the Reclamation Reform Act and the Reclamation States Emergency Drought Relief Act • Periodic review of the LROC	• Delivery of water to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree	The Annual Operating Plan for 2011, which governed releases, was issued. Annual operations were revised through the Annual Operating Plan pursuant to the LROC and the 2007 Interim Guidelines to reflect current hydrologic conditions. An Intentionally Created Surplus (ICS) Surplus condition was declared for 2011. ICS water was created in 2011. Water was delivered to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree. Water was delivered to Mexico pursuant to the 1944 Water Treaty. Pursuant to criteria outlined in IBWC Minute No. 318, water deliveries to Mexico included a downward adjustment of 50,336 acre-feet. IBWC Minute No. 318 allows Mexico to store water in Lake Mead through 2013 for later use. No review of the LROC was conducted in 2011. In 2011, Nevada and Arizona did not use their entire apportionments.
2.2.1.4 Daily Hoover Dam Operations (Table 2-4, page 2-10)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States, deliver 1944 Water Treaty water to Mexico, and generate hydropower with these water releases	• Monthly energy targets are set prior to each month, based on the best information available with respect to downstream water demands and lake elevation targets at lakes Mohave and Havasu; energy targets may be revised during the month to meet changing water demands and other constraints (e.g., to benefit native fish in Lake Mohave)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States and to generate hydropower with these water releases	Water releases from Hoover Dam were made to satisfy beneficial use requirements of entitlement holders in the United States, to deliver 1944 Water Treaty water, and to generate hydropower with these water releases. Energy targets were set monthly based on the best information available with respect to downstream water demands and lake elevation targets at lakes Mohave and Havasu. Energy targets were revised during the month to meet changing water demands and other constraints.

2.2.1.4 Daily Davis Dam Operations (Table 2-5, page 2-11)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States, deliver 1944 Water Treaty water to Mexico, and generate hydropower with these water releases	• Timing of releases, to a limited degree, may be varied by a few days, based on available downstream storage, Lake Mohave and Lake Havasu operational constraints, downstream water requirements, and hydropower needs	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States and generate hydropower with these water releases	Water releases from Davis Dam were made to satisfy beneficial use requirements of entitlement holders in the United States, to deliver 1944 Water Treaty water to Mexico, and to generate hydropower with these water releases. The timing of releases was varied based on available downstream storage, operational constraints for lakes Mohave and Havasu, downstream water requirements, and hydropower needs.
2.2.1.4 Daily Parker Dam Operations (Table 2-6, page 2-11)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States, deliver 1944 Water Treaty water to Mexico, and generate hydropower with these water releases	• Timing of releases, to a limited degree, may be varied by the hour based on hydropower needs, water requirements, or other operations constraints immediately downstream of the dam	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States and generate hydropower with these water releases	Water releases from Parker Dam were made to satisfy beneficial use requirements of entitlement holders in the United States, to deliver 1944 Water Treaty water to Mexico, and to generate hydropower with these water releases. The timing of releases was varied based on available downstream water requirements, hydropower needs, and other operational constraints immediately downstream of Parker Dam.
2.2.1.4 Daily Senator Wash, Imperial Dam, Laguna Dam, and Warren H. Brock Reservoir Operations (Table 2-7, page 2-11)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States, deliver 1944 Water Treaty water to Mexico, and generate hydropower with water releases for Senator Wash	• Senator Wash, Imperial Dam, and Laguna Dam operations to prevent over deliveries, to release water to entitlement holders, for sluicing operations, to deliver a portion of the 1944 Water Treaty deliveries to Mexico, and for flood control purposes	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States	Water releases from Senator Wash, Imperial and Laguna dams, and Brock Reservoir were made to satisfy beneficial use requirements of entitlement holders in the United States, to deliver 1944 Water Treaty water to Mexico, and to generate hydropower with water releases from Senator Wash. 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.
2.2.1.5 Electric Power Generation (page 2-11) **43 CFR PART 431** (page 2-14)	• Operational requirements to satisfy 43 CFR Part 431 requirements	---	---	Hydroelectric power generated: • Hoover Dam: 3,705,574,280 kWh • Davis Dam: 1,130,209,000 kWh • Parker Dam: 458,594,527 kWh Operations met the requirements to satisfy 43 CFR Part 431.

2.2.1.6 Lower Colorado Water Supply Project - California (page 2-15; Table 2-8, page 2-16)	• Delivery of water under executed LCWSP contracts	• Reclamation's execution and administration of individual LCWSP contracts	• Participate in the development and consult in the execution of individual contracts under the LCWSP.	In 2011, 4,460 acre-feet was pumped by the LCWSP wellfield. IID reduced its consumptive use of Colorado River water by this amount and it was made available through exchange for use by the LCWSP contractors and MWD.
2.2.1.7 1944 Water Treaty Deliveries(page 2-17; Table 2-9, page 2-20)	• 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 T juana pursuant to Minute No. 314 of the 1944 Water Treaty and contract	• Routing of water through the Yuma Division for delivery to Northerly International Boundary (NIB) • Determination of quantity of water delivered at Southerly International Boundary (SIB) up to 140,000 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 T juana pursuant to Minute No. 314 of the 1944 Water Treaty • Routing of water through the Yuma Division during flood control conditions	• Delivery of emergency water to Tijuana pursuant to Minute No. 314 of the 1944 Water Treaty and contract • Retention of a portion of MWD's entitlement in Lake Mead to accommodate delivery of water pursuant to Minute No. 314 of the 1944 Water Treaty	Water delivery met the Mexico allotment (1.5 maf) pursuant to the 1944 Water Treaty and related Minutes.Reclamation complied with the salinity requirements of Minute No. 242 of the 1944 Water Treaty. Delivery of emergency water to T juana pursuant to Minute No. 314 of the 1944 Water Treaty totaled 0 acre-feet. Pursuant to criteria outlined in IBWC Minute No. 318, water deliveries to Mexico included a downward adjustment of 50,336 acre-feet. This water will be stored in Lake Mead for future delivery to Mexico. Delivery of water at SIB totaled 130,827 acre-feet. Delivery at NIB totaled 1,378,063 acre-feet. A total of 77,954 acre-feet of water passed to Mexico in excess of treaty requirements. In 2011, 130,623 acre-feet of water was bypassed pursuant to Minute No. 242 of the IBWC. Drainage pumping and delivery of drainage return flows were made at NIB and SIB.

2.2.1.8 Decree Accounting (page 2-21; Table 2-10, page 2-22)	• Annual preparation of official records of the diversion, return flow, and consumptive use of Colorado River water pursuant to Article V of the Supreme Court Consolidated Decree of 2006 in Arizona v. California, 547 U.S. 150 (Decree)	• None	• Report data for Decree Accounting records	The *Colorado River Accounting and Water Use Report; Arizona, California, Nevada* for Calendar Year 2011, was published May 15, 2012 and is summarized below. The final report is available at http://www.usbr.gov/lc/region/g4000/wtracct.html Diversions from Mainstream Summary: <u>Arizona:</u> Diversions = 3,642,930 acre-feet Measured Returns = 691,433 acre-feet Unmeasured Returns = 170,389 acre-feet Consumptive Use = 2,781,108 acre-feet <u>California</u>: Diversions = 4,861,340 acre-feet Measured Returns = 587,577 acre-feet Unmeasured Returns = 75,742 acre-feet Consumptive Use = 4,312,661 acre-feet <u>Nevada:</u> Diversions = 438,435 acre-feet Measured Returns = 214,025 acre-feet Unmeasured Returns = 1,563 acre-feet Consumptive Use = 222,847 acre-feet
2.2.2 Future Flow-Related Covered Actions				
2.2.2.1 Specific Surplus and Shortage Guidelines (page 2-22; Table 2-11, page 2-24)	• Delivery of surplus water pursuant to Article II(B)(2) of the 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	• Adoption of specific post-2026 surplus guidelines • Adoption of specific post-2026 shortage guidelines	• Consult with States on development of specific post-2026 surplus guidelines or specific post-2026 shortage guidelines • Delivery of water to water users in the United States pursuant to applicable Federal law, including the Boulder Canyon Project Act and the Decree	No surplus water was delivered pursuant to Article II(B)(2) of the Decree. No water was delivered pursuant to Article II(B)(3) of the Decree.

2.2.2.2 Flood Release Contracts (page 2-24; Table 2-12, page 2-25)	• Delivery of water under executed flood release contracts	• Execution of contracts for water released during flood control operations	• Participate in the development of and consult in the execution of flood release contracts	No water deliveries were made under flood release contracts.
2.2.2.3 Changes in the Storage and Delivery of State Entitlement Waters through Various Administrative Actions (page 2-25; Table 2-13, page 2-26)	---	---	---	No administrative actions were taken to reduce the water deliveries as listed in Table 2-13 of the *Biological Assessment*.
Flow Changes Below Hoover Dam to Davis Dam (Table 2-14, after page 2-26)	---	---	---	Repayment of IOPP overruns resulted in reduced diversions of 11,659 acre-feet by CAWCD in Arizona and 2,049 acre-feet by the Fort Mojave Indian Tr be (FMIT) in California. 185,704 acre-feet of ICS was created by MWD. 9,559 acre-feet of ICS was created by operation of the YDP. Mexico adjusted its delivery schedule downward by 50,336 acre-feet. These amounts would have been released from Lake Mead for downstream use but were left in Lake Mead decreasing the volume of water passing Hoover Dam by 259,307 acre-feet. However, during 2011, IID overran its entitlement by 82,662 acre-feet, Beattie Farms overran by 453 acre-feet, the Cocopah Indian Tribe overran by 605 acre-feet, and the FMIT overran by 155 acre-feet resulting in 83,875 acre-feet of increased release from Hoover Dam. Net change in flow below Hoover Dam was 175,432 acre-feet.
Flow Changes Below Davis Dam to Parker Dam (Table 2-15, after page 2-26)	---	---	---	Repayment of IOPP overruns resulted in reduced diversions of 11,659 acre-feet by CAWCD in Arizona and 2,049 acre-feet by the Fort Mojave Indian Tribe (FMIT) in California. 185,704 acre-feet of ICS was created by MWD. 9,559 acre-feet of ICS was created by operation of the YDP. Mexico adjusted its delivery schedule downward by 50,336 acre-feet. These amounts would have been released from Lake Mead for downstream use but were left in Lake Mead decreasing the volume of water passing Hoover Dam by 259,307 acre-feet. However, during 2011, IID overran its entitlement by 82,662 acre-feet, Beattie Farms overran its entitlement by 453 acre-feet, the Cocopah Indian Tribe overran its entitlement by 605 acre-feet, and FMIT overran by 155 acre-feet resulting in 83,875 acre-feet of increased release from Hoover Dam. Net change in flow below Hoover Dam was 175,432 acre-feet.

Flow Changes Below Parker Dam to Imperial Dam (Table 2-16, after page 2-26)	---	---	---	IID conserved the following amounts, which were diverted by MWD at Lake Havasu: 99,940 acre-feet under the amended 1988 IID/MWD Conservation Agreement; 63,278 acre-feet under the IID/SDCWA transfer agreement; and 67,700 acre-feet from AAC lining conservation. CVWD conserved 28,265 acre-feet from lining of the Coachella Canal. A total of 259,183 acre-feet of the water was diverted by MWD which would otherwise have passed Parker Dam for delivery to IID and CVWD. CVWD consumptively used 9,387 acre-feet less water than scheduled. Mexico's reduced delivery schedule of 50,336 acre-feet reduced flows below Parker Dam. 9,559 acre-feet of System Efficiency ICS was created as a result of the Yuma Desalting Plant Pilot Run; this water was left in Lake Mead and did not flow past Parker Dam. These activities resulted in a total of 328,465 acre-feet of reduced flows past Parker Dam. IID overran its entitlement by 82,662 acre-feet, Beattie Farms overran by 453 acre-feet, the Cocopah Indian Tribe overran by 605 acre-feet, and excess water to Mexico of 77,954 acre-feet all resulted in a total of 161,674 acre-feet of increased flows past Parker Dam. The net change in flow below Parker Dam in 2011 was a reduction of 166,791 acre-feet.
Water Conservation Field Services Program (page 2-27; Table 2-17, page 2-28)	• Develop water conservation program pursuant to Reclamation Reform Act (RRA) section 210(a)	• Implementation of the Field Services Program	• Consult in the development of conservation plans pursuant to RRA section 210(a)	All water conservation plans for the Lower Colorado Region are complete.
Unlawful Use (page 2-28; Table 2-18, page 2-30)	• Boulder Canyon Project Act requires all Colorado River water users to have a contract with the Secretary of the Interior	• Implementation of appropriate policy or rule to address unlawful use of Colorado River water • Execution of water delivery contracts with entities or individuals identified as unlawful users	• Consult with states in the development of policies or rules to address unlawful use of Colorado River water • Consult with the states on the execution of water delivery contracts with entities or individuals identified as unlawful users	A proposed policy is currently under development.

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"	• Delivery of water pursuant to executed contracts for unallocated water in Arizona (non-CAP)	• Execution of water delivery contracts for unallocated water in Arizona (non-CAP)	• Review of water delivery contracts and consultation with Arizona on contract recommendations	Unallocated (non-CAP) Arizona water was delivered to Central Arizona Water Conservation District 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.
Central Arizona Project Contract Actions (page 2-31; Table 2-20, page 2-31)	• Delivery of water pursuant to executed contracts	• Completion of allocation and execution of contracts for delivery of CAP water subject to Congressional direction	• Review of contracts and consultation on proposed allocation	Water was delivered to the CAP for use by subcontractors and Indian tribes in satisfaction of water delivery contracts. Transfer of Town of Superior's 285 acre-feet to Arizona Water Company (Superstition System) was executed on September 12, 2011.
Changes in Delivery Related to Water Transfers (page 2-32; Table 2-21, page 2-32	• Delivery of water under executed off-stream storage agreements, pursuant to 43 CFR Part 414	• Execution of Storage and Interstate Release Agreements, pursuant to 43 CFR Part 414	• Delivery of water under executed off-stream storage agreements, pursuant to 43 CFR Part 414	IID conserved and delivered 63,278 af of water to MWD for exchange with SDCWA. The water was conserved and made available under the Colorado River Water Delivery Agreement (CRWDA) reflecting changes in points of diversion and is used to implement the Quantification Settlement Agreement water transfers. In addition, MWD diverted 99,940 acre-feet of water made available by IID under the amended 1988 IID/MWD Conservation Agreement. IID exchanged 56,200 af of water with the SDCWA and made 11,500 af of water available to MWD as a result of the lining of the All-American Canal. CVWD exchanged 23,765 af with SDCWA and made 4,500 af of water available to MWD as a result of the lining of the Coachella Canal. IID also made 16,000 acre-feet available to CVWD under the CRWDA Intra-priority 3 Transfer.
Changes in Delivery Related to Off-Stream Storage (page 2-32; Table 2-22, page 2-33)	• Delivery of water under executed off-stream storage agreements, pursuant to 43 CFR Part 414	• Execution of Storage and Interstate Release Agreements, pursuant to 43 CFR Part 414	• Delivery of water under executed off-stream storage agreements, pursuant to 43 CFR Part 414	Water was stored off-stream by SNWA. No changes in delivery or points of delivery resulted from off-stream storage in 2011.
Changes in Amount of Delivery (page 2-33; Table 2-23, page 2-34)	• Delivery of water pursuant to executed contracts or amendments to recognize changes in amounts of delivery or changes in points of diversion	• Execution of contract amendments or amendments to recognize changes in amounts of delivery or changes in points of diversion	• Review of contracts and consultation on new or amended contracts	No changes.

Changes in Type of Water Use (page 2-34; Table 2-24, page 2-34)	• Delivery of water pursuant to executed contracts or contract amendments that recognize changed water use types	• Execution of contracts or contract amendments that recognize changed water use types	• Review of contracts and consultation with Reclamation on new or amended contracts	No changes.
Inclusions and Exclusions to Service Areas (page 2-34; Table 2-25, page 2-35)	• Delivery of water pursuant to executed contract amendments or new contracts that includes or excludes lands in service areas	• Execution of contract amendments or new contracts that includes or excludes lands in service areas	• Review of contracts and consultation on new or amended contracts	Inclusion of 55.7 acres of land within North Gila Irrigation and Drainage District signed September 19, 2011. Inclusion and exclusion of 620 acres of land within Central Arizona Irrigation and Drainage District for lands owned by Eloy Associates LLC signed September 12, 2011.
Contract Terminations (page 2-35; Table 2-26, page 2-36)	• None	• Termination of water contract due to abandonment • Execution of contract amendments when entitlement holder has relinquished water	• Consultation on the disposition of any water allocated for use but not consumptively used within a state	No water contracts were terminated.
2.3 WESTERN AREA POWER ADMINISTRATION	---	---	---	See section 2.2.1.5 accomplishments in this table.
2.4 NATIONAL PARK SERVICE	---	---	• Water entitlement holder	See section 2.2.1.8 accomplishments in this table.
2.5 BUREAU OF INDIAN AFFAIRS				
2.5.2.2 Ongoing Water Conservation Practices (page 2-77)	---	• Conduct conservation measures for efficient water use	---	Existing practices were continued.
2.5.2.6 Flow-Related Actions (page 2-82)	---	---	• Water entitlement holder	See section 2.2.1.8 accomplishments in this table.
2.5.3.2 Future Water Conservation Practices (page 2-77)	---	• Institute new conservation measures for efficient water use	---	No implementation in 2011.
2.5.3.5 Headgate Rock Dam Operation and Maintenance (page 2-88)	---	• Water releases and generate hydropower with these water releases	---	Existing practices were continued.
2.6 FISH AND WILDLIFE SERVICE	---	---	• Water entitlement holder	See section 2.2.1.8 accomplishments in this table.
2.7 BUREAU OF LAND MANAGEMENT	---	---	• Water entitlement holder	See section 2.2.1.8 accomplishments in this table.

NOTES:
1. See *LCR MSCP Habitat Conservation Plan*, section 2.1.1, Relationship of Non-Federal Covered Activities to Federal Nondiscretionary Actions. This can be accessed at http://www.lcrmscp.gov/publications/VolumeII.pdf.
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 2011.

B-2. LCR MSCP Federal Non-Flow-Related Covered Actions and Incidental Take Summary, Fiscal Year 2011

Federal Covered Actions *Biological Assessment* Chapter 2	Covered Actions Summary			Covered Actions Implemented						Notes
	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions	Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.2 BUREAU OF RECLAMATION										
2.2.3 Ongoing Non-Flow-Related (Facilities and Channel Activities) (page 2-36; Table 2-27, page 2-37)	• Operate, maintain, and control river in Arizona, California, and Nevada • Construct, maintain, and improve drainage works for water projects • Maintain floodway to accommodate 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	---	• 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	Partial Removal of Wash fan at Manson's Wash	4	Parker		Arrowweed	0.23 acres	1, 3, and 6	Mason's Wash Fan: 02 acres

Protected Bankline Maintenance and Care of Unprotected Banklines (page 2-43)	---	• Protected bankline location and maintenance	Replacement of 250 ft of existing bankline stabilization and 1,500 ft of new bankline stabilization at RM A151.5	4	Parker	RM A 151.5	Arrowweed	1.7 acres	1, 3, and 6	Replacement of 250 ft of existing bankline stabilization and 1,500 feet of new bankline stabilization at RM A151.5. About 1800 CY of 4" minus for CRFWLS and YAP bankline. About 1,500 CY of Gravel for stockpile pads, and proposed 6" thick roadway. About 7,300 CY of Riprap for the CRFWLS and YAP bankline repair.
Levee Maintenance (page 2-44)	---	• Levee location and maintenance	---							No implementation in FY11.
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	Laguna Desilting Basin Dredging Project removed 1,500,000 cubic yards of material	6	Laguna		None		1, 3, and 6.	
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 FY11							No implementation in FY11.
Stockpiles (page 2-49; Table 2-37, page 2-49)	---	• Location of three future stock piles	No Activities in FY11	4	LCR		None	None	1, 3, and 6.	Replenished 7 existing stockpile sites located at various LCR sites.
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 6	Limitrophe Yuma Laguna	0-24 24-43 43-49	None None None	0 0 0	1, 3, and 6 1, 3, and 6 1, 3, and 6	Road Maintenance: Limitrophe Division Miles 128.4. Yuma Division - Miles 128.4. (Gila River Area - Miles 63.9.) Laguna Division - Miles 20.

				4	C bola	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 66.4
				4	Parker	134-178	None	0	1, 3, and 6	Parker Division - Miles 133.6.
				3	Mohave	234-276	None	0	1, 3, and 6	Mohave Division - Miles 98.8.
2.2.3.2 Major Federal Facilities and Miscellaneous Operation, Maintenance, and Replacement (page 2-50; Table 2-36, after page 2-50)	---	• Maintenance of Yuma area drainage wells and conveyance facilities including maintenance and access roads • Maintenance of open channel drains and outfall channels • Maintenance and replacement of gauging stations, survey line markers, and boat ramps	**Gauging Stations** **Conveyance facilities** **Yuma Area drainage wells** – Replaced pumps and motors for SG-713, 714, 3, 1, 11, 716, YV-27, and YV-28	4 7 7	LCR Yuma Mesa Conduit Yuma Mesa, Yuma Valley, and South Gila wells	106.6 27.0 31.0-34.0	AW and Saltcedar None None	0.10 acre 0 0	1, 3, and 6 1, 3, and 6 1, 3, and 6	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. YMC – misc. maintenance activities. Replaced pumps and motors for SG-713, 714, 3, 1, 11, 716, YV-27, and YV-28
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 FY11.
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 FY11.

Parker Division (page 2-57; Table 2-39, page 2-57)	---	• Backwater maintenance	Excavation of sediment plugs and replacement of inlet culverts in the east and west channels leading into the Aha Quin backwater in CA	4	Parker		Mixed Saltcedar, arrowweed, Phragmites	Less than 1	1, 3, 6	Aha Quin Culvert Crossings
Palo Verde Division (page 2-58; Table 2-40, page 2-58)	---	• Backwater maintenance	No Backwater activities in FY11 in the Palo Verde Division.							No implementation in FY11.
Cibola Division (page 2-58; Table 2-41, page 2-59)	---	• Backwater maintenance	Replaced culvert at C canal near Palo Verde, CA	4	C bola		Mixed Saltcedar, arrowweek, Phragmites	Less than 1	1, 3, 6	C Canal Culvert Replacement
Imperial Division (page 2-59; Table 2-42, page 2-59)	---	• Backwater maintenance	No Backwater activities in FY11 in the Imperial Division.							No implementation in FY11.
Laguna Division (page 2-60; Table 2-43, page 2-60)	---	• Backwater maintenance	No Backwater activities in FY11 in the Laguna Division.							No implementation in FY11.
Yuma Division (page 2-60; Table 2-44, page 2-61)	---	• Backwater maintenance	No backwater activities in FY11 in the Yuma Division.							No implementation in FY11.
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 pond's bankline in order to allow continued fishing access to public.	7	Gila River		Mixed Saltcedar, Phragmites, and cattail.	2	1, 3, and 6.	
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 FY11 at Topock Marsh.							No implementation in FY11.
2.2.4.2 Laguna Reservoir (page 2-63)	---	---	See Desilting basins							See Desilting basins
2.2.4.3 Bankline Maintenance - Unprotected Banklines (page 2-65; Table 2-46, page 2-66)	---	---	No unprotected bankline work conducted in FY11.							No implementation in FY11.
2.2.4.4 Proposed Jetties (page 2-67; Table 2-48, page 2-67)	---		No jetty work conducted in FY11.							No implementation in FY11.
2.3 WESTERN AREA POWER ADMINISTRATION			Maintenance for Davis - Mead 230K Transmission line							No implementation in FY011.
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 Near Las Vegas Wash			1,858 acres 310 acres 258 acres 5 acres 43 acres		Habitat restoration through removal of exotic plants (gross infested acres).
2.4.3 Fishery Management (page 2-71)		• Habitat modifications on Lake Mead and Lake Mohave, including development and enhancement of grow-out ponds, construction of docks, and creation of angler enhancement structures			Lake Mohave			0.5 acres		Creation of fish habitat at Princess Cove and Carp Cove, Lake Mohave. Partnership with NDOW.

2.4.4 Boating Access (page 2-72)		• Maintenance and enhancement of boating access on Lake Mead and Lake Mohave			Lake Mead			7,611 yd^2 4,162 yd^2 4,267 yd^2 3,174 yd^2 1,395 yd^2		Existing launch ramps extended: Echo Bay Callville Bay Boulder Harbor Hemenway Harbor South Cover
2.5 BUREAU OF INDIAN AFFAIRS										
2.5.2.1 Ongoing Irrigation System Operation and Maintenance (page 2-74)		• Irrigation system operation and maintenance for existing Irrigation Projects		3 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 FY10 and FY11.
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 FY10 and FY11.
2.5.3.2 Future Water Conservation Practices (page 2-85)		• Installation, operation, and maintenance of new equipment								No implementation in FY10 and FY11.

2.5.3.3 Future Farmland Development (page 2-85)		• Develop additional agricultural acreage, including construction of irrigation systems								No implementation in FY10 and FY11.
2.5.3.6 Future Wildland Fire Management (page 2-88)		• Implementation of new fuels management projects								No implementation in FY10 and FY11.
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 2011

Non-Federal Covered Activities *Habitat Conservation Plan* Chapter 2	Covered Activities Summary	Covered Activities Implemented						Notes
		Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.2 ARIZONA								
2.2.1 Ongoing Flow-Related Covered Activities[1] (page 2-4)	• Diversion of up to 2.8 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 Activities[1] (page 2-6)	Future Arizona water contract holder activities may include: • Diversions, discharges, and return flows through existing facilities • Changes to points of diversion • New points of diversion • Interstate water banking • Water marketing • Water transfers • Any other actions as made possible from any future agreements and/or measures taken by the Arizona Department of Water Resources or contract holder(s) Future Arizona hydroelectric power contract holder activities may include: • Execution, administration, and operation of extended, renewed, new, or additional contracts for hydroelectric power from hydroelectric facilities at Hoover Dam, Davis Dam, Parker Dam, Headgate Rock Dam, Siphon Drop Power Plant, and Pilot Knob Power Plant							Non-Federal Flow-Related Covered Activities are included in the Federal Flow-Related Covered Actions and Accomplishments (see Appendix B, Table B-1).

2.2.3 Ongoing Non-Flow-Related Covered Activities (page 2-7)	Operation, maintenance, and replacement of: • The facilities and equipment through which water is diverted and conveyed • The facilities through which return flows are returned to the river • Drainage wells in the Yuma area • The facilities and equipment through which electric power is generated and transmitted • The appurtenant works that support these facilities, including access and service roads, electric power and communication transmission lines and substations, docks, boat ramps, and bankline protection	6	Yuma Valley	---	---	---	1 and 3	195 miles of canal maintenance and 60 miles of open drain maintenance.
2.2.3.1 Arizona Game and Fish Department Programs and Activities								
Vegetation and Habitat Management Programs (page 2-8)	• Aquatic, wetland, and riparian habitat maintenance and restoration activities							No implementation in FY11.
Fish Surveys (page 2-8)	• Surveys for Federally listed and nonnative fish species							**Kingman Region:** Lake Mead: 3 days/2 nights gillnets, 3 nights electrofishing Lake Mohave: 3 days/2 nights gillnets Topock Marsh: 3 days/2 nights gillnets **Yuma Region:** 9 days/10 nights electrofishing, 3 nights trammel netting
Fish Stocking (page 2-9)	• Stocking of trout							No fish stocking activity.
Maintenance of Aids to Navigation and Boating Access (page 2-9)	• Place and maintain aids to navigation							Maintained 132 buoys, one boat dock, and one boat ramp.
Law Enforcement Patrol Activities (page 2-9)	• Administer law enforcement and boating safety program using watercraft patrols							4,116 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)	• 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)	Future California water contract holder activities may include: • Diversions, discharges, and return flows through existing facilities • Changes to points of diversion • New points of diversion • Interstate water banking • Water marketing • Water transfers • Any other actions as made possible from any future agreements and/or measures taken by the Colorado River Board of California or contract holder(s) Future California hydroelectric power contract holder activities may include: • Execution, administration, and operation of extended, renewed, new, or additional contracts for hydroelectric power from hydroelectric facilities at Hoover Dam, Davis Dam, Parker Dam, Headgate Rock Dam, Siphon Drop Power Plant, and Pilot Knob Power Plant							Non-Federal Flow-Related Covered Activities are included in the Federal Flow-Related Covered Actions and Accomplishments (see Appendix B, Table B-1).
2.3.3 Ongoing Non-Flow-Related Activities	Operation, maintenance, and replacement of: • The facilities and equipment through which water is diverted and conveyed • The facilities through which return flows are returned to the river	4 6	Palo Verde Irrigation District Bard Water District	---	---	---	1 and 3 1 and 3	

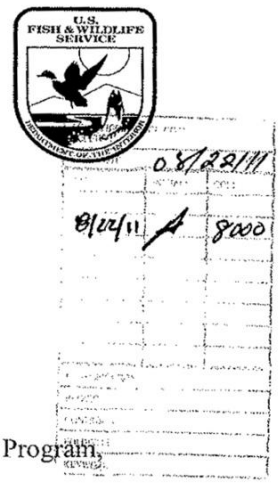
	• The facilities and equipment through which electric power is generated and transmitted • The appurtenant works that support these facilities, including access and service roads, electric power and communication transmission lines and substations, docks, boat ramps, and bankline protection							
2.4 NEVADA								
2.4.1 Ongoing Flow-Related Covered Activities[1] (page 2-15)	• Diversion of up to 0.3 maf of Nevada's full annual entitlement, plus surplus flows, plus Nevada's share of any unused apportionment, plus volume of return flows, as applicable • Generation and transmission of hydroelectric power • Power contracting							Non-Federal Flow-Related Covered Activities are included in the Federal Flow-Related Covered Actions and Accomplishments (see Appendix B, Table B-1).
2.4.2 Future Flow-Related Covered Activities[1] (page 2-17)	Future Nevada water contract holder activities may include: • Diversions, discharges, and return flows through existing facilities • Changes to points of diversion • New points of diversion • Interstate water banking • Water marketing • Water transfers • Any other actions as made possible from any future agreements and/or measures taken by the Colorado River Commission of Nevada or contract holder(s) Future Nevada hydroelectric power contract holder activities may include: • Execution, administration, and operation of extended, renewed, new, or additional contracts for hydroelectric power from hydroelectric facilities at Hoover Dam, Davis Dam, Parker Dam, and Headgate Rock Dam							Non-Federal Flow-Related Covered Activities are included in the Federal Flow-Related Covered Actions and Accomplishments (see Appendix B, Table B-1).

2.4.3 Ongoing Non-Flow-Related Activities (page 2-18)	Operation, maintenance, and replacement of: • The facilities and equipment through which water is diverted and conveyed • The facilities through which return flows are returned to the river • The facilities and equipment through which electric power is generated and transmitted • The appurtenant works that support these facilities, including access and service roads, electric power and communication transmission lines and substations, docks, boat ramps, and bankline protection							No implementation in FY11.
2.4.3.1 Nevada Department of Wildlife Programs and Activities (page 2-18)	Implementation of select Federally funded: • Aquatic, wetland, and riparian habitat maintenance and restoration activities	---	---	---	---	---	---	A total of 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.
	• Aquatic, wetland, and riparian revegetation enhancement activities	---	---	---	---	---	---	No implementation in FY11.
	• Place and maintain aids to navigation and boating access	3	Clark County, downstream of Davis Dam	257.5 - 275.0	None	0	1 and 3	Performed routine maintenance and inspection of aids to navigation.
	• Administer law enforcement and boating safety program using watercraft patrols	1 and 2	---	Lake Mead - 275.0	None	0	1 and 3	Conducted routine law enforcement patrols on Lake Mead, Lake Mohave, mainstem of LCR below Davis Dam, and limited patrol activities in Laughlin Lagoon.

[1] See *LCR MSCP Habitat Conservation Plan*, section 2.1.1, Relationship of Non-Federal Covered Activities to Federal Nondiscretionary Actions. This can be accessed at http://www.lcrmscp.gov/publications/VolumeII.pdf.

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



In reply refer to:
AESO/SE
22410-2004-F-0161

August 18, 2011

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 2010 Accomplishment Report and Consistency Review of Fiscal Year 2012 Work Plan and Budget

This responds to your memorandum of July 8, 2011, requesting review by the Fish and Wildlife Service (FWS) of the combined document containing the Fiscal Year 2010 Accomplishment Report and the Fiscal Year 2012 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 2010 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 2010 covered by the LCR MSCP (October 1, 2009-September 31, 2010), 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.

We understand that the LCR MSCP partners are working together to develop the means to initiate the Remedial Measures Fund as described in section 5.12.3 of the Habitat Conservation Plan. Having this funding in place during the early years of the implementation of the LCR MSCP will enable Reclamation to have more flexibility to implement annual work plans in the event of a changed circumstance, since funding for normally scheduled annual work projects would be less disrupted if remedial measures were needed. Further, the FWS appreciates the

efforts of the partners to develop this fund in the coming years as it provides greater certainty that remedial measures can be implemented in a timely manner if such are needed.

Also contained in the Accomplishment Report is an accounting of funds expended by Reclamation and project proponents during Fiscal Year 2010 that would be credited to the cost of LCR MSCP implementation. The FWS concurs with the amount of $8,121,670.47 for a credit to Reclamation against future expenditures. We also understand that Reclamation intends to start using their credits in FY13.

The Fiscal Year 2012 Work Plan and Budget contains the work tasks and estimated costs for LCR MSCP implementation during Fiscal Year 2012 beginning on October 1, 2011. 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.

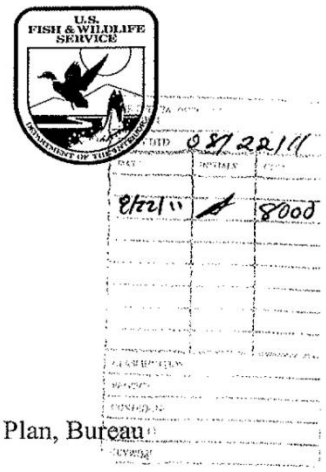
Steven L. Spangle

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 10-12 Concurrence.docx:cgg

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 18, 2011

Memorandum

To: Program Manager, Lower Colorado River Multi-Species Conservation Plan, Bureau of Reclamation, Boulder City, Nevada (LC-8451)

From: Field Supervisor

Subject: Completion of Conservation Measure DET01 under the LCR MSCP for the Desert Tortoise, Riverside County, California

This memorandum responds to your July 21, 2011, request for Fish and Wildlife Service (FWS) concurrence with the completion of the requirement under DET01 to acquire, protect, and transfer 230 acres of unprotected, occupied desert tortoise habitat to offset effects of the proposed actions covered under the LCR MSCP.

The material provided with your request documents that the Bureau of Reclamation (Reclamation) has purchased 260 acres of private land within the Bureau of Land Management's (BLM's) Chuckwalla Desert Wildlife Area (DWA) of the Chuckwalla Bench Area of Critical Environmental Concern and title to these properties was transferred to the BLM. The BLM manages the public lands within the DWA to protect resource values and habitat for Federally-listed plant and animal species such as the desert tortoise.

The FWS concurs with Reclamation that the acquisition of this 260 acres and its transfer to BLM for long-term management for desert tortoises meets the requirements of DET01 in the LCR MSCP. Reclamation should document the completion of this conservation action in the appropriate annual report for LCR MSCP covered activities.

We congratulate Reclamation and the other LCR MSCP partners on this accomplishment. The LCR MSCP has accomplished significant conservation benefits in the six years since it was signed in 2005. We look forward to our continuing involvement with this important program. If there are other questions, or we may assist in any way, please contact Ms. Lesley Fitzpatrick of my staff at (602) 242-0210 (x236) or me (x244).

Steven L. Spangle

cc: Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ

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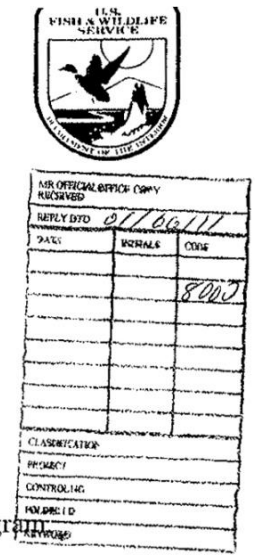
United States Department of the Interior
U.S. Fish and Wildlife Service
Arizona Ecological Services Office
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
Telephone: (602) 242-0210 Fax: (602) 242-2513



In reply refer to:

AESO/SE
22410-2004-F-0161

January 4, 2011

Memorandum

To: Program Manager, Lower Colorado River Multi-Species Conservation Program, Bureau of Reclamation, Boulder City, Nevada (LC-8000)

From: Field Supervisor

Subject: Request for Approval of Minor Modifications to the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) Habitat Conservation Plan (HCP)

This responds to your memorandum of December 7, 2010, requesting review by the Fish and Wildlife Service (FWS) of five Program Decision Documents (PDD) from the LCR MSCP Steering Committee containing minor modifications to the conservation actions for razorback sucker (RASU3) in PDD 11-002, bonytail (BONY3) in PDD 11-003, BLRA1 in PDD 11-004, sticky buckwheat (STBU1) in PDD 11-005, and threecorner milkvetch (THMI1) in PDD 11-006.

I have reviewed the proposed modifications and believe these minor changes do not alter the amount or intent of the subject conservation measures, and will assist in providing for the delivery of appropriate conservation for these five species. These changes are consistent with the adaptive-management principles upon which the LCR MSCP is founded. I approve these modifications.

Thank you for your continued efforts to ensure that the LCR MSCP functions as a stellar example of a successful HCP; providing benefits to the covered species, increasing the knowledge base for riparian restoration efforts applicable to other programs, and meeting the water and power needs of the partners. We appreciate the close working relationship between you and Ms. Lesley Fitzpatrick of my staff that contributes to the success of the program. If you have any questions concerning this approval, please contact Ms. Fitzpatrick at (602) 242-0210 x 236 or me at x244.

Steven L. Spangle

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES: Marty Tuegel)
Lower Colorado River Coordinator, Fish and Wildlife Service, Phoenix, AZ

W:\Lesley Fitzpatrick\LCR MSCP 2010 Minor Mods.docx: jkey

Appendix D. Financial Statement

D-1. Required Contributions

	FY06	FY07	FY08	FY09	FY10	Subtotal
Reclamation						
Cash	6,072,381.00	6,291,054.00	6,655,509.00	6,784,470.00	7,255,458.00	33,058,872.00
Total	**6,072,381.00**	**6,291,054.00**	**6,655,509.00**	**6,784,470.00**	**7,255,458.00**	**33,058,872.00**
Arizona						
Cash	471,863.10	488,855.40	517,175.90	866,420.50	926,568.70	3,270,883.60
Habitat Maintenance	135,375.00	140,250.00	148,375.00	151,250.00	161,750.00	737,000.00
Total	**607,238.10**	**629,105.40**	**665,550.90**	**1,017,670.50**	**1,088,318.70**	**4,007,883.60**
Nevada						
Cash	1,838,148.82	1,904,342.55	2,014,665.43	1,884,091.00	1,578,887.40	9,220,135.20
Habitat Maintenance	135,375.00	140,250.00	148,375.00	151,250.00	161,750.00	737,000.00
In-Kind Credit	0	0	0	0	436,000.00	436,000.00
Total	**1,973,523.82**	**2,044,592.55**	**2,163,040.43**	**2,035,341.00**	**2,176,637.40**	**10,393,135.20**
California						
Cash	**3,220,869.08**	**3,336,856.05**	**3,530,167.67**	**3,266,131.22**	**3,492,870.91**	**16,846,894.93**
MWD	1,887,361.54	1,955,327.46	2,068,604.00	1,939,074.72	2,073,688.19	9,924,055.91
IID	500,971.43	519,011.96	549,079.48	559,718.78	598,575.29	2,727,356.94
CVWD	273,257.15	283,097.43	299,497.92	305,301.15	326,495.61	1,487,649.26
LADWP	154,845.72	160,421.88	169,715.48	173,003.99	185,014.18	843,001.25
SDCWA	145,737.14	150,985.30	159,732.19	0	0	456,454.63
PVID	122,067.53	126,463.31	133,789.60	136,382.00	145,849.84	664,552.28
SCPPA	63,760.00	66,056.07	69,882.84	71,236.94	76,182.31	347,118.16
SCE	54,651.43	56,619.49	59,899.60	61,060.23	65,299.11	297,529.86
Bard	6,072.38	6,291.05	6,655.52	6,784.47	7,255.46	33,058.88
CRBC	6,072.38	6,291.05	6,655.52	6,784.47	7,255.46	33,058.88
Needles	6,072.38	6,291.05	6,655.52	6,784.47	7,255.46	33,058.88
Funding Credit						
SDCWA	**0**	**0**	**0**	**162,827.28**	**174,130.99**	**336,958.27**
MWD	**0**	**0**	**0**	**0**	**0**	**0**
Habitat Maintenance	**270,750.00**	**280,500.00**	**296,750.00**	**302,500.00**	**323,500.00**	**1,474,000.00**
Total	**3,491,619.08**	**3,617,356.05**	**3,826,917.67**	**3,731,458.50**	**3,990,501.90**	**18,657,853.20**
TOTAL	**12,144,762.00**	**12,582,108.00**	**13,311,018.00**	**13,568,940.00**	**14,510,916.00**	**66,117,744.00**

	FY11	Total
Reclamation		
Cash	16,400.070.00	49,458,942.00
Total	16,400.070.00	49,458,942.00
Arizona		
Cash	1,120,135.50	4,391,019.10
Habitat Maintenance	1,339,875.00	2,076,875.00
Total	**2,460,010.50**	**6,467,894.10**
Nevada		
Cash	3,144,146.00	12,364,281.20
Habitat Maintenance	1,339,875.00	2,076,875.00
In-Kind Credit	436,000.00	872,000.00
Total	**4,920,021.00**	**15,313,156.20**
California		
Cash	**5,333,036.34**	**22,179,931.27**
MWD	2,320,583.58	12,244,639.49
IID	1,353,005.78	4,080,362.72
CVWD	738,003.15	2,225,652.41
LADWP	418,201.78	1,261,203.03
SDCWA	0	456,454.63
PVID	134,240.47	798,792.75
SCPPA	172,200.74	519,318.90
SCE	147,600.63	445,130.49
Bard	16,400.07	49,458.95
CRBC	16,400.07	49,458.95
Needles	16,400.07	49,458.95
Funding Credit		
SDCWA	**393,601.68**	**730,559.95**
MWD	**613,650.48**	**613,650.48**
Habitat Maintenance	**5,359,500.00**	**6,833,500.00**
Total	**9,020,038.50**	**27,677,891.70**
TOTAL	**32,800,140.00**	**98,917,884.00**

D-2. Funding Credits

San Diego County Water Authority:

Credits Earned

FY	Credits Earned	Composite i	2003 Dollars	Total 2003 Dollars
2005	145,737.14	1.019	143,019.76	143,019.76
2006	500,000	1.083	461,680.51	604,700.27
2007	250,000	1.122	222,816.39	827,516.66
2008	3,298,069.94	1.187	2,778,491.95	3,606,008.61

Credits Used

FY	Total 2003 Credits Available	2003 Credits Used	Composite i	Current Year Credits
2009	3,606,008.61	134,568.00	1.210	162,827.28
2010	3,471,440.61	134,568.00	1.294	174,130.99
2011	3,336,872.61	330,480.00	1.191	393,601.68
2012	3,006,392.61			

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

Credits Used

FY	Total 2003 Credits Available	2003 Credits Used	Composite i	Current Year Credits
2011	1,545,719.10	515,239.70	1.191	613,650.48
2012	1,030,479.40			

Bureau of Reclamation:

Credits Earned

FY	Credits Earned*	Composite i	2003 Dollars	Total 2003 Dollars
2004	1,559,739.07	1.000	1,559,739.07	1,559,739.07
2005	4,112,477.11	1.019	4,035,796.97	5,595,536.04
2006	0	1.083	0	5,595,536.04
2007	1,314,455.02	1.122	1,171,528.54	6,767,064.58
2008	0	1.187	0	6,767,064.58
2009	1,833,416.80	1.210	1,515,220.50	8,282,285.08
2010	4,335,477.54	1.294	3,350,446.32	11,632,731.40
2011	796,149.37	1.191	668,471.34	12,301,202.74

*Revised based on expenditures.

D-3. Funding Accounts

Habitat Maintenance Fund:

Contributions

FY	Required 2003 Dollars	Additional 2003 Dollars	Composite i	Total Current Year Dollars	Cumulative*
2006	$500,000		1.083	$541,500	$541,500
2007	$500,000		1.122	$561,000	$1,102,500
2008	$500,000		1.187	$593,500	$1,696,000
2009	$500,000		1.210	$605,000	$2,301,000
2010	$500,000		1.294	$647,000	$2,948,000
2011	$4,500,000		1.191	$5,359,500	$8,307,500
2012	$4,500,000		1.210	$5,445,000	$13,752,500
2013	$4,500,000	$1,463,549.16	1.251	$7,460,400	$21,212,900
2014	$4,500,000				
2015	$3,036,450.84				

*Does not include interest earned.

Remedial Measures Fund:

Contributions

FY	Required 2003 Dollars	Additional 2003 Dollars	Composite i	Total Current Year Dollars	Cumulative*
2011	$266,000				
2012	$266,000				
2013	$266,000		1.251	$998,298	$998,298
2014	$266,000				
2015	$266,000				

*Does not include interest earned.

Land and Water Fund:

FY	Current Year Contributions	Cumulative Contributions
2011	$8,900,000	$8,900,000
2012	$4,600,000	$13,500,000

D-4. Program Accomplishment

Work Task New/Old	2004 Obligations	2004 Expenditures	2005 Obligations	2005 Expenditures	Subtotal Expenditures
A1	$0.00	$0.00	$421,740.74	$403,953.57	$403,953.57
Total A	**$0.00**	**$0.00**	**$421,740.74**	**$403,953.57**	**$403,953.57**
B1/A3*	$55,223.00	$55,223.00	$115,645.72	$115,645.72	$170,868.72
B2	$0.00	$0.00	$155,810.60	$145,568.04	$145,568.04
B3/A1*	$200,000.00	$0.00	$0.00	$14,527.30	$14,527.30
B4	$0.00	$0.00	$100,000.00	$9,857.95	$9,857.95
B5	$0.00	$0.00	$108.50	$40,720.81	$40,720.81
B6	$0.00	$0.00	$25,878.76	$25,878.76	$25,878.76
B7	$0.00	$0.00	$186,003.61	$186,003.61	$186,003.61
B8/A2*	$54,762.00	$54,762.00	$70,030.00	$70,030.00	$124,792.00
B9	$0.00	$0.00	$3,073.11	$3,073.11	$3,073.11
B10	$0.00	$0.00	$0.00	$0.00	$0.00
B11	$0.00	$0.00	$0.00	$0.00	$0.00
Total B	**$309,985.00**	**$109,985.00**	**$656,550.30**	**$611,305.30**	**$721,290.30**
C1	$0.00	$0.00	$45,276.00	$45,276.00	$45,276.00
C2	$0.00	$0.00	$0.00	$0.00	$0.00
C3	$0.00	$0.00	$0.00	$0.00	$0.00
C4	$0.00	$0.00	$0.00	$0.00	$0.00
C5	$0.00	$0.00	$0.00	$0.00	$0.00
C6	$0.00	$0.00	$0.00	$0.00	$0.00
C7	$0.00	$0.00	$0.00	$0.00	$0.00
C8	$0.00	$0.00	$177,053.00	$136,060.00	$136,060.00
C9	$0.00	$0.00	$43,816.00	$43,816.00	$43,816.00
C10	$0.00	$0.00	$0.00	$0.00	$0.00
C11	$0.00	$0.00	$0.00	$0.00	$0.00
C12	$0.00	$0.00	$0.00	$0.00	$0.00

Work Task New/Old	2004 Obligations	2004 Expenditures	2005 Obligations	2005 Expenditures	Subtotal Expenditures
C13	$0.00	$0.00	$99,996.80	$99,996.80	$99,996.80
C14	$0.00	$0.00	$0.00	$0.00	$0.00
C15	$0.00	$0.00	$22,255.00	$22,255.00	$22,255.00
C16	$0.00	$0.00	$0.00	$0.00	$0.00
C17	$0.00	$0.00	$45,000.00	$9,750.00	$9,750.00
C18	$0.00	$0.00	$41,981.82	$41,981.82	$41,981.82
C19	$0.00	$0.00	$0.00	$0.00	$0.00
C20/B2*	$64,011.00	$0.00	$53,779.96	$53,779.96	$53,779.96
C21	$0.00	$0.00	$95,534.00	$70,000.00	$70,000.00
C22	$0.00	$0.00	$48,096.00	$0.00	$0.00
C23	$0.00	$0.00	$0.00	$0.00	$0.00
C24	$0.00	$0.00	$0.00	$0.00	$0.00
C25	$0.00	$0.00	$0.00	$0.00	$0.00
C26	$0.00	$0.00	$0.00	$0.00	$0.00
C27	$0.00	$0.00	$0.00	$0.00	$0.00
C28	$0.00	$0.00	$0.00	$0.00	$0.00
C29	$0.00	$0.00	$0.00	$0.00	$0.00
C30	$0.00	$0.00	$0.00	$0.00	$0.00
C31	$0.00	$0.00	$0.00	$0.00	$0.00
C32	$0.00	$0.00	$0.00	$0.00	$0.00
C33	$0.00	$0.00	$0.00	$0.00	$0.00
C34	$0.00	$0.00	$0.00	$0.00	$0.00
C35	$0.00	$0.00	$0.00	$0.00	$0.00
C36	$0.00	$0.00	$0.00	$0.00	$0.00
C37	$0.00	$0.00	$0.00	$0.00	$0.00
C38	$0.00	$0.00	$0.00	$0.00	$0.00
C39	$0.00	$0.00	$0.00	$0.00	$0.00
C40	$0.00	$0.00	$0.00	$0.00	$0.00

Work Task New/Old	2004 Obligations	2004 Expenditures	2005 Obligations	2005 Expenditures	Subtotal Expenditures
C41	$0.00	$0.00	$0.00	$0.00	$0.00
C42	$0.00	$0.00	$0.00	$0.00	$0.00
C43	$0.00	$0.00	$0.00	$0.00	$0.00
C44	$0.00	$0.00	$0.00	$0.00	$0.00
C45	$0.00	$0.00	$0.00	$0.00	$0.00
C46	$0.00	$0.00	$0.00	$0.00	$0.00
C47	$0.00	$0.00	$0.00	$0.00	$0.00
C48	$0.00	$0.00	$0.00	$0.00	$0.00
C49	$0.00	$0.00	$0.00	$0.00	$0.00
C50	$0.00	$0.00	$0.00	$0.00	$0.00
Total C	**$64,011.00**	**$0.00**	**$672,788.58**	**$522,915.58**	**$522,915.58**
D1	$0.00	$0.00	$29,367.09	$29,367.09	$29,367.09
D2	$0.00	$0.00	$750,000.00	$370,174.62	$370,174.62
D3	$0.00	$0.00	$0.00	$0.00	$0.00
D4	$0.00	$0.00	$60,520.00	$60,520.00	$60,520.00
D5	$0.00	$0.00	$247,118.33	$247,118.33	$247,118.33
D6	$0.00	$0.00	$0.00	$0.00	$0.00
D7	$0.00	$0.00	$0.00	$0.00	$0.00
D8	$0.00	$0.00	$134,246.08	$134,246.08	$134,246.08
D9/B1*	$55,000.00	$0.00	$0.00	$0.00	$0.00
D10	$0.00	$0.00	$0.00	$0.00	$0.00
D11/C1*	$400,000.00	$168,133.36	$341,866.45	$100,963.76	$269,097.12
D12	$0.00	$0.00	$0.00	$0.00	$0.00
Total D	**$455,000.00**	**$168,133.36**	**$1,563,117.95**	**$942,389.88**	**$1,110,523.24**
E1/D1*	$1,077,729.33	$835,629.33	$348,991.39	$388,028.39	$1,223,657.72
E2	$0.00	$0.00	$147,333.85	$147,333.85	$147,333.85
E3/D4*	$1,037,791.00	$400,290.00	$31,268.45	$83,721.77	$484,011.77
E4	$0.00	$0.00	$17,278.54	$17,278.54	$17,278.54

Work Task New/Old	2004 Obligations	2004 Expenditures	2005 Obligations	2005 Expenditures	Subtotal Expenditures
E5	$0.00	$0.00	$80,058.95	$100,548.43	$100,548.43
E6/D3*	$110,004.00	$0.00	$109,927.52	$79,586.39	$79,586.39
E7	$0.00	$0.00	$370,437.68	$312,199.68	$312,199.68
E8	$0.00	$0.00	$1,035.50	$1,035.50	$1,035.50
E9	$0.00	$0.00	$53,320.19	$53,320.19	$53,320.19
E10	$0.00	$0.00	$0.00	$0.00	$0.00
E11	$0.00	$0.00	$0.00	$0.00	$0.00
E12/D5*	$6,673.38	$6,673.38	$70,893.38	$25,754.05	$32,427.43
E13	$0.00	$0.00	$48,482.00	$25,912.33	$25,912.33
E14	$0.00	$0.00	$84,309.07	$84,309.07	$84,309.07
E15	$0.00	$0.00	$0.00	$0.00	$0.00
E16	$0.00	$0.00	$134,814.86	$5,392.59	$5,392.59
E17	$0.00	$0.00	$0.00	$0.00	$0.00
E18	$0.00	$0.00	$0.00	$0.00	$0.00
E19	$0.00	$0.00	$0.00	$0.00	$0.00
E20/D2*	$95,000.00	$35,000.00	$0.00	$0.00	$35,000.00
E21	$0.00	$0.00	$19,729.97	$19,739.97	$19,739.97
E22/D6*	$5,088.00	$4,028.00	$0.00	$0.00	$4,028.00
E23	$0.00	$0.00	$0.00	$0.00	$0.00
E24	$0.00	$0.00	$0.00	$0.00	$0.00
E25	$0.00	$0.00	$0.00	$0.00	$0.00
E25 In-Kind	$0.00	$0.00	$0.00	$0.00	$0.00
E26	$0.00	$0.00	$0.00	$0.00	$0.00
E27	$0.00	$0.00	$0.00	$0.00	$0.00
E28	$0.00	$0.00	$0.00	$0.00	$0.00
E29	$0.00	$0.00	$0.00	$0.00	$0.00
E30	$0.00	$0.00	$0.00	$0.00	$0.00
E31	$0.00	$0.00	$0.00	$0.00	$0.00

Work Task New/Old	2004 Obligations	2004 Expenditures	2005 Obligations	2005 Expenditures	Subtotal Expenditures
Total E	**$2,332,285.71**	**$1,281,620.71**	**$1,517,881.35**	**$1,344,160.75**	**$2,625,781.46**
F1	$0.00	$0.00	$199,492.67	$199,492.67	$199,492.67
F2	$0.00	$0.00	$65,235.81	$65,235.81	$65,235.81
F3	$0.00	$0.00	$23,023.55	$23,023.55	$23,023.55
F4	$0.00	$0.00	$0.00	$0.00	$0.00
F5	$0.00	$0.00	$0.00	$0.00	$0.00
F6	$0.00	$0.00	$0.00	$0.00	$0.00
F7	$0.00	$0.00	$0.00	$0.00	$0.00
Total F	**$0.00**	**$0.00**	**$287,752.03**	**$287,752.03**	**$287,752.03**
G1/C2*	$235,000.00	$0.00	$0.00	$0.00	$0.00
G2	$0.00	$0.00	$0.00	$0.00	$0.00
G3	$0.00	$0.00	$0.00	$0.00	$0.00
G4	$0.00	$0.00	$0.00	$0.00	$0.00
G5	$0.00	$0.00	$0.00	$0.00	$0.00
Total G	**$235,000.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
H1	$0.00	$0.00	$0.00	$0.00	$0.00
H2	$0.00	$0.00	$0.00	$0.00	$0.00
Total H	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
I1	$0.00	$0.00	$0.00	$0.00	$0.00
Total I	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Grand Totals	**$3,396,281.71**	**$1,559,739.07**	**$5,119,830.95**	**$4,112,477.11**	**$5,672,216.18**

*FY04 Work Task numbers were revised in FY05.

Work Task	2006 Obligations	2006 Expenditures	2007 Obligations	2007 Expenditures	2008 Obligations	2008 Expenditures	2009 Obligations	2009 Expenditures	2010 Obligations	2010 Expenditures	Subtotal Expenditures
A1	$1,120,653.36	$1,138,440.53	$1,052,867.52	$1,037,492.71	$965,660.35	$965,660.35	$1,052,853.25	$1,052,853.25	$1,296,959.74	$1,255,046.41	$5,449,493.25
Total A	**$1,120,653.36**	**$1,138,440.53**	**$1,052,867.52**	**$1,037,492.71**	**$965,660.35**	**$965,660.35**	**$1,052,853.25**	**$1,052,853.25**	**$1,296,959.74**	**$1,255,046.41**	**$5,449,493.25**
B1	$222,390.86	$216,316.31	$227,440.83	$246,686.92	$149,085.82	$144,764.64	$206,001.63	$223,658.88	$234,965.09	$234,965.09	$1,066,391.84
B2	$206,485.90	$206,485.90	$233,348.47	$149,191.21	$334,013.77	$330,768.94	$503,628.30	$417,210.83	$352,255.56	$555,904.57	$1,659,561.45
B3	$13,190.17	$13,190.17	$41,588.73	$41,588.73	$102,288.46	$77,288.46	$169,669.00	$179,239.39	$95,522.93	$106,304.52	$417,611.27
B4	$127,627.57	$54,248.17	$117,698.86	$174,269.47	$140,519.61	$86,110.71	$229,364.46	$212,292.78	$269,833.73	$318,418.43	$845,339.56
B5	$176,017.60	$121,570.05	$301,359.83	$95,138.87	$303,301.12	$186,455.13	$259,449.57	$231,055.42	$351,957.84	$481,429.95	$1,115,649.42
B6	$101,713.03	$36,713.03	$20,654.33	$50,255.33	$48,190.46	$10,897.25	$31,769.89	$59,462.10	$41,521.10	$77,031.09	$234,358.80
B7	$205,640.44	$167,528.16	$136,000.40	$171,075.40	$173,950.09	$173,950.09	$185,238.41	$185,238.41	$165,056.32	$165,056.32	$862,848.38
B8	$50,869.73	$50,869.73	$46,711.07	$46,711.07	$66,890.83	$66,890.83	$73,421.00	$26,111.00	$78,710.75	$126,020.75	$316,603.38
B9	$570.14	$570.14	-$36.00	-$36.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$534.14
B10	$57,122.00	$0.00	$260,000.00	$147,305.11	$74,191.86	$126,084.93	$89,956.67	$122,880.49	$70,053.15	$140,878.20	$537,148.73
B11	$39,704.30	$39,704.30	$67,010.31	$2,010.31	$16,879.79	$28,895.98	$119,439.72	$47,327.37	$53,930.37	$132,727.00	$250,664.96
Total B	**$1,201,331.74**	**$907,195.96**	**$1,451,776.83**	**$1,124,196.42**	**$1,409,311.81**	**$1,232,106.96**	**$1,867,938.65**	**$1,704,476.67**	**$1,713,806.84**	**$2,338,735.92**	**$7,306,711.93**
C1	$73,525.15	$72,382.15	$0.00	$29,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$101,382.15
C2	$10,000.00	$0.00	$10,000.00	$0.00	$10,000.00	$20,000.00	$10,000.00	$20,000.00	$10,000.00	$10,000.00	$50,000.00
C3	$161,445.47	$161,445.47	$34,848.11	$34,848.11	$4,637.56	$4,637.56	$11,547.48	$11,547.48	$13,285.36	$13,285.36	$225,763.98
C4	$14,128.53	$4,128.53	$11,780.56	$1,780.56	$12,667.29	$22,667.29	$15,557.23	$25,557.23	$11,532.14	$10,648.80	$64,782.41
C5	$8,583.92	$8,583.92	$47,425.58	$47,425.58	$82,971.14	$82,971.14	$83,428.78	$83,428.78	$97,189.14	$97,189.14	$319,598.56
C6	$76,875.35	$76,875.35	$26,676.33	$26,676.33	-$2,110.00	-$2,110.00	$0.00	$0.00	$0.00	$0.00	$101,441.68
C7	$189,789.41	$68,121.58	$80,818.40	$102,387.02	$88,573.21	$148,829.53	$129,403.53	$110,818.42	$58,380.22	$116,808.22	$546,964.77
C8	$187,973.54	$108,932.54	$180,751.80	$157,708.80	$190,297.91	$142,918.10	$23,606.34	$39,115.60	-$4,417.26	-$4,417.26	$444,257.78
C9	$30,253.86	$5,828.86	$38,785.76	$63,210.76	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$69,039.62
C10	$63,519.00	$47,365.78	$106,382.73	$116,382.73	$159,000.24	$156,041.84	$132,905.58	$51,983.16	$127,882.41	$204,288.36	$576,061.87
C11	$95,301.06	$44,091.06	$142,660.83	$147,083.82	$128,801.82	$121,895.64	$135,376.13	$98,043.33	$160,883.55	$137,378.89	$548,492.74
C12	$173,576.33	$122,584.33	$184,685.94	$155,160.86	$174,728.02	$155,237.02	$184,842.91	$209,012.49	$216,432.73	$171,572.67	$813,567.37

Work Task	2006 Obligations	2006 Expenditures	2007 Obligations	2007 Expenditures	2008 Obligations	2008 Expenditures	2009 Obligations	2009 Expenditures	2010 Obligations	2010 Expenditures	Subtotal Expenditures
C13	$265,621.17	$160,471.22	$302,066.02	$325,075.86	$147,816.23	$170,683.76	$149,876.40	$209,148.98	$341,670.90	$266,310.38	$1,131,690.20
C14	$38,229.17	$8,229.17	$67.52	$67.52	$0.00	$0.00	$65,136.31	$13,360.30	$67,997.50	$63,679.95	$85,336.94
C15	$98,025.48	$98,025.48	$92,892.96	$92,892.96	$81,892.97	$81,892.97	$80,882.78	$80,882.78	$96,551.48	$96,551.48	$450,245.67
C16	$0.00	$0.00	$55,332.60	$18,882.60	$0.00	$36,450.00	$0.00	$0.00	$0.00	$0.00	$55,332.60
C17	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C18	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C19	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C20	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C21	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C22	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C23	$0.00	$0.00	$138,945.21	$138,945.21	$148,207.26	$143,751.26	$70,985.95	$74,129.95	$0.00	$0.00	$356,826.42
C24	$0.00	$0.00	$0.00	$0.00	$86,935.13	$86,935.13	$377,198.25	$281,820.73	$165,079.12	$250,183.33	$618,939.19
C25	$0.00	$0.00	$0.00	$0.00	$210,841.42	$129,741.75	$228,412.27	$216,650.06	$213,756.65	$245,692.99	$592,084.80
C26	$0.00	$0.00	$0.00	$0.00	$621.85	$621.85	$74,709.00	-$291.00	$82,395.92	$49,780.55	$50,111.40
C27	$0.00	$0.00	$0.00	$0.00	$93,190.68	$39,734.64	$110,074.68	$147,061.35	$57,914.14	$71,248.65	$258,044.64
C28	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$130,739.27	$68,885.22	$26,392.77	$52,670.45	$121,555.67
C29	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$80,464.99	$80,464.99	$126,061.29	$26,061.29	$106,526.28
C30	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$94,554.39	$59,880.30	$77,335.50	$93,241.41	$153,121.71
C31	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$103,693.22	$66,655.68	$100,903.63	$73,863.03	$140,518.71
C32	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$87,893.04	$87,893.04	$85,228.77	$85,228.77	$173,121.81
C33	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$205,229.84	$5,229.84	$70,817.31	$75,956.21	$81,186.05
C34	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$42,196.13	$42,196.13	$69,518.18	$69,518.18	$111,714.31
C35	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$33,949.46	$10,688.46	$10,688.46
C36	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$21,836.95	$93,004.96	$93,004.96
C37	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$266,477.27	$113,822.56	$113,822.56
C38	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$6,250.70	$6,250.70	$6,250.70
C39	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$251,804.17	$170,403.17	$170,403.17

Work Task	2006 Obligations	2006 Expenditures	2007 Obligations	2007 Expenditures	2008 Obligations	2008 Expenditures	2009 Obligations	2009 Expenditures	2010 Obligations	2010 Expenditures	Subtotal Expenditures
C40	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$71,936.76	$2,106.76	$2,106.76
C41	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$5,885.67	$5,885.67	$5,885.67
C42	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$49,236.73	$49,236.73	$49,236.73
C43	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C44	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C45	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C46	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C47	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C48	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C49	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
C50	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total C	**$1,486,847.44**	**$987,065.44**	**$1,454,120.35**	**$1,457,528.72**	**$1,619,072.73**	**$1,542,899.48**	**$2,628,714.50**	**$2,083,474.84**	**$2,980,169.16**	**$2,728,139.86**	**$8,799,108.34**
D1	$44,997.82	$44,997.82	$18,766.77	$18,766.77	$20,146.27	$20,146.27	$27,400.01	$27,400.01	$18,997.38	$18,997.38	$130,308.25
D2	$848,505.45	$708,099.72	$915,330.65	$711,050.40	$621,896.84	$907,303.29	$1,274,835.64	$556,069.59	$152,316.08	$719,637.66	$3,602,160.66
D3	$74,346.50	$25,199.42	$72,362.72	$78,829.48	$81,286.79	$69,400.31	$222,500.41	$140,793.91	$104,750.84	$113,389.00	$427,612.12
D4	$66,045.80	$3,058.80	$71,104.98	$111,368.21	$75,233.41	$61,170.52	$780.62	$24,973.85	$0.00	$0.00	$200,571.38
D5	$245,205.41	$245,205.41	$238,487.89	$238,487.89	$254,903.38	$254,903.38	$282,279.28	$282,279.28	$224,813.84	$224,813.84	$1,245,689.80
D6	$158,961.43	$58,961.43	$177,773.39	$192,511.07	$124,050.07	$166,931.67	$300,988.48	$148,813.20	$226,354.82	$194,266.82	$761,484.19
D7	$454,775.02	$166,600.05	$450,164.71	$463,095.44	$526,687.60	$710,350.15	$526,939.86	$447,287.78	$548,459.47	$521,922.72	$2,309,256.14
D8	$310,623.73	$302,623.73	$332,620.94	$340,620.94	$339,719.60	$339,719.60	$469,412.71	$469,412.71	$676,835.76	$636,835.76	$2,089,212.74
D9	$99,886.92	$33,254.92	$89,831.54	$79,684.54	$101,177.29	$40,618.43	$139,417.88	$153,474.97	$162,881.50	$169,968.27	$477,001.13
D10	$18,977.01	$18,977.01	$27,483.85	$12,118.85	$5,369.81	$20,734.81	$0.00	$0.00	$0.00	$0.00	$51,830.67
D11	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
D12	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$12,886.12	$7,730.12	$7,730.12
Total D	**$2,322,325.09**	**$1,606,978.31**	**$2,393,927.44**	**$2,246,533.59**	**$2,150,471.06**	**$2,591,278.43**	**$3,244,554.89**	**$2,250,505.30**	**$2,128,295.81**	**$2,607,561.57**	**$11,302,857.20**
E1	$273,378.20	$240,612.20	$230,237.45	$181,081.26	$120,026.35	$115,480.80	$195,931.36	$197,716.08	$204,821.21	$213,790.05	$948,680.39
E2	$270,978.22	$238,212.22	$0.00	$0.00	$26,446.69	$95,003.21	$86,242.83	$68,373.83	$91,981.79	$106,416.04	$508,005.30

Work Task	2006 Obligations	2006 Expenditures	2007 Obligations	2007 Expenditures	2008 Obligations	2008 Expenditures	2009 Obligations	2009 Expenditures	2010 Obligations	2010 Expenditures	Subtotal Expenditures
E3	$53,581.02	$53,581.02	$94,430.60	$94,430.60	$65,565.30	$65,565.30	$97,370.14	$96,480.04	$17,434.18	$15,805.84	$325,862.80
E4	$590,485.99	$275,398.70	$782,488.02	$706,458.13	$828,982.19	$662,454.83	$1,349,593.46	$952,890.91	$1,553,565.67	$1,355,331.31	$3,952,533.88
E5	$1,292,930.68	$843,994.77	$3,322,086.06	$997,606.83	$3,611,928.60	$3,207,890.57	$789,905.06	$3,373,478.92	$770,765.54	$559,001.12	$8,981,972.21
E6	$23,437.93	$23,437.93	$16,036.43	$16,036.43	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$39,474.36
E7	$12,309.09	$12,309.09	$5,515.55	$5,515.55	$4,410.55	$597.23	$0.00	$0.00	$0.00	$0.00	$18,421.87
E8	$488,610.09	$185,255.91	$71,382.17	$317,523.58	$163,444.58	$169,788.34	$132,389.11	$104,938.56	$0.00	$59,498.19	$837,004.58
E9	$117,538.92	$77,538.92	$85,084.59	$115,256.59	$182,393.19	$184,705.20	$2,285,834.49	$1,776,712.34	$2,129,989.54	$2,072,293.39	$4,226,506.44
E10	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E11	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E12	$32,151.02	$32,151.02	$11,633.08	$11,633.08	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$43,784.10
E13	$82,438.05	$82,438.05	$18,876.44	$18,876.44	$110.00	$110.00	$0.00	$0.00	$0.00	$0.00	$101,424.49
E14	$2,114,868.58	$1,630,141.53	$3,188,676.30	$3,664,056.46	$965,430.09	$970,775.11	$540,515.32	$442,013.60	$655,197.95	$464,914.90	$7,171,901.60
E15	$265,497.38	$220,949.66	$421,634.95	$383,320.87	$433,665.01	$338,520.03	$161,470.80	$201,103.14	$4,331.69	$121,330.87	$1,265,224.57
E16	$158,330.58	$200,443.47	$103,685.80	$103,685.80	$234,994.34	$234,994.34	$203,840.83	$203,145.39	$294,547.68	$251,048.46	$993,317.46
E17	$1,287.40	$1,287.40	$4,757.28	$4,757.28	$10,480.66	$10,480.66	$7,711.94	$7,711.94	$1,013,487.38	$13,487.38	$37,724.66
E18	$0.00	$0.00	$2,376.11	$2,376.11	$25,218.68	$25,218.68	$205,056.92	$190,497.11	$197,050.80	$154,637.24	$372,729.14
E19	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E20	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E21	$0.00	$0.00	$0.00	$0.00	-$802.38	-$802.38	$83,869.06	$83,869.06	$26,129.72	$26,129.72	$109,196.40
E22	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E23	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E24	$0.00	$0.00	$55,957.46	$51,332.46	$1,075,422.08	$389,885.00	$689,711.29	$988,219.33	$523,414.75	$590,792.33	$2,020,229.12
E25	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$137,722.25	$117,119.60	$63,672.19	$84,274.84	$201,394.44
E25 In-Kind	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$436,000.00	$436,000.00	$436,000.00
E26	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$147.62	$147.62	$0.00	$0.00	$147.62
E27	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$12,635.95	$12,635.95	$688,738.54	$283,233.36	$295,869.31

Work Task	2006 Obligations	2006 Expenditures	2007 Obligations	2007 Expenditures	2008 Obligations	2008 Expenditures	2009 Obligations	2009 Expenditures	2010 Obligations	2010 Expenditures	Subtotal Expenditures
E28	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$257,890.16	$156,905.74	$156,905.74
E29	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$173,512.57	$173,512.57	$173,512.57
E30	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
E31	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total E	**$5,777,823.15**	**$4,117,751.89**	**$8,414,858.29**	**$6,673,947.47**	**$7,747,715.93**	**$6,470,666.92**	**$6,979,948.43**	**$8,817,053.42**	**$9,102,531.36**	**$7,138,403.35**	**$33,217,823.05**
F1	$138,265.04	$138,265.04	$286,184.13	$255,369.52	$305,647.09	$221,016.81	$360,842.17	$344,424.98	$394,781.36	$379,228.21	$1,338,304.56
F2	$28,524.45	$28,524.45	$143,492.76	$143,492.76	$157,021.22	$78,686.22	$143,556.56	$182,724.56	$114,944.30	$125,520.30	$558,948.29
F3	$10,384.22	$10,384.22	$30,038.11	$30,038.11	$33,109.48	$33,109.48	$55,782.13	$55,782.13	$48,782.43	$48,782.43	$178,096.37
F4	$0.00	$0.00	$69,897.69	$69,897.69	$93,145.13	$93,145.13	$92,697.58	$92,697.58	$115,018.90	$115,018.90	$370,759.30
F5	$0.00	$0.00	$41,573.87	$41,573.87	$137,912.88	$129,939.88	$175,494.19	$167,068.67	$156,279.56	$169,647.12	$508,229.54
F6	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$17,076.49	$17,076.49	$41,207.42	$41,207.42	$58,283.91
F7	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total F	**$177,173.71**	**$177,173.71**	**$571,186.56**	**$540,371.95**	**$726,835.80**	**$555,897.52**	**$845,449.12**	**$859,774.41**	**$871,013.97**	**$879,404.38**	**$3,012,621.97**
G1	$97,959.45	$97,959.45	$144,443.78	$94,607.72	$145,357.59	$174,902.91	$337,661.19	$318,351.29	$484,297.71	$438,276.83	$1,124,098.20
G2	$57,262.87	$57,262.87	$73,272.35	$73,272.35	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$130,535.22
G3	$283,189.83	$206,117.04	$342,265.08	$230,401.38	$414,505.30	$273,816.05	$388,826.06	$441,109.20	$241,728.79	$326,952.38	$1,478,396.05
G4	$82,039.77	$80,869.98	$60,549.49	$61,719.28	$8,485.07	$8,485.07	$33,419.32	$33,419.32	$33,414.42	$33,414.42	$217,908.07
G5	$8,789.12	$8,789.12	$35,511.43	$35,511.43	$16,759.13	$16,759.13	$0.00	$0.00	$0.00	$0.00	$61,059.68
Total G	**$529,241.04**	**$450,998.46**	**$656,042.13**	**$495,512.16**	**$585,107.09**	**$473,963.16**	**$759,906.57**	**$792,879.81**	**$759,440.92**	**$798,643.63**	**$3,011,997.22**
H1	$541,500.00	$541,500.00	$561,000.00	$561,000.00	$593,500.00	$593,500.00	$605,000.00	$605,000.00	$647,000.00	$647,000.00	$2,948,000.00
H2	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total H	**$541,500.00**	**$541,500.00**	**$561,000.00**	**$561,000.00**	**$593,500.00**	**$593,500.00**	**$605,000.00**	**$605,000.00**	**$647,000.00**	**$647,000.00**	**$2,948,000.00**
I1	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$16,429.75	$16,429.75	$18,946.39	$18,946.39	$35,376.14
Total I	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$16,429.75**	**$16,429.75**	**$18,946.39**	**$18,946.39**	**$35,376.14**
Grand Totals	**$13,156,895.53**	**$9,927,104.30**	**$16,555,779.12**	**$14,136,583.02**	**$15,797,674.77**	**$14,425,972.82**	**$18,000,795.16**	**$18,182,447.45**	**$19,518,164.19**	**$18,411,881.51**	**$75,083,989.10**

Work Task	2011 Obligations	2011 Expenditures	Expenditures Grand Total
A1	$1,138,509.80	$1,164,324.46	$7,017,771.28
Total A	$1,138,509.80	$1,164,324.46	$7,017,771.28
B1	$206,468.97	$196,380.27	$1,433,640.83
B2	$230,585.84	$215,918.30	$2,021,047.79
B3	$136,901.52	$141,549.52	$573,688.09
B4	$150,310.56	$111,787.33	$966,984.84
B5	$270,542.88	$516,841.63	$1,673,211.86
B6	$17,692.75	$23,230.91	$283,468.47
B7	$246,148.11	$242,893.11	$1,291,745.10
B8	$83,094.77	$63,127.77	$504,523.15
B9	$0.00	$0.00	$3,607.25
B10	$3,498.01	$17,672.96	$554,821.69
B11	$25,979.31	$72,240.61	$322,905.57
Total B	$1,371,222.72	$1,601,642.41	$9,629,644.64
C1	$0.00	$0.00	$146,658.15
C2	$11,293.33	$1,293.33	$51,293.33
C3	$10,270.70	$10,270.70	$236,034.68
C4	$11,705.91	$8,879.67	$73,662.08
C5	$95,482.79	$95,482.79	$415,081.35
C6	$0.00	$0.00	$101,441.68
C7	-$2,315.00	-$2,315.00	$544,649.77
C8	$0.00	$0.00	$580,317.78
C9	$0.00	$0.00	$112,855.62
C10	$132,922.93	$117,400.67	$693,462.54
C11	$57,589.11	$165,093.69	$713,586.43
C12	$196,158.23	$230,969.52	$1,044,536.89
C13	$80,324.83	$155,096.91	$1,386,783.91

Work Task	2011 Obligations	2011 Expenditures	Expenditures Grand Total
C14	$71,883.70	$117,164.58	$202,501.52
C15	$23,239.78	$23,239.78	$495,740.45
C16	$0.00	$0.00	$55,332.60
C17	$0.00	$0.00	$9,750.00
C18	$0.00	$0.00	$41,981.82
C19	$0.00	$0.00	$0.00
C20	$0.00	$0.00	$53,779.96
C21	$0.00	$0.00	$70,000.00
C22	$0.00	$0.00	$0.00
C23	$0.00	$0.00	$356,826.42
C24	$183,056.69	$24,155.95	$643,095.14
C25	$252,351.95	$243,390.68	$835,475.48
C26	$4,795.46	$112,410.83	$162,522.23
C27	$42,984.20	$42,984.20	$301,028.84
C28	-$4,261.38	$31,314.99	$152,870.66
C29	$0.00	$100,000.00	$206,526.28
C30	$91,603.18	$84,466.75	$237,588.46
C31	$111,372.84	$175,450.98	$315,969.69
C32	$92,560.49	$92,560.49	$265,682.30
C33	$50,844.82	$245,705.92	$326,891.97
C34	$12,304.81	$12,304.81	$124,019.12
C35	$146,076.28	$11,161.28	$21,849.74
C36	$50,440.81	$138,207.29	$231,212.25
C37	$53,704.86	$150,988.99	$264,811.55
C38	$0.00	$0.00	$6,250.70
C39	$174,690.00	$201,453.00	$371,856.17
C40	$125,751.99	$125,107.76	$127,214.52
C41	$31,150.14	$31,150.14	$37,035.81

Work Task	2011 Obligations	2011 Expenditures	Expenditures Grand Total
C42	$103,142.42	$32,289.92	$81,526.65
C43	$1,099.56	$1,099.56	$1,099.56
C44	$33,542.26	$33,542.26	$33,542.26
C45	$175,342.41	$125,969.16	$125,969.16
C46	$103,992.63	$56,680.51	$56,680.51
C47	$1,147.88	$1,147.88	$1,147.88
C48	$50,572.34	$50,502.41	$50,502.41
C49	$0.00	$0.00	$0.00
C50	$0.00	$0.00	$0.00
Total C	$2,576,822.95	$3,046,622.40	$12,368,646.32
D1	$18,725.89	$18,725.89	$178,401.23
D2	$655,142.92	$850,868.92	$4,823,204.20
D3	$120,009.76	$96,376.11	$523,988.23
D4	$0.00	$0.00	$261,091.38
D5	$289,547.70	$289,547.70	$1,782,355.83
D6	$237,749.92	$295,090.92	$1,056,575.11
D7	$543,056.20	$600,256.19	$2,909,512.33
D8	$614,086.24	$592,711.03	$2,816,169.85
D9	$147,131.56	$217,528.56	$694,529.69
D10	$33,659.04	$33,659.04	$85,489.71
D11	$0.00	$0.00	$269,097.12
D12	$117,017.13	$45,155.76	$52,885.88
Total D	$2,776,126.36	$3,039,920.12	$15,453,300.56
E1	$267,986.63	$222,156.86	$2,394,494.97
E2	$132,989.92	$140,484.47	$795,823.62
E3	$0.00	$61,353.62	$871,228.19
E4	$1,483,727.80	$1,502,175.84	$5,471,988.26
E5	$451,820.04	$734,522.58	$9,817,043.22

Work Task	2011 Obligations	2011 Expenditures	Expenditures Grand Total
E6	$0.00	$0.00	$119,060.75
E7	$0.00	$0.00	$330,621.55
E8	$0.00	$22,143.98	$860,184.06
E9	$738,284.20	$961,222.68	$5,241,049.31
E10	$0.00	$0.00	$0.00
E11	$0.00	$0.00	$0.00
E12	$0.00	$0.00	$76,211.53
E13	$0.00	$0.00	$127,336.82
E14	$508,610.43	$683,705.92	$7,939,916.59
E15	$17,255.29	$17,255.29	$1,282,479.86
E16	$259,346.35	$186,157.60	$1,184,867.65
E17	$41,359.94	$730,765.63	$768,490.29
E18	$205,944.26	$205,088.24	$577,817.38
E19	$0.00	$0.00	$0.00
E20	$0.00	$0.00	$35,000.00
E21	$34,019.70	$34,019.70	$162,956.07
E22	$0.00	$0.00	$4,028.00
E23	$0.00	$0.00	$0.00
E24	$639,675.70	$716,795.58	$2,737,024.70
E25	$10,293.25	$10,293.25	$211,687.69
E25 In-Kind	$436,000.00	$436,000.00	$872,000.00
E26	$0.00	$0.00	$147.62
E27	$3,060,556.46	$810,593.24	$1,106,462.55
E28	$258,521.17	$330,289.20	$487,194.94
E29	$59,667.12	$59,667.12	$233,179.69
E30	$88,884.93	$88,884.93	$88,884.93
E31	$21,979.16	$16,115.11	$16,115.11

Work Task	2011 Obligations	2011 Expenditures	Expenditures Grand Total
Total E	$8,716,922.35	$7,969,690.84	$43,813,295.35
F1	$480,326.82	$497,781.32	$2,035,578.55
F2	$185,177.77	$158,354.77	$782,538.87
F3	$53,952.06	$53,952.06	$255,071.98
F4	$119,649.91	$118,393.86	$489,153.16
F5	$153,930.06	$153,930.06	$662,159.60
F6	$88,758.78	$88,758.78	$147,042.69
F7	$1,403.06	$1,403.06	$1,403.06
Total F	$1,083,198.46	$1,072,573.91	$4,372,947.91
G1	$678,848.47	$625,217.16	$1,749,315.36
G2	$0.00	$0.00	$130,535.22
G3	$54,339.42	$171,292.05	$1,649,688.10
G4	$137,434.07	$137,434.07	$355,342.14
G5	$0.00	$0.00	$61,059.68
Total G	$870,621.96	$933,943.28	$3,945,940.50
H1	$5,359,500.00	$5,359,500.00	$8,307,500.00
H2	$0.00	$0.00	$0.00
Total H	$5,359,500.00	$5,359,500.00	$8,307,500.00
I1	$76,251.83	$76,251.83	$111,627.97
Total I	$76,251.83	$76,251.83	$111,627.97
Grand Totals	**$23,969,176.43**	**$24,264,469.25**	**$105,020,674.53**

Appendix E. Reports Published in FY11

Except where otherwise noted for journal articles, these reports are available online on the LCR MSCP website at: http://www.lcrmscp.gov/steer_committee/technical_reports.html

Work Task	Report Title
C4:	Relict Leopard Frog Monitoring and Management, 2009 Annual Report
C5:	Wiesenborn, W.D. 2011. UV-Excited Fluorescence on Riparian Insects except Hymenoptera is Associated with Nitrogen Content. Psyche: A Journal of Entomology. Available online at: http://www.hindawi.com/journals/psyche/
C5:	Wiesenborn, W.D. 2011. Nitrogen Content in Riparian Arthropods is Most Dependent on Allometry and Order. Florida Entomologist 94: 71-80.
C5:	Wiesenborn, W.D. 2011. Biomasses of Arthropod Taxa Differentially Increase on Nitrogen-Fertilized Willows and Cottonwoods. Restoration Ecology 19: 323-332.
C11:	Stress Inducing Factors of Bonytail Hatchery and Stocking Practice
C11:	Passive Integrated Transponders in *Gila elegans*: Location, Retention, Stress, and Mortality
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
C25:	Imperial Ponds Native Fish Monitoring August 2009 – August 2010
C25:	Imperial Ponds Native Fish Monitoring July 2008 – July 2009 Annual Report

C28: Real and Artificial Nest Predation along the Lower Colorado River, 2008-2009

C36: Annual Report on the Elf Owl Detectability Study, 2010

C42: Laboratory Testing of Lassenite Pozzolan for Use as a Soil Amendment in Habitat Restoration

D2: Southwestern Willow Flycatcher Surveys, Demography, and Ecology along the Lower Colorado River and Tributaries, 2010. Annual Report

D6: Summary Report on the Lower Colorado River Riparian Bird Surveys, 2008-2010

D7: Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use on the Lower Colorado River and Tributaries, 2010 Annual Report

D9: Monitoring of Covered and Evaluation Bat Species for the Lower Colorado River Multi-Species Conservation Program — 2010 Final Report

E4: Palo Verde Ecological Reserve Restoration Development and Monitoring Plan: Phase 7

E5: Cibola Valley Conservation and Wildlife Area Restoration Development and Monitoring Plan: Phase 6

E14: Evaluation of a Secondary Filtration Technology for Nonnative Fish Exclusion at the Imperial Ponds, Imperial National Wildlife Refuge, Arizona

E27: Finding of No Significant Impact and Final Environmental Assessment

F3: Small Mammal Colonization at Habitat Creation Areas Along the Lower Colorado River: 2009