Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Final Implementation Report, Fiscal Year 2011 Work Plan and Budget, Fiscal Year 2009 Accomplishment Report

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

June 2010

Lower Colorado River Multi-Species Conservation Program Steering Committee Members

Federal Participant Group

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

Arizona Participant Group

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

Other Interested Parties Participant Group

QuadState County Government Coalition
Desert Wildlife Unlimited

California Participant Group

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

Nevada Participant Group

Colorado River Commission of Nevada
Nevada Department of Wildlife
Southern Nevada Water Authority
Colorado River Commission Power Users
Basic Water Company

Native American Participant Group

Hualapai Tribe
Colorado River Indian Tribes

Conservation Participant Group

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

Lower Colorado River Multi-Species Conservation Program

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

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Acronyms

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
MAPS	Monitoring Avian Productivity and Survivorship
MCWA	Mohave County Water Authority
Metropolitan	The Metropolitan Water District of Southern California
MSHCP	Clark County Multi-Species Habitat Conservation Program
NAU	Northern Arizona University
NDOW	Nevada Division of Wildlife
NEPA	National Environmental Policy Act
NFH	National Fish Hatchery
NFWG	Native Fish Work Group
NPS	National Park Service
NWR	National Wildlife Refuge

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

Program Overview

The Lower Colorado River Multi-Species Conservation Program (LCR MSCP) is a partnership of Federal and non-Federal stakeholders, created to respond to the need to balance the use of Lower Colorado River (LCR) water resources and the conservation of native species and their habitats in compliance with the Endangered Species Act (ESA). This is a long-term (50-year) plan to conserve at least 26 species along the LCR from Lake Mead to the Southerly International Boundary with Mexico through implementation of a Habitat Conservation Plan (HCP).

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

Twenty-six Federal or state-listed candidate and sensitive species and their associated habitats, ranging from aquatic and wetland habitats to riparian and upland areas, are covered in the LCR MSCP. Of the 26 covered species, 6 are currently listed under the Federal ESA. The program addresses the biological needs of mammals, birds, fish, amphibians, and reptiles, as well as invertebrates and plants.

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

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

Program Implementation

On April 2, 2005, and April 4, 2005, the Secretary of the Interior, representatives from Arizona, California, and Nevada, and water and power organizations in these states signed the program documents required to implement the LCR MSCP. Program

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

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

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

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

As agreed to in the FMA, Reclamation is the entity responsible for implementing the LCR MSCP over the 50-year term of the program. The FMA also calls for the establishment of a Steering Committee, currently consisting of 56 entities, to provide input and oversight functions in support of LCR MSCP implementation. The Steering Committee includes non-Federal and Federal entities that are receiving ESA coverage through the LCR MSCP, or stakeholders interested in the environment of the LCR. A complete list of Steering Committee membership can be viewed on the LCR MSCP Web site. During FY09, George Caan, Colorado River Commission, served as Chair of the Steering Committee, and Bill Werner, 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 FY09, a summary of work underway during FY10, and proposed work to be performed during FY11. It also documents research and monitoring activities undertaken in support of the LCR MSCP. Incidental Take for covered actions implemented during FY09 is also documented. This Annual Report fully meets the reporting requirements outlined in Section 7.4.1 of the FMA.

LCR MSCP Program Funding

As outlined in the FMA, the total program cost in 2003 dollars is $626 million split in a 50-50 cost share between the Federal and non-Federal entities. Table 7-1 of the HCP outlines the annual minimum funding level before inflation. Each year, the annual program cost is adjusted for inflation based on a formula outlined in Section 8.1.1 of the FMA. Table 1-1a provides Annual Contributions Before Inflation, Composite Inflation Indexes, and Indexed Annual Contributions. Indexed Annual Program costs are calculated using the Composite Inflation Index from 2 years prior as outlined in the FMA.

Table 1-1a. 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

Section 8.1.2 of the FMA states that funds provided by either a Federal Party or a State Permittee that are in excess of their funding obligation for a specific year shall be treated as a credit against future funding obligations. Any shortage of the funds provided by either a Federal Party or a State Permittee will be treated as a deficit to future funding obligations. Table 1-1b provides a listing of funding credits by funding entity.

Table 1-1b. Funding Credit and Deficit Report

Fiscal Year	Credits*	Deficits	Funding Entity
2004	$3,381,440	$0	Reclamation
2005	$5,980,712	$0	Reclamation
2005	$145,737	$0	San Diego County Water Authority
2006	$506,149	$0	Reclamation
2006	$500,000	$0	San Diego County Water Authority
2007	$3,869,537	$0	Reclamation
2007	$250,000	$0	San Diego County Water Authority
2008	$876,677	$0	Reclamation
2008	$3,298,070	$0	San Diego County Water Authority
2008	$1,834,769**	$0	The Metropolitan Water District of Southern California
2009	$1,170,697	$0	Reclamation

*Credits are shown in current fiscal year dollars and will be adjusted for inflation when applied to a future funding obligation.

**Amount adjusted to take into account final interest payment.

Table 1-1c provides a summary of the LCR MSCP program accomplishments. The table outlines required program funding and actual program accomplishment. A detailed financial statement is provided in Appendix E.

Table 1-1c. LCR MSCP Program Account

Fiscal Year	Required Federal Funding	Required Non-Federal Funding	Total Required Funding	Program Accomplishment	Cumulative Program Accomplishment
2004	$0	$0	$0	$3,381,440	$3,381,440
2005	$0	$0	$0	$6,126,449	$9,507,889
2006	$6,072,381	$6,072,381	$12,144,742	$13,150,911	$22,658,800
2007	$6,291,054	$6,291,054	$12,582,108	$16,701,645	$39,360,445
2008	$6,655,509	$6,655,509	$13,311,018	$15,797,675	$55,158,120
2009	$7,255,458	$7,255,458	$14,510,916	$18,000,800	$73,158,920
				Total:	**$73,158,920**

FY11 Contributions and Adjustments

As outlined in Table 1-1a, the annual funding commitment for FY11 is $27,540,000, based on the 2003 estimate, and $32,800,140 after the Preliminary Composite Inflation Index of 1.191 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 FY11 are shown below. Section 8.3 of the FMA allows for adjusted non-Federal funding during the first 10 years of the program. The FY11 preliminary 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. FY11 Contribution Schedule

Funding Entity	FY11 Contributions	FY11 Adjusted Contributions
Federal:	$16,400,070.00	$16,400,070.00
Non-Federal:	$16,400,070.00	$16,400,070.00
California	*$8,200,035.00*	*$9,020,038.50*
Arizona	*$4,100,017.50*	*$2,460,010.50*
Nevada	*$4,100,017.50*	*$4,920,021.00*
Total:	**$32,800,140.00**	**$32,800,140.00**

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.

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 FY09 with interest, FY10 contributions, and FY11 projected contributions. No funds have been withdrawn from any of the accounts to date.

Table 1-3. Existing Habitat Maintenance Fund

Funding Partner	FY09 Contributions	Cumulative through FY09*	FY10 Contribution	FY11 Projected Contribution
California:	$302,500	$1,334,547.54	$323,500	$2,679,750.00
Arizona:	$151,250	$596,037.45	$161,750	$1,339,875.00
Nevada:	$151,250	$622,001.48	$161,750	$1,339,875.00
Total:	**$605,000**	**$2,552,586.47**	**$647,000**	**$5,359,500.00**

*Includes interest earned.

In-Kind Contributions

Section 8.7.4 of the FMA provides that in-kind goods or services shall be credited based on approval by the Program Manager and the Steering Committee. In April 2007, the Steering Committee passed Program Decision Document 08-001, *In-Kind Credit for Goods and Services*, which provides specific guidelines for the calculation of in-kind credit for goods and services. No in-kind contributions were received in FY09.

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 place a high percentage of mesquite habitat in California. 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 FY11 Program and FY09 Accomplishment

The minimum funding required in the LCR MSCP program documents for FY11 is $32,800,140. Reclamation is proposing an annual program budget totaling $33,654,938.00 as shown in Table 1-4. Table 1-5 shows by work task: FY09 estimates and actual accomplishment, cumulative program accomplishment (FY04-FY09), FY10 approved program, FY11 proposed program, and out-year funding for FY12 and FY13. Out-year funding estimates are not adjusted for future inflation.

Table 1-4. FY11 Proposed Program Funding

Program Area	FY11 Funding
Program Administration	$1,212,438.00
Fish Augmentation	$1,465,000.00
Species Research	$3,422,000.00
System Monitoring	$2,735,000.00
Conservation Area Development and Management	$17,301,000.00
Post-Development Monitoring	$965,000.00
Adaptive Management Program	$1,125,000.00
Existing Habitat Maintenance	$5,359,500.00
Public Involvement	$70,000.00
Total:	**$33,654,938.00**

Reclamation will ensure the minimum program accomplishment occurs that meets the Indexed Annual Contribution outlined in Table 1-1a of $32,800,140; however, Reclamation is presenting work tasks totaling $33,654,938.00 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 FY11, 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 FY12 or FY13, 3) providing more than the minimum funding required

to the Habitat Maintenance Fund, or 4) beginning activities associated with any changed circumstances as defined in Section 5.12.3 of the HCP, should any occur.

In FY09, Reclamation estimated work tasks totaling $18,822,780.00. Actual LCR MSCP costs for FY09 were $18,000,800.16. In accordance with the FMA, Reclamation received a credit of $1,170,697 for FY09 (Tables 1-1b and 1-1c).

Table 1-5. Annual Funding Matrix

Work Task	Name	FY09 Estimate	FY09 Actual Accomplishment[1]	Cumulative Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Projected Estimate[2]	FY13 Projected Estimate[2]
A	**Program Administration**							
A-1	Program Administration	$1,231,780.00	$1,065,356.20	$4,650,873.21	$1,313,220.00	$1,212,438.00	$1,212,438.00	$1,212,438.00
Closed[3]	Work Tasks Pre-FY09			$165,789.34				
		$1,231,780.00	**$1,065,356.20**	**$4,816,662.55**	**$1,313,220.00**	**$1,212,438.00**	**$1,212,438.00**	**$1,212,438.00**
B	**Fish Augmentation**							
B-1	Lake Mohave Razorback Sucker Larvae Collection	$200,000.00	$206,001.63	$1,016,321.45	$200,000.00	$200,000.00	$200,000.00	$200,000.00
B-2	Willow Beach National Fish Hatchery	$350,000.00	$503,628.30	$1,457,476.07	$250,000.00	$250,000.00	$250,000.00	$250,000.00
B-3	Achii Hanyo Rearing Station	$170,000.00	$169,669.00	$426,736.46	$100,000.00	$150,000.00	$150,000.00	$150,000.00
B-4	Dexter National Fish Hatchery	$250,000.00	$229,364.46	$737,211.07	$180,000.00	$180,000.00	$200,000.00	$220,000.00
B-5	Bubbling Ponds Fish Hatchery	$335,000.00	$259,449.57	$1,078,127.69	$250,000.00	$250,000.00	$250,000.00	$250,000.00
B-6	Lake Mead Fish Hatchery	$50,000.00	$31,769.89	$234,327.35	$50,000.00	$50,000.00	$50,000.00	$50,000.00
B-7	Lakeside Rearing Ponds	$175,000.00	$185,238.41	$930,829.50	$150,000.00	$250,000.00	$175,000.00	$175,000.00
B-8	Fish Tagging Equipment	$75,000.00	$73,421.00	$381,354.83	$75,000.00	$85,000.00	$90,000.00	$100,000.00

Work Task	Name	FY09 Estimate	FY09 Actual Accomplishment[1]	Cumulative Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Projected Estimate[2]	FY13 Projected Estimate[2]
B-10	Uvalde National Fish Hatchery	$60,000.00	$89,956.67	$481,270.53	$85,000.00	$0	$0	$0
B-11	Overton Wildlife Management Area	$175,000.00	$119,439.72	$243,033.51	$50,000.00	$50,000.00	$75,000.00	$75,000.00
Closed[3]	Work Tasks Pre-FY09	$0.00	$0.00	$4,370.00	$0.00	$0.00	$0.00	$0.00
		$1,840,000.00	**$1,867,938.65**	**$6,991,058.46**	**$1,390,000.00**	**$1,465,000**	**$1,440,000.00**	**$1,470,000.00**
C	**Species Research**							
C-2	Sticky Buckwheat and Threecorner Milkvetch…	$11,000.00	$10,000.00	$40,000.00	$11,000.00	$11,000.00	$11,000.00	$11,000.00
C-3	MSCP Covered Species Profile Development	$15,000.00	$11,547.48	$260,325.04	$15,000.00	$15,000.00	$15,000.00	$15,000.00
C-4	Relict Leopard Frog	$11,000.00	$15,557.23	$54,133.52	$11,000.00	$11,000.00	$11,000.00	$11,000.00
C-5	Effects of Abiotic Factors on Insect Populations…	$90,000.00	$83,428.78	$222,409.92	$90,000.00	$90,000.00	$90,000.00	$0.00
C-7	Survey and Habitat Characterization for MacNeill's Sootywing	$145,000.00	$129,403.53	$488,583.74	$80,000.00	$0.00	$0.00	$0.00
C-8	Razorback Sucker Survival Studies	$25,000.00	$23,606.34	$820,609.25	$0.00	$0.00	$0.00	$0.00
C-10	Razorback Sucker Rearing Studies	$125,000.00	$132,905.58	$461,806.82	$125,000.00	$125,000.00	$125,000.00	$125,000.00

Work Task	Name	FY09 Estimate	FY09 Actual Accomplishment[1]	Cumulative Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Projected Estimate[2]	FY13 Projected Estimate[2]
C-11	Bonytail Rearing Study	$165,000.00	$135,376.13	$502,139.95	$165,000.00	$150,000.00	$150,000.00	$150,000.00
C-12	Demographics… of Repatriated Razorback Suckers…	$200,000.00	$184,842.91	$717,832.93	$200,000.00	$200,000.00	$0.00	$0.00
C-13	Lake Mead Razorback Sucker	$150,000.00	$149,876.40	$963,379.63	$300,000.00	$125,000.00	$125,000.00	$125,000.00
C-14	Humpback Chub Program Support	$200,000.00	$65,136.31	$103,433.31	$70,000.00	$75,000.00	$20,000.00	$20,000.00
C-15	Flannelmouth Sucker Habitat…	$80,000.00	$80,882.78	$405,693.75	$80,000.00	$25,000.00	$0.00	$0.00
C-23	Evaluation of Remote Sensing Techniques…	$60,000.00	$70,985.95	$358,138.21	$0.00	$0.00	$0.00	$0.00
C-24	Avian Species Habitat…	$375,000.00	$377,198.25	$464,133.38	$200,000.00	$175,000	$250,000.00	$200,000.00
C-25	Imperial Ponds Native Fish…	$225,000.00	$228,412.27	$439,253.69	$235,000.00	$235,000.00	$250,000.00	$250,000.00
C-26	Raceway Rearing of Razorback Sucker…	$100,000.00	$74,709.00	$75,330.85	$70,000.00	$70,000.00	$0.00	$0.00
C-27	Small Mammal Population Studies	$65,000.00	$110,074.68	$203,265.36	$35,000.00	$70,000.00	$70,000.00	$0.00
C-28	Nest Predation Effects of Riparian Bird Species	$145,000.00	$130,739.27	$130,739.27	$25,000.00	$0.00	$0.00	$0.00

Work Task	Name	FY09 Estimate	FY09 Actual Accomplishment[1]	Cumulative Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Projected Estimate[2]	FY13 Projected Estimate[2]
C-29	Age…of Reach 3 Razorback Sucker Population	$125,000.00	$80,464.99	$80,464.99	$125,000.00	$0.00	$0.00	$0.00
C-30	Measures to Reduce Transport of Quagga Mussel	$100,000.00	$94,554.39	$94,554.39	$70,000.00	$150,000.00	$150,000.00	$150,000.00
C-31	Razorback Sucker Genetic Diversity Assessment	$125,000.00	$103,693.22	$103,693.22	$125,000.00	$125,000.00	$125,000.00	$125,000.00
C-32	Salinity, Temperature, and Oxygen Limits for Bonytail and Razorback Sucker	$85,000.00	$87,893.04	$87,893.04	$85,000.00	$100,000.00	$125,000.00	$125,000.00
C-33	Survival of 500-mm Razorback Sucker Released in Reach 3	$75,000.00	$205,229.84	$205,229.84	$75,000.00	$100,000.00	$100,000.00	$100,000.00
C-34	Zooplankton Communities in Off-channel Native Fish Habitats	$60,000.00	$42,196.13	$42,196.13	$60,000.00	$10,000.00	$0.00	$0.00
C-35	Western Bats Roosting Characteristics	$0.00	$0.00	$0.00	$50,000.00	$150,000.00	$150,000.00	$150,000.00
C-36	Elf Owl Detectability	$0.00	$0.00	$0.00	$50,000.00	$50,000.00	$50,000.00	$0.00
C-37	Hydrology and Soil Conditioning Avian Riparian Species	$0.00	$0.00	$0.00	$150,000.00	$50,000.00	$50,000.00	$0.00

Work Task	Name	FY09 Estimate	FY09 Actual Accomplishment[1]	Cumulative Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Projected Estimate[2]	FY13 Projected Estimate[2]
C-38	Stable Isotope and Microchemistry Analyses of Fin Rays…	$0.00	$0.00	$0.00	$80,000.00	$0.00	$0.00	$0.00
C-39	Post Stocking Distribution and Survival of Bonytail in Reach 3	$0.00	$0.00	$0.00	$90,000.00	$250,000.00	$250,000.00	$250,000.00
C-40	Genetic and Demographic Studies to Guide Conversation Mgmt of RASU and BONY in Off-Channel Habitats	$0.00	$0.00	$0.00	$75,000.00	$100,000.00	$180,000.00	$180,000.00
C-41	Role of Artificial Habitat in Survival of RASU and BONY	$0.00	$0.00	$0.00	$25,000.00	$25,000.00	$25,000.00	$0.00
C-42	Experiments & demonstration of soil amendments for Use in Restoration Sites	$0.00	$0.00	$0.00	$200,000.00	$100,000.00	$200,000.00	$200,000.00
C-43	Population demographics & Habitat Use of California Leaf Nose	$0.00	$0.00	$0.00	$0.00	$20,000.00	$60,000.00	$40,000.00

Work Task	Name	FY09 Estimate	FY09 Actual Accomplishment[1]	Cumulative Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Projected Estimate[2]	FY13 Projected Estimate[2]
C-44	… Fish Food Resources in Off-channel Native Fish Habitats	$0.00	$0.00	$0.00	$0.00	$60,000.00	$100,000.00	$100,000.00
C-45	… Stocked RASU in Reach 3	$0.00	$0.00	$0.00	$0.00	$170,000.00	$200,000.00	$200,000.00
C-46	Physiological Response in BONY and RASU to Transport Stress	$0.00	$0.00	$0.00	$0.00	$120,000.00	$120,000.00	$70,000.00
C-47	Genetic Monitoring and Management … in Bonytail Rearing Ponds	$0.00	$0.00	$0.00	$0.00	$220,000.00	$250,000.00	$250,000.00
C-48	… RASU Brood stock at Dexter NFH	$0.00	$0.00	$0.00	$0.00	$60,000.00	$60,000.00	$0.00
C-49	Investigations of RASU and BONY Movements and Habitat Use Downstream of Parker Dam	$0.00	$0.00	$0.00	$0.00	$125,000.00	$150,000.00	$150,000.00
C-50	Food Habitats of Adult RASU Below Hoover Dam	$0.00	$0.00	$0.00	$0.00	$60,000.00	$75,000.00	$0.00
Closed[3]	Work Tasks Pre-FY08	$0.00	$0.00	$778,609.00				
		$2,757,000.00	**$2,628,714.50**	**$8,103,849.23**	**$2,972,000.00**	**$3,422,000.00**	**$3,537,000.00**	**$2,997,000.00**

Work Task	Name	FY09 Estimate	FY09 Actual Accomplishment[1]	Cumulative Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Projected Estimate[2]	FY13 Projected Estimate[2]
D	**System Monitoring**							
D-1	Marsh Bird Surveys	$35,000.00	$27,400.01	$146,230.28	$35,000.00	$25,000.00	$35,000.00	$35,000.00
D-2	Southwestern Willow Flycatcher Surveys	$690,000.00	$1,274,835.64	$4,445,162.48	$650,000.00	$675,000.00	$700,000.00	$700,000.00
D-3	Southwestern Willow Flycatcher Habitat Monitoring	$90,000.00	$222,500.41	$610,465.20	$90,000.00	$90,000.00	$95,000.00	$95,000.00
D-5	Monitoring Avian Productivity…	$300,000.00	$282,279.28	$1,314,917.66	$250,000.00	$275,000.00	$300,000.00	$300,000.00
D-6	System Monitoring for Riparian Obligate Avian Species	$135,000.00	$300,988.48	$761,772.55	$210,000.00	$210,000.00	$210,000.00	$210,000.00
D-7	Yellow-Billed Cuckoo Surveys	$540,000.00	$526,939.86	$1,958,567.46	$540,000.00	$550,000.00	$550,000.00	$550,000.00
D-8	Razorback Sucker and Bonytail Stock Assessment	$350,000.00	$469,412.71	$1,614,377.31	$400,000.00	$575,000.00	$600,000.00	$650,000.00
D-9	… Covered Bat Species	$130,000.00	$139,417.88	$485,314.17	$150,000.00	$150,000.00	$150,000.00	$150,000.00
D-10	System Monitoring and Studies on Small Mammal Populations	$0	$0	$52,197.81	$0.00	$65,000.00	$65,000.00	$65,000.00

Work Task	Name	FY09 Estimate	FY09 Actual Accomplishment[1]	Cumulative Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Projected Estimate[2]	FY13 Projected Estimate[2]
D-12	Lowland Leopard Frog and Colorado River Toad Surveys	$0.00	$0.00	$0.00	$20,000.00	$120,000.00	$150,000.00	$75,000.00
Closed[3]	Work Tasks Pre-FY09	$0.00	$780.62	$1,003,695.03				
		$2,270,000.00	**$3,244,554.89**	**$12,392,699.95**	**$2,345,000.00**	**$2,735,000.00**	**$2,855,000.00**	**$2,830,000.00**
E	**Conservation Area Development and Management**							
E-1	Beal Lake Riparian Restoration	$180,000.00	$195,931.36	$2,412,492.71	$130,000.00	$200,000.00	$200,000.00	$200,000.00
E-2	Beal Lake Native Fish	$70,000.00	$86,242.83	$689,426.52	$50,000.00	$120,000.00	$80,000.00	$80,000.00
E-3	Ahakhav Tribal Preserve	$145,000.00	$97,370.14	$1,392,665.44	$241,000.00	$0.00	$0.00	$0.00
E-4	Palo Verde Ecological Preserve	$1,250,000.00	$1,349,593.46	$3,618,294.65	$1,683,000.00	$1,950,000.00	$2,174,000.00	$1,000,000.00
E-5[5]	Cibola Valley Conservation Area	$1,000,000.00	$789,905.06	$9,209,864.66	$900,000.00	$1,100,000.00	$1,100,000.00	$1,100,000.00
E-8	Seed Feasibility Study	$210,000.00	$132,389.11	$859,825.69	$0.00	$0.00	$0.00	$0.00
E-9	Hart Mine Marsh	$3,125,000.00	$2,285,834.49	$2,724,171.68	$2,380,000.00	$500,000.00	$300,000.00	$200,000.00
E-14	Imperial Ponds…	$483,000.00	$540,515.32	$6,915,377.41	$651,840.00	$610,000.00	$525,000.00	$395,000.00
E-15[5]	Backwater Site Selection	$209,000.00	$161,470.80	$1,282,267.81	$286,750.00	$20,000.00	$20,000.00	$20,000.00

Work Task	Name	FY09 Estimate	FY09 Actual Accomplishment[1]	Cumulative Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Projected Estimate[2]	FY13 Projected Estimate[2]
E-16	Conservation Area Site Selection	$200,000.00	$203,978.83	$835,000.17	$360,000.00	$375,000.00	$375,000.00	$375,000.00
E-17[5]	Topock Marsh Pumping	$5,000.00	$7,711.94	$24,076.60	$800,000.00	$270,000.00	$2,750,000.00	$70,000.00
E-18	Law Enforcement and Fire Suppression	$200,000.00	$205,056.92	$232,651.60	$250,000.00	$250,000.00	$325,000.00	$325,000.00
E-21[4]	Planet Ranch	$50,000.00	$83,869.06	$103,066.68	$100,000.00	$8,900,000.00	$1,500,000.00	$750,000.00
E-24[5]	Cibola NWR Unit #1	$1,072,000.00	$689,711.29	$1,821,090.37	$600,000.00	$636,000.00	$1,700,000.00	$1,500,000.00
E-25	Big Bend Conservation Area	$80,000.00	$137,722.25	$137,722.25	$500,000.00	$500,000.00	$80,000.00	$80,000.00
E-26	Headquarters Lake	$265,000.00	$147.62	$147.62	$0.00	$0.00	$0.00	$0.00
E-27[5]	Laguna Division Conservation Area	$0.00	$0.00	$0.00	$750,000.00	$1,375,000.00	$5,000,000.00	$12,000,000.00
E-28	Yuma East Wetland	$0.00	$0.00	$0.00	$250,000.00	$250,000.00	$450,000.00	$450,000.00
E-29	Desert Tortoise	$0.00	$0.00	$0.00	$195,000.00	$50,000.00	$50,000.00	$0.00
E-30	Flat-tailed Horned Lizard	$0.00	$0.00	$0.00	$0.00	$195,000.00	$50,000.00	$50,000.00
Closed[3]	Work Tasks Pre-FY09	$0.00	$0.00	$982,552.55				
		$8,544,000.00	**$6,967,450.48**	**$33,240,694.41**	**$10,127,590.00**	**$17,301,000.00**	**$16,499,000.00**	**$18,595,000.00**
F	**Post-Development Monitoring**							
F-1	Habitat Monitoring	$350,000.00	$360,842.17	$1,328,143.26	$350,000.00	$350,000.00	$425,000.00	$425,000.00

Work Task	Name	FY09 Estimate	FY09 Actual Accomplishment[1]	Cumulative Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Projected Estimate[2]	FY13 Projected Estimate[2]
F-2	Avian Use of Habitat Creation Sites	$150,000.00	$143,556.56	$550,165.78	$170,000.00	$170,000.00	$180,000.00	$180,000.00
F-3	Small Mammal Colonization of Restoration Sites	$55,000.00	$55,782.13	$156,690.61	$55,000.00	$60,000.00	$65,000.00	$65,000.00
F-4	Monitoring of Covered Bat Species	$90,000.00	$92,697.58	$255,740.71	$110,000.00	$110,000.00	$110,000.00	$110,000.00
F-5	Monitoring of Fish Restoration Sites	$150,000.00	$175,494.19	$354,981.07	$150,000.00	$175,000.00	$200,000.00	$200,000.00
F-6	Monitoring of MacNeill's Sootywing…	$10,000.00	$17,076.49	$17,076.49	$50,000.00	$70,000.00	$70,000.00	$70,000.00
F-7	Post-Development Monitoring of Marsh Birds	$0.00	$0.00	$0.00	$0.00	$30,000.00	$30,000.00	$30,000.00
		$805,000.00	**$845,449.12**	**$2,662,797.92**	**$885,000.00**	**$965,000.00**	**$1,080,000.00**	**$1,080,000.00**
G	**Adaptive Management Program**							
G-1	Data Management	$450,000.00	$337,661.19	$959,469.78	$650,000.00	$700,000.00	$950,000.00	$950,000.00
G-3	Adaptive Management Research Projects	$230,000.00	$388,826.06	$1,427,875.36	$300,000.00	$300,000.00	$380,000.00	$380,000.00
G-4	Science/Adaptive Management	$50,000.00	$33,419.32	$185,323.39	$50,000.00	$125,000.00	$125,000.00	125,000.00
		$730,000.00	**$759,906.57**	**$2,572,668.53**	**$1,000,000.00**	**$1,125,000.00**	**$1,455,000**	**$1,455,000**

Work Task	Name	FY09 Estimate	FY09 Actual Accomplishment[1]	Cumulative Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Projected Estimate[2]	FY13 Projected Estimate[2]
H	**Funding Accounts**							
H-1[6]	Existing Habitat Maintenance	$605,000.00	$605,000.00	$2,301,000.00	$647,000.00	$5,359,500.00	$5,359,500.00	5,359,500.00
		$605,000.00	**$605,000.00**	**$2,301,000.00**	**$647,000.00**	**$5,359,500.00**	**$5,359,500.00**	**$5,359,500.00**
I	**Public Outreach**							
I-1	Public Outreach	$40,000.00	$16,429.75	$77,488.88	$50,000.00	$70,000.00	$70,000.00	$70,000.00
		$40,000.00	**$16,429.75**	**$77,488.88**	**$50,000.00**	**$70,000.00**	**$70,000.00**	**$70,000.00**
	Program Total:	**$18,822,780.00**	**$18,000,800.16**	**$73,158,919.93**	**$20,729,810.00**	**$33,654,938.00**	**$33,507,938.00**	**$35,068,438.00**

[1] Financial accomplishment is reported as obligations rather than expenditures to accurately portray program accomplishment.

[2] FY12 and FY13 numbers are not adjusted for projected inflation.

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

[4] E-21 Steering Committee approved FY09 funding at the 4/22/09 meeting.

[5] E5, E15, E17, E24, E27 Steering Committee approved FY10 funding changes at the 10-28-09 meeting.

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

Compliance Reporting

LCR MSCP

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

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

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

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

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

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

   Table 1-7 provides a summary of fish repatriation. Table 1-8 provides a matrix showing those work tasks that work toward the completion of the Conservation Measures. Conservation Measures are still in progress. Appendix F lists technical reports that were completed in FY09.

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 FY09 is reported in Appendix C. The USFWS Section 10 Permit and the 2005 BO authorize incidental take resulting from conduct of Federal Covered Actions and non-Federal Covered Activities, and Reclamation's implementation of the Conservation Plan, as long as Conservation Measures and Avoidance and Minimization Measures are in place. Due to the wide range and scope of the program, surrogate measures were used in the program compliance documents to

quantify impacts. These same surrogates are used to determine types and levels of any incidental take known to have occurred in FY09. 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 2010 Work Plan and Budget, Fiscal Year 2008 Accomplishment Report* is provided in Appendix C.

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

   No minor modifications to the LCR MSCP have been made at this time.

Table 1-6. LCR MSCP Habitat Objectives

Land Cover Type		Managed Acres[1]	Year Established	Projected Year To Be Credited[2]	Actual Habitat Created (Acres)	Year Achieved
Nurseries (Upland Species)						
E4	PVER, Phase 1	40	FY06	FY10		
	Total	40				
Cottonwood-Willow						
E1	Beal Lake Riparian	107	FY04	FY11		
E5	CVCA, Phase 1	91	FY06	FY10		
	CVCA, Phase 2	71	FY08	FY11		
	CVCA, Phase 3	103	FY07	FY10		
	CVCA, Phase 7	72	FY12	FY15		
E4	PVER Nursery, Phase 1	21	FY06	FY10		
	PVER, Phase 2	78	FY07	FY10		
	PVER, Phase 3	84	FY08	FY11		
	PVER, Phase 4	100	FY09	FY11		
	PVER, Phase 5	216	FY10	FY13		
	PVER, Phase 6	220	FY11	FY14		
	PVER, Phase 7	226	FY12	FY15		
E14	Imperial Ponds	34	FY11	FY14		
E24	Unit 1, Crane Roost	154	FY09	FY12		
	Unit 1, 1/3 Hippy Burn	100	FY12	FY15		
E28	Yuma East Wetlands	183	FY12	FY15		
	Total	1,860				
Honey Mesquite						
E5	CVCA, Phase 4	58	FY09	FY10		
	CVCA, Phase 5	71	FY10	FY11		
	CVCA, Phase 6	89	FY11	FY12		
	Total	218				

Land Cover Type			Managed Acres[1]	Year Established	Projected Year To Be Credited[2]	Actual Habitat Created (Acres)	Year Achieved
Marsh							
E14	Imperial Ponds, Field 18		12	FY08	FY10		
E9	Hart Mine Marsh – South		68	FY09	FY12		
E9	Hart Mine Marsh – North		106	FY10	FY13		
E28	Yuma East Wetlands		167	FY11	FY11		
		Total	353				
Backwater Isolated							
E14	Imperial Ponds		80	FY07	FY10		
E25	Big Bend		15	FY09	FY10		
		Total	95				
Total land cover projected to be established through FY12 is 2,566 acres							

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

[2] Projected. A habitat credit strategy is being developed and will be finalized in FY10.

Table 1-7. Summary of Fish Augmentation

REACH	RASU FY09	RASU PROGRAM	BONY FY09	BONY PROGRAM
2	12,496	38,097	0	6,998
3	5,848	28,728	4,073	17,892
4/5	5,955	44,100	2,506	11,067
Subtotal	24,299	110,925	6,579	35,957
Grand Total Both Species				**146,882**

Table 1-8. Status of Conservation Measures

Species/Habitat/Action	Code	Description	FY09 Approved	FY10 Approved	FY11 Proposed
Yuma Clapper Rail	CLRA1	Create habitat, 512 acres	C24 E1 E4 E5 E9 E12 E13 E14 E15 E19 E20 E21 E23 E26 F1 F2	C3 E9 E14 E16 E21 E26 E27 E28 F2 G1 G4	C3 E9 E14 E16 E21 E26 E27 E28 F2 F7 G1 G4
	CLRA2	Maintain existing important habitat	C24 D1 H1	C3 G1 G4 H1	C3 G1 G4 H1
	MRM1	Define habitat characteristics	C3 C21 C28 D1 D2 D5 D6 F1 F2	C3 C24 D1 E21 F2 G1 G4	C3 C24 D1 E21 F2 F7 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C28 D1 D2 D5 D6 F1 F2 F4	C3 C24 D1 F1 F2 G1 G4	C3 C24 D1 F1 F2 F7 G1 G4
	MRM5	Monitor selenium levels in backwater			
	CMM1	Reduce risk of loss to wildfire	E18	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire		F2 G1 G4	F2 G1 G4
Southwestern Willow Flycatcher	WIFL1	Create habitat, 4,050 acres	C5 C20 C24 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E22 E23 E24 G3 F1 F2	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4
	WIFL2	Maintain existing important habitat	C5 C20 C24 D3 D4 E21 H1	C3 D2 D3 D4 E21 F1 G1 G4 H1	C3 D2 D3 D4 E21 F1 G1 G4 H1
	MRM1	Define habitat characteristics	C3 C5 C28 D1 D2 D3 D4 D5 D6 F2	C3 C5 C24 C28 C37 C42 D2 D3 D4 D5 D6 E21 F2 G1 G4	C3 C5 C24 C28 C37 C42 D2 D3 D4 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C21 C28 D1 D2 D3 D4 D5 D6 F1 F2 F4	C24 C28 D2 D3 D4 D5 D6 F1 F2 G1 G4	C24 C28 D2 D3 D4 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation	D2	D2 G1 G4	D2 G1 G4
	CMM1	Reduce risk of loss to wildfire	E18	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire		F2 G1 G4	F2 G1 G4
Desert Tortoise	DETO1	Acquire, protect 230 acres	E16	C3 E29 G1 G4	C3 E29 G1 G4
	DETO2	Avoid impacts on individuals and burrows		C3 G1 G4	C3 G1 G4
Bonytail	BONY1	Coordinate conservation efforts with USFWS and recovery programs			
	BONY2	Create 360 acres of bonytail habitat	C25 C30 E2 E12 E13 E14 E15 E25 E26	C3 C25 C30 C32 C40 E2 E14 E15 E16 E25 E26 G1 G4	C3 C25 C30 C32 C40 E2 E14 E15 E16 E25 E26 G1 G4

Species/Habitat/Action	Code	Description	FY09 Approved	FY10 Approved	FY11 Proposed
	BONY3	Rear/stock 620,000: 4,000-6,000 sub-adult/year for 40 years Lake Mohave 4,000 sub-adult/year for 50 years Lake Havasu 8,000 experimental augmentation at Parker-Imperial for 5 consecutive years 4,000 sub-adults/year Parker-Imperial for 45 years	B2 B3 B4 B7 B8 B10 C11 C30 D8	B2 B3 B4 B7 B8 B10 C11 C30 C32 C39 C41 G1 G4	B2 B3 B4 B7 B8 B10 C11 C30 C32 C39 C41 C46 C47 C49 G1 G4
	BONY4	Develop (if necessary) additional rearing capacity	B2 B3 B4 B7 B8 B10 C11 C30	B2 B3 B4 B7 B8 B10 C11 C30 G1 G4	B2 B3 B4 B7 B8 B10 C11 C30 C46 C47 C49 G1 G4
	BONY5	Monitor and research, adaptive management populations and backwater habitat	B7 B8 B9 C11 C30 C34 D8 F5 G3	B7 B8 C11 C23 C30 C32 C34 C39 C40 C41 D8 F5 G1 G4	B7 B8 C11 C23 C30 C32 C34 C39 C40 C41 C44 C46 C47 C49 D8 F5 G1 G4
	MRM5	Monitor selenium levels in backwater	E15	G1 G4	G1 G4
Humpback Chub	HUCH1	$500,000 to existing programs	C14	C14 G1	C14 G1
Razorback Sucker	RASU1	Coordinate conservation efforts with USFWS and recovery programs			
	RASU2	Create 360 acres of razorback sucker habitat	C25 C30 C31 C32 E2 E12 E13 E14 E15 E25 E26	C3 C25 C30 C31 C32 C40 E2 E14 E15 E16 E25 E26 G1 G4	C3 C25 C30 C31 C32 C40 E2 E14 E15 E16 E25 E26 G1 G4
	RASU3	Rear/stock 660,000: 24,000 sub-adult/year for 5 years (Parker, Mohave — see plan) 6,000 sub-adult/year for 45 years Lake Havasu 6,000 sub-adult/year for 45 years Parker Dam	B1 B2 B3 B4 B5 B6 B7 B8 B10 B11C10 C30 C31 C32 C33 D8	B1 B2 B3 B4 B5 B6 B7 B8 B10 B11 C10 C26 C30 C31 C32 C33 C38 C41 G1 G4	B1 B2 B3 B4 B5 B6 B7 B8 B10 B11 C10 C26 C30 C31 C32 C33 C38 C41 C46 C48 C49 G1 G4
	RASU4	Develop (if necessary) additional rearing capacity	B2 B4 B3 B5 B6 B7 B8 B10 B11 C10 C30	B2 B3 B4 B5 B6 B7 B8 B10 B11 C10 C26 C30 G1 G4	B2 B3 B4 B5 B6 B7 B8 B10 B11 C10 C26 C30 C46 C48 C49 G1 G4
	RASU5	Support ongoing Lake Mohave conservation efforts	B1 B2 B7 B8 C12 C30 C31 C32 D8	B1 B2 B7 B8 C12 C30 C31 C32 C41 G1 G4	B1 B2 B7 B8 C12 C30 C31 C32 C41 G1 G4
	RASU6	Monitor and research, adaptive management populations and backwater habitat	B2 B7 B8 B11 C8 C10 C12 C17 C29 C30 C31 C32 C33 C34 D8 F5 G3	B2 B7 B8 B11 C8 C10 C23 C29 C30 C31 C32 C33 C34 C38 C40 C41 D8 F5 G1 G4	B2 B7 B8 B11 C8 C10 C23 C29 C30 C31 C32 C33 C34 C38 C40 C41 C44 C45 C46 C49 C50 D8 F5 G1 G4

Species/Habitat/Action	Code	Description	FY09 Approved	FY10 Approved	FY11 Proposed
	RASU7	Funding for ongoing Reclamation/SNWA Lake Mead Studies	B6 B11 C13	B6 B11 C13 G1 G4	B6 B11 C13 G1 G4
	RASU8	Continue conservation efforts identified in ISC/SIA BO	B1 B6 B8 B11 C8 C30	B1 B6 B11 C26 C30 G1 G4	B1 B6 B11 C26 C30 G1 G4
	MRM5	Monitor selenium levels in backwater		G1 G4	G1 G4
Western Red Bat	WRBA1	Status/habitat surveys	D9	C3 D9 F4 G1 G4	C3 D9 F4 G1 G4
	WRBA2	Create 765 acres	C5 D9 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E23 E24 F1 F4	C3 D9 E1 E3 E4 E5 E8 E16 E21 E24 G1 G4	C3 D9 E1 E3 E4 E5 E8 E16 E21 E24 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C18 C19 C24 C27 D1 D2	C3 C5 C35 D9 E21 F4 G1 G4	C3 C5 C35 D9 E21 F4 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C18 C19 C24 C27 D1 D2 F1 F4 G6	C3 F1 F4 G1 G4	C3 F1 F4 G1 G4
	CMM1	Reduce risk of loss of habitat to wildfire	E18	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			
Western Yellow Bat	WYBA1	Conduct surveys for species distribution	D9 F4	C3 D9 G1 G4	C3 D9 G1 G4
	WYBA2	Avoid removal of roost trees (palms)	F4	E16 F4 G1 G4	E16 F4 G1 G4
	WYBA3	Create 765 acres	C5 D9 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E23 E24 F1 F4	C3 D9 E1 E3 E4 E5 E8 E21 E24 F4 G1 G4	C3 D9 E1 E3 E4 E5 E8 E21 E24 F4 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C24 C27 C28 D1 D5	C3 C5 C35 D9 E21 F4 G1 G4	C3 C5 C35 D9 E21 F4 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C27 C28 D5 F1 F4	C3 F1 F4 G1 G4	C3 F1 F4 G1 G4
	CMM1	Reduce risk of loss of habitat to wildfire	E18	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			
Desert Pocket Mouse	DPMO1	Locate occupied habitat, restore disturbed habitat	C27 F3	C3 F3 G1 G4	C3 F3 G1 G4
Colorado River Cotton Rat	CRCR1	Status/habitat surveys — define habitat first 5 years	C27 F3 G3	C3 C27 F3 G1 G4	C3 C27 F3 G1 G4
	CRCR2	Create 125 acres	C27 E1 E3 E4 E5 E6 E7 E8 E16 E19 E21 E22 E24 F1 F3	C3 E9 E16 E21 G1 G4	C3 E9 E16 E21 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 C28 D11 F1 F3	C3 F1 F3 G1 G4	C3 F1 F3 G1 G4
	CMM1	Reduce risk of loss of habitat to wildfire	E18	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			
Yuma Hispid Cotton Rat	YHCR1	Status/habitat surveys — define habitat first 5 years	C27 F3 G3	C3 C27 G1 G4	C3 C27 G1 G4
	YHCR2	Create 76 acres	C27 E1 E3 E4 E5 E6 E7 E8 E16 E19 E22 E23 E24 F1 F3	C3 E16 E27 E28 G1 G4	C3 E16 E27 E28 G1 G4

Species/Habitat/Action	Code	Description	FY09 Approved	FY10 Approved	FY11 Proposed
	MRM2	Monitor and adaptively manage created habitat	C3 C24 C28 D11 F1 F3 F4	C3 F1 F3 G1 G4	C3 F1 F3 G1 G4
	CMM1	Reduce risk of loss of habitat to wildfire	E18	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			
Western Least Bittern	LEBI1	Create 512 acres	C24 E1 E3 E4 E5 E7 E8 E9 E12 E13 E14 E15 E19 E20 E21 E22 E26 F1 F2	C3 E9 E14 E16 E21 E26 E27 E28 G1 G4	C3 E9 E14 E16 E21 E26 E27 E28 F7 G1 G4
	MRM1	Define habitat characteristics	C3 C28 D1 D5 F1 F2	C3 C24 D1 E21 F2 G1 G4	C3 C24 D1 E21 F2 F7 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C28 D1 D5 F1 F2 F4	C3 C24 D1 F1 F2 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	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire		F2 G1 G4	F2 G1 G4
California Black Rail	BLRA1	Create 130 acres	C24 E1 E3 E4 E5 E8 E9 E12 E13 E14 E15 E23 F1 F2	C3 E14 E16 E26 E27 E28 G1 G4	C3 E14 E16 E26 E27 E28 F7 G1 G4
	BLRA2	Maintain existing occupied habitat	C24 D1 H1	C3 G1 G4 H1	C3 G1 G4 H1
	MRM1	Define habitat characteristics	C3 C28 D1 D5 D6 F1 F2	C3 C24 D1 F2 G1 G4	C3 C24 D1 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C28 D1 D2 D6 F1 F2 F4	C3 C24 D1 F1 F2 G1 G4	C3 C24 D1 F1 F2 G1 G4
	MRM5	Monitor selenium levels			
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire		F2 G1 G4	F2 G1 G4
Yellow-billed Cuckoo	YBCU1	Create 4,050 acres	C5 C21 C22 C24 E1 E3 E4 E5 E6 E8 E14 E19 E20 E21 E22 E23 E24 F1 F2	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4
	YBCU2	Maintain existing habitat	C5 C6 C21 C22 C24 E22 H1	C3 D7 E21 G1 G4 H1	C3 D7 E21 G1 G4 H1
	MRM1	Define habitat characteristics	C3 C5 C6 C22 C28 D1 D5 D6 D7 F1 F2	C3 C5 C24 C28 C37 C42 D5 D6 D7 E21 F2 G1 G4	C3 C5 C24 C28 C37 C42 D5 D6 D7 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 C22 C28 D5 D6 D7 F1 F2 F4	C3 C24 C28 D5 D6 D7 F1 F2 G1 G4	C3 C24 C28 D5 D6 D7 F1 F2 G1 G4

Species/Habitat/Action	Code	Description	FY09 Approved	FY10 Approved	FY11 Proposed
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire		F2 G1 G4	F2 G1 G4
Elf Owl	ELOW1	Create 1,784 acres reaches 3-5	C24 E1 E3 E4 E5 E6 E8 E19 E21 E22 E23 E24 F1 F2	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4
	ELOW2	Install elf owl boxes before Gila woodpeckers established		C3 G1 G4	C3 G1 G4
	MRM1	Define habitat characteristics	C3 C28 D1 D5 D6 F1 F2	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 C28 D5 D6 F1 F2 F4	C3 C24 D5 D6 F1 F2	C3 C24 D5 D6 F1 F2
	MRM3	Research nest competition European starlings		C3 G1 G4	C3 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire		F2 G1 G4	F2 G1 G4
Gilded Flicker	GIFL1	Create 4,050 acres reaches 3-7	C5 C24 E1 E3 E4 E5 E6 E8 E19 E21 E22 E23 F1 F2 G24	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
	GIFL2	Install artificial snags until vegetation has matured			
	MRM1	Define habitat characteristics	C3 C5 C28 D1 D5 D6 F1 F2	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 C5 C28 D5 D6 F1 F2 F4	C3 C24 D5 D6 F1 F2 G1 G4	C3 C24 D5 D6 F1 F2 G1 G4
	MRM3	Research nest competition European starlings		C3 G1 G4	C3 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire		F2 G1 G4	F2 G1 G4
Gila Woodpecker	GIWO1	Create 1,702 acres reaches 3-6	C5 C24 E3 E1 E4 E5 E6 E8 E19 E20 E21 E22 E23 E24 F1 F2	C3 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4
	GIWO2	Install artificial snags			
	MRM1	Define habitat characteristics	C3 C5 C28 D1 D5 D6 F1 F2	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 C5 C6 C28 D5 D6 F1 F2 F4	C3 C24 D5 D6 F1 F2 G1 G4	C3 C24 D5 D6 F1 F2 G1 G4
	MRM3	Research nest competition European starlings		C3 G1 G4	C3 G1 G4

Species/Habitat/Action	Code	Description	FY09 Approved	FY10 Approved	FY11 Proposed
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire		F2 G1 G4	F2 G1 G4
Vermilion Flycatcher	VEFL1	Create 5,208 acres	C5 C24 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E22 E23 E24 F1 F2	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C28 D1 D5 D6 F1 F2	C3 C5 C24 C28 C37 C42 D5 D6 E21 F2 G1 G4	C3 C5 C24 C28 C37 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C28 D5 D6 F1 F2 F4	C3 C24 C28 D5 D6 F1 F2 G1 G4	C3 C24 C28 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation	C1		
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire		F2 G1 G4	F2 G1 G4
Arizona Bell's Vireo	BEVI1	Create 2,983 acres	C5 C24 E1 E4 E5 E6 E8 E21 E22 E23 E24 F1 F2	C3 C5 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 C5 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C28 D1 D5 D6 F1 F2	C3 C24 C28 C37 C42 D5 D6 E21 F2 G1 G4	C3 C24 C28 C37 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C28 D5 D6 F1 F2 F4	C3 C24 C28 D5 D6 F1 F2 G1 G4	C3 C24 C28 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation			
Sonoran Yellow Warbler	YWAR1	Create 4,050 acres	C5 C24 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E22 E23 E24 F1 F2	C3 E1 E3 E4 E5 E8 E16 E21 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E27 E28 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C28 D1 D5 D6 F1 F2	C3 C5 C24 C28 C37 C42 D5 D6 E21 F2 G1 G4	C3 C5 C24 C28 C37 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C28 D5 D6 F1 F2 F4	C3 C24 C28 D5 D6 F1 F2 G1 G4	C3 C24 C28 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation	C1		
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire		F2 G1 G4	F2 G1 G4
Summer Tanager	SUTA1	Create 602 acres	C5 C24 E3 E4 E5 E6 E7 E8 E19 E20 E21 E22 E24 F1 F2	C3 E1 E3 E4 E5 E8 E16 E21 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E27 E28 G1 G4

Species/Habitat/Action	Code	Description	FY09 Approved	FY10 Approved	FY11 Proposed
	MRM1	Define habitat characteristics	C3 C5 C28 D1 D5 D6 F1 F2	C3 C5 C24 C28 C37 C42 D5 D6 E21 F2 G1 G4	C3 C5 C24 C28 C37 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 C28 D5 F1 F2	C3 C24 C28 D5 D6 F1 F2 G1 G4	C3 C24 C28 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation	C1		
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E28 G1 G4	E28 G1 G4
	CMM2	Replace created habitat affected by wildfire		F2 G1 G4	F2 G1 G4
Flat-tailed Horned Lizard	FTHL1	Acquire and protect 230 acres	E16	C3 G1 G4	C3 G1 G4
	FTHL2	Implement conservation measures to avoid take		C3 G1 G4	C3 E30 G1 G4
Relict Leopard Frog	RLFR1	10,000/year for 10 years to conservation program	C4	C4 G1	C4 G1
Flannelmouth Sucker	FLSU1	85 acres Reach 3	E15 E25 G3	C3 E15 E16 E25 G1 G4	C3 E15 E16 E25 G1 G4
	FLSU2	80,000/year for 5 years	C15	C15 G1 G4	C15 G1 G4
	FLSU3	Develop management needs/strategies	C15	C15 G1 G4	C15 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C15 C28 F4	C3 G1 G4	C3 G1 G4
	MRM5	Monitor selenium levels in backwater		G1 G4	G1 G4
MacNeill's Sootywing Skipper	MNSW1	Status surveys/habitat — define habitat first 5 years	C7	C3 C7 F6 G1 G4	C3 C7 F6 G1 G4
	MNSW2	222 acres	C7 E1 E3 E4 E5 E19 E21 E22 F1 F6	C3 E1 E3 E4 E5 E16 E21 G1 G4	C3 E1 E3 E4 E5 E16 E21 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C28 F1 F2 F4	C3 F1 F6 G1 G4	C3 F1 F6 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18 G3	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			
Sticky Buckwheat	STBU1	10,000 year until 2030 to MSCP HCP	C2	C2 G1	C2 G1
Threecorner Milkvetch	THMI1	10,000 year until 2030 to MSCP HCP	C2	C2 G1	C2 G1
California Leaf-nosed Bat	CLNB1	Distribution surveys	D9 F4	C3 D9 G1 G4	C3 D9 G1 G4 C34
	CLNB2	Create habitat near roost sites (priority when creating cottonwood-willow, mesquite habitat for other species)	C5 E21	C3 E1 E3 E4 E5 E8 E16 E21 E24 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 G1 G4 C34
	MRM1	Define habitat characteristics	C3 C5 C28 C27 D1 F1	C3 C5 D9 E21 F4 G1 G4	C3 C5 D9 E21 F4 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C27 C28 F1 F4	C3 F4 G1 G4	C3 F4 G1 G4

Species/Habitat/Action	Code	Description	FY09 Approved	FY10 Approved	FY11 Proposed
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habit affected by wildfire			
Pale Townsend's Big-eared Bat	PTBB1	Distribution surveys	D9 F4	C3 D9 G1 G4	C3 D9 G1 G4
	PTBB2	Create habitat near roost sites	C5 E21	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4
	MRM1	Determine habitat characteristics	C3 C5 C24 C27 C28 F1	C3 C5 D9 E21 F4 G1 G4	C3 C5 D9 E21 F4 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C24 C27 C28 F1 F4	C3 F4 G1 G4	C3 F4 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18 G1 G4	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			
Colorado River Toad	CRTO1	Distribution surveys, habitat affinity, limiting factors	C3	C3 D12 G1 G4	C3 D12 G1 G4
	CRTO2	Protect existing occupied habitat	H1	C3 G1 G4 H1	C3 G1 G4 H1
	CRTO3	Research to establish in unoccupied habitat		C3 G1 G4	C3 G1 G4
Lowland Leopard Frog	LLFR1	Distribution surveys, habitat affinity, limiting factors	C3 G3	C3D12 G1 G4	C3D12 G1 G4
	LLFR2	Protect existing occupied habitat	H1	C3 G1 G4 H1	C3 G1 G4 H1
	LLFR3	Research to establish in unoccupied habitat	C3 G3	C3 G1 G4	C3 G1 G4
Other					
Topock Marsh Pumping	AMM2	Avoid flow-related impacts on covered species	C21 C22 D2 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, Reclamation modified an existing contract to include the monitoring of 372 acres of occupied southwestern willow flycatcher habitat. This acreage is split into 11 different sites between Palo Verde Diversion Dam and Imperial Dam. Annual monitoring of soil moisture conditions at these sites is being performed to determine whether a change in soil moisture conditions has occurred due to water transfer actions. No change in soil moisture conditions attributable to water transfer actions was observed through 2008; therefore, no management actions have been required. Monitoring will continue under Work Task D3 for up to 5 years after implementation of all water transfer actions. A review of the current monitoring program, including methodology and results from the first 5 years, will be completed in FY10.

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

California Endangered Species Act (CESA) Permit

In conjunction with Federal ESA coverage, California State law requires CESA permitting for the California activities. The California Partners applied for and received a CESA Incidental Take Permit pursuant to CDFG Code sections 2081(a) and 2081(b). The California Partners negotiated the terms of the CESA permit with CDFG to be

compatible with the LCR MSCP. This CESA permit provides compliance only for California Partners.

The LCR MSCP conservation activities fulfill the requirements of the CESA permit. However, certain CESA permit requirements are more specific in relationship to location or timing. All other CESA permit requirements are otherwise the same as those for the LCR MSCP. The LCR MSCP accomplishments in FY09 also meet the CESA permit requirements. 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 FY09, 72,828 RASU and 28,959 BONY have been stocked into reaches 3, 4, and 5. Since the start of the LCR MSCP, more than 101,787 native fish have been stocked into the lower river in California.

Through FY09, 283 acres of cottonwood-willow land cover have been established at the Palo Verde Ecological Reserve (PVER). It is anticipated that more than 700 acres will be established through FY11.

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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 Web site. Through the end of 2009, the program has stocked 146,882 native fish (Table 1-7).

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

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

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

1. Willow Beach NFH (USFWS)
2. Achii Hanyo Rearing Station (USFWS)
3. Dexter NFH (USFWS)

4. Bubbling Ponds SFH (AGFD)
5. Lake Mead SFH (NDOW)
6. Uvalde NFH (USFWS)
7. Overton WMA (NDOW)

FY09 Accomplishments

Fish Augmentation work tasks are presented in Section B. Key accomplishments for FY09 include:

- successful capture of over 27,000 wild RASU larvae from Lake Mohave (B1)
- tagging and stocking of 6,581 RASU from Willow Beach NFH (B2)
- tagging and stocking of 4,579 BONY from Achii Hanyo Rearing Station (B3)
- providing 50,000 larval RASU to Bubbling Ponds SFH, providing 3,903 fingerling BONY to Willow Beach NFH, and tagging and stocking 2,637 BONY from Dexter NFH (B4)
- tagging and stocking 14,197 RASU from Bubbling Ponds SFH (B5)
- rearing and transfer of RASU from Lake Mead SFH (B6) to Overton WMA (B11)
- tagging and stocking 520 large RASU from lakeside ponds (B7)

FY10 Activities

Fish augmentation actions currently underway in FY10 are similar to those conducted in FY09, with similar results expected. One major work action underway for FY10 is the update and revision of the Fish Augmentation Plan. After five years of rearing and stocking fish (2005-2009), a number of changes and adjustments have been proposed for this program. First, new protocols are being 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) are notified of stocking plans before the events occur. Second, 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). Third, fish production levels were to be ramped up to provide extra fish for species research in the years FY11-FY15, but prerequisite research needs are pushing these target dates into Phase 3 (FY16-FY20).

Proposed FY11 Activities

Similar to FY10, routine fish augmentation program plans for FY11 look to repeat the highly successful activities conducted over the first five years of the program and described in work tasks B1through B11. A substantial funding increase is being requested for B7 to replace the earthen dike that separates Yuma Cove backwater from Lake Mohave proper.

Stocking targets for FY11 are as follows:

- Reach 2 will receive a total of 6,000 RASU. These will be wild-caught larvae collected at Lake Mohave and reared at either Willow Beach Hatchery or in lakeside ponds. No BONY will go into Reach 2.
- Reach 3 will receive 8,000 RASU from Bubbling Ponds SFH 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 Facility (satellite of Willow Beach NFH).
- 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.

FY09 Accomplishments

Fish research work tasks presented in Section C detail accomplishments for FY09. Some of the more significant findings from FY09 are:

- The warm spring source of Bubbling Ponds SFH is such that RASU being reared for the LCR MSCP grow well all winter long (C10).
- Polyculture research shows that RASU and BONY can successfully be reared together in the same pond (C10).
- RASU in Lake Mead have successfully recruited new wild fish into their population for more than 25 consecutive years (C13).
- Juvenile and subadult flannelmouth sucker use Laughlin Lagoon and Big Bend backwaters (C15).
- Remote PIT-tag monitoring units can provide population estimates without having to recapture native fish (C23, C25).
- The concentrations of salt and formalin recommended for killing quagga mussels are totally ineffective (C30).
- Larvae collected from Lake Mohave appear to adequately represent genetic diversity of historical stock (C31).
- Dissolved oxygen levels must be maintained at or above 3 mg/l for proper development of RASU eggs and larvae (C32).

FY10 Activities

Many of the native fish research actions underway in FY09 are continuing in FY10. Research remains focused on propagation and culturing, brood stock maintenance, post-stocking survival, habitat use and needs, genetics, and developing new/improved

monitoring tools. Probably the most important work that started in FY10 is the tracking of BONY in Reach 3 to better understand causes of poor post-stocking survival (C39).

Proposed FY11 Activities

In addition to continuing research from FY09 and FY10, FY11 will include the start of new investigations to manage food resources in floodplain ponds (C44), to reassess the genetic makeup of RASU brood stock at Dexter (C48), to track BONY movements below Parker Dam (C49), and to coalesce RASU data from Reach 3 to develop a reach-wide habitat use assessment and gain a better ecological perspective of this evolving population (C45).

Accelerated Research

A major component of the conservation strategy for native fish laid out in the HCP is the stocking of large numbers of RASU and BONY each year for five consecutive years, and to then conduct intensive follow-up research. The HCP describes this research as follows:

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

> "Monitoring and focused research will be a component of the adaptive management process. In particular, the stocking of 24,000 subadult fish for 5 consecutive years (conservation measure RASU3, submeasure 1) will be conducted as an adaptive management experiment, elements of which will include focusing augmentations in locations that currently support large numbers of fish, followed by intensive monitoring and research for an estimated 7-8 years." (HCP, RASU6, p. 5-49)

Three items have become apparent to suggest that these conservation measures (BONY3, BONY5, RASU3, RASU6) should be revisited: 1) stocking levels for BONY are too low to initiate the accelerated research, 2) post-stocking survival of fish in Reach 4/5 is too poor to expect acceptable research results, and 3) invasion of the exotic quagga mussel is adversely impacting both production and research.

Annual stocking requirements under this accelerated research are 24,000 RASU and 12,000 BONY per year for five years. Reclamation originally anticipated that production of RASU and BONY would reach the levels necessary to meet requirements for these research actions sometime in FY10/FY11. Production of RASU attained this level and more than 24,000 fish were stocked in FY09 (Table 1-7). BONY production levels are such that 12,000 fish could be reared; however, this number has never been attained due to issues over stocking fish from Uvalde NFH. Therefore, accelerated, focused, intensive

research and monitoring for BONY cannot begin until these stocking issues are cleared up.

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

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

The HCP specifically states:

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

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

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

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

System Monitoring (Section D)

System monitoring is conducted on existing populations of covered fish species to determine population status, distribution, density, migration, productivity, and other ecologically important parameters. The system monitoring for RASU and BONY is covered in D8. Monitoring data for FLSU are included in the research actions covered in C15. Reclamation annually presents this information by project reach in a status report to the LCR MSCP Steering Committee.

FY09 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 300-500 adults, but larvae and juvenile fish were observed, along with active spawning in three separate areas. However, BONY are absent from this reach. Reach 2 had a population of roughly 1,500 repatriated RASU. Fewer than 50 wild RASU are estimated to still remain in the reservoir. Only repatriated BONY were present, but recapture numbers were too low to generate a population estimate. Reach 3 also had a strong RASU population, with roughly 1,500 adults observed in spawning populations between Laughlin, Nevada, and Needles, California. Active spawning was observed and larvae were occasionally found, but no juvenile fish were located.

This reach also had a healthy population of FLSU, estimated to comprise some 2,500 adults, but these fish were mostly found in the upper 10 miles of this reach. Researchers observed and captured juvenile FLSU in both Laughlin Lagoon and Big Bend backwaters. Fingerling size FLSU were captured along the river margin in late spring, and adults most often occupied main channel habitats.

Only stocked BONY were captured from Reach 3 and these were mostly near the point of release. All BONY captured after more than three months post-release were located in the Bill Williams River bay or river mouth in the most downstream portion of this reach.

Fish surveys in Reach 4/5 were limited. Netting and electrofishing in the main channel sections of Reach 4 upstream of Headgate Rock Dam during the winter failed to yield any native fishes, despite more than 8,000 having been stocked during the year. Visual surveys in early spring did locate an aggregation of razorback suckers, which may be the initial formation of a spawning group. Successful surveys for native fish in Reach 4/5 were mostly limited to floodplain ponds located at Imperial Refuge. Populations in these ponds are discussed under C25.

FY10 Activities

Monitoring will continue in all reaches. Data will be gleaned from monitoring, from research actions, and from results supplied by partners. Results will be summarized by reach. Underwater surveys will be conducted by SCUBA divers below Hoover Dam to generate seasonal counts of adult RASU. Permit issues are being resolved to allow surveys in Reach 4 along the CRIT tribal lands.

Proposed FY11 Activities

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

Conservation Area Development (Section E)

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

Post-Development Monitoring (Section F)

Post-development monitoring will be conducted at each conservation area following completion of habitat creation activities. This monitoring will evaluate both the maturation of the site as it develops into covered species habitat and the use of the habitat by the covered species. Post-Development Monitoring of Fish Restoration Sites (F5) provides funding to support post-development monitoring of Beal Lake and Imperial Ponds. Monitoring of the connected backwater at Big Bend Conservation Area will begin in 2010.

Adaptive Management Program (Section G)

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

The current needs of the AMP are in the form of data collection and organization so that, when needed, the information can be readily accessed for use in the decision-making process. For native fishes, all stocking and tagging data developed by the LCR MSCP are maintained in an electronic database (G1).

Another aspect of the AMP that is needed early on is a tool box of evaluation techniques that can gauge the effectiveness of conservation measures as they are completed. Adaptive Management Research Projects (G3) will allow for the development of these tools. Funds allocated from G3 are used to initiate reconnaissance level investigations. If more research is needed, the work is written up as a separate research study and submitted for funding under Section C above.

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

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

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

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

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

Species Research (Section C)

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

Species research work tasks focus on key priorities set in the Five-year Monitoring and Research Priorities document. Two of the work tasks (C2 and C4) are specific to stand-alone conservation measures in which money is transferred to another entity to support ongoing programs for Sticky Buckwheat, Threecorner Milkvetch, and the Relict Leopard Frog.

Habitats have been characterized for the MacNeill's Sootywing (C7) and the results are being incorporated into new restoration sites. Sootywing surveys will continue at restoration sites under F6.

Habitat requirements continue to be determined for many of the avian species under Avian Species Habitat Requirements (C24). Habitat suitability index models are being developed for riparian avian species such as the yellow warbler, Arizona Bell's vireo, and summer tanager. Yellow-billed cuckoo habitat modeling is also being studied under this work task, along with habitat preferences for marsh bird use.

In FY09, a new work task, Nest Predation on Avian Covered Species (C28), was created from a study that began under G3. This study will be completed in FY10 and will help determine whether management actions can be designed to minimize predation threats, which have been identified as the leading cause of nest failure for southwestern willow flycatchers along the LCR.

Four new work tasks were developed for FY10. Western Red Bat and Western Yellow Bat Roosting Characteristics Study (C35) will determine roosting characteristics for the western red bat and western yellow bat. An Elf Owl Detectability Study (C36) will establish modifications needed to the current tape playback presence/absence elf owl survey to make it more efficient and effective. Hydrology Studies for Avian Riparian Obligate Species (C37) will determine what hydrologic conditions such as soil moisture, depth to ground water, and amount of standing water are needed underneath habitat for the willow flycatcher and yellow-billed cuckoos in order to duplicate these conditions at habitat creation sites. Finally, Experiments and Demonstration of Soil Amendments for Use in Restoration Sites (C42) will test particular soil amendments to aid in water retention, to be used in the design and management of created habitats planned in Section E.

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

System Monitoring (Section D)

System monitoring is being conducted to determine the ongoing status of covered species and their habitats in the LCR MSCP planning area. System monitoring programs that were established prior to LCR MSCP implementation were continued in FY08 and FY09. In FY11, new system-wide surveys will begin 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.

Two system monitoring work tasks, Southwestern Willow Flycatcher Presence/Absence Surveys (D2) and Southwestern Willow Flycatcher Habitat Monitoring (D3), continue existing monitoring for the SWFL and its habitat. Occupied SWFL habitat is monitored between Parker and Imperial dams under the 2001 BO requirements subsumed within the LCR MSCP (D3). The 2001 BO Reasonable and Prudent Measure 4 requires annual presence/absence surveys for up to five years after the implementation of all water transfers (D2), while Conservation Measure 4 requires habitat monitoring to be conducted annually for the same time period (D3). In FY10, a five-year review will be conducted to assess the efficacy of the protocol and to review the results.

An additional investigation, Study of Interactions between the Tamarisk Leaf Beetle and Nesting Southwestern Willow Flycatcher, is being conducted under D2. This study will help determine potential effects that defoliation by the tamarisk leaf beetle may have on nesting habitat in the future along the LCR. The leaf beetle was released in St. George, Utah in 2006, and by 2008, populations had exploded and defoliated nesting habitat utilized by the SWFL. This beetle is spreading southward and is expected to encompass sites monitored by the LCR MSCP by either 2010 or 2011. This study will show the potential effects of the leaf beetle on nesting habitat, determine potential effects on SWFL source populations along the Virgin River and LCR, and help prioritize new conservation area placement.

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

System monitoring for YBCU was initiated in FY06 and surveys continue under D7 utilizing a species-specific protocol to provide data on this late successional riparian obligate species. Data from these studies will be used to help design and manage created habitats in Section E. Presence/absence surveys continued in FY09 and for the first time a nestling YBCU, which had been banded at an LCR MSCP conservation area (CVCA) in FY08, was found utilizing and nesting in another LCR MSCP conservation area (PVER).

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.

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 FY09, post-development monitoring for habitat characteristics and LCR MSCP covered species use was conducted at several riparian restoration demonstration sites and habitat creation sites (Table 1-9). Each proposed habitat creation project will be designed to provide habitat requirements for targeted covered species. To evaluate effectiveness in providing these habitat requirements, pre- and post-development monitoring will be conducted for targeted covered species, including avian species (F2), small mammals (F3), bats (F4), and insects (F6). In FY11, a new work task (F7) was added for marsh bird post-development monitoring. Pre-development marsh bird monitoring was initially conducted under D1.

Table 1-9. LCR MSCP Covered Species Post-Restoration monitoring in FY09

Conservation Area	Vegetation	Avian	YBCU	SWFL	Small Mammals	Bats	Marsh Birds
Beal Lake	X	X	X	X	X	X	
‘Ahakhav Tribal Preserve	X	X	X	X	X	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 FY09, pre-development data were collected for sites or phases proposed for habitat creation implementation, including Palo Verde Ecological Reserve (E4), Cibola Valley Conservation Area (E5), and Hart Mine Marsh (E9). Post-development monitoring occurred for sites or phases where implementation has already occurred, including Beal Lake Riparian Restoration (E1), ‘Ahakhav Tribal Preserve (E3), Palo Verde Ecological Reserve (E4), Cibola Valley Conservation Area (E5), and Cibola NWR Unit #1 (E24). Post-development habitat monitoring is expected to continue through the life of the program at intervals determined by age and successional stages of each stand.

Adaptive Management Program (Section G)

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

Data Management (G1) is an integral component of any conservation program, including the LCR MSCP. Funds are allocated to design a data management system capable of tracking all information needed in the decision making process. Implementation of the data management system continued in FY09 with the restructuring of the LCR MSCP SharePoint and Web sites. In FY10 and FY11, the main database structure will be built and data modules will be constructed for fish, birds, mammals, land, hydrological features, GIS, adaptive management, project management, and administration.

Funding has been allocated under Adaptive Management Research Projects (G3) to begin priority research studies identified when applicable. Research projects associated with riparian species that began under G3 in FY09 include a study that was initiated on the hydrology and water management of southwestern willow flycatcher known breeding sites at Topock Marsh. Studies initiated in FY10 under G3 include Population Demographics and Habitat Use of the California Leaf-nosed Bat, which will become a new work task (C43), and habitat use by the two cotton rats, which will become an extension of the existing C27 work task.

Conservation Area Development and Management

A major component of the LCR MSCP is the creation and management of habitat. Section E addresses the identification, selection, development, and management of created habitat and any restoration research being conducted. In general, habitat creation projects target land cover types with the intent that the vegetation is managed for or developed into a specific habitat. The term “created habitat” is typically used when an established land cover type has met or exceeded its species-specific performance standard. Land cover type is defined in the HCP as, “the dominant feature of the land surface discernible from aerial photographs defined by vegetation, or human uses.” This definition is used in conjunction with species-specific performance standards to evaluate the creation of habitat.

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

As described in the conservation measures, habitat creation goals for the LCR MSCP include the establishment of:

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

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

Conservation areas developed primarily for riparian and honey mesquite land cover types such as PVER (E4), CVCA (E5), and Cibola NWR Unit #1 (E24) involve the conversion of existing land cover types (such as active agricultural, fallow agricultural, and undeveloped land) to native riparian species. Restoration research priorities are being developed as a part of the *Final Science Strategy*. The requirements are expected to include methods to cost effectively establish and manage planned land cover types while excluding growth of nonnative plant species. Completed terrestrial restoration research projects include Beal Lake Riparian Restoration (E1), ‘Ahakhav Tribal Preserve (E3), Cottonwood Genetics Study (E6), Mass Transplanting Demonstration (E7), and Seed Feasibility Study (E8).

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

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

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

Site Identification and Selection

A logical process for identifying and selecting locations for habitat creation projects contributes to the overall success of the LCR MSCP. In general, ideal sites are those that have the greatest potential for successfully achieving the desired habitat in the most cost-effective manner. Although this objective appears obvious, it is obscured by a number of variables that can affect both cost-effective development and habitat success. These variables can be 1) logistical: site accessibility, available infrastructure, availability of

sufficient resources (water); 2) physical: depth to groundwater, soil texture and chemistry, water quality, eutrophic stage; and 3) political: potential impacts to other species or habitats, permitting requirements, and landowner/partner support. This represents only a portion of the known variables that must be considered when identifying and selecting sites, as unforeseen factors can contribute to greater costs and may limit success in habitat creation. As the program proceeds, this newly acquired knowledge will be incorporated into the site selection processes outlined in E15 and E16. Appropriate adaptations are being made through the AMP to properly address and apply newly acquired information, allowing for more accurate assessment of development costs and success potential for future habitat creation projects.

FY09 Accomplishments

Conservation Areas FY09 accomplishments focused on securing properties for both the desert tortoise and flat-tailed horned lizard (FTHL). Three federal appraisals were conducted to establish fair market value for privately held lands occupied by desert tortoises within the Chuckwalla Bench ACEC. The appraisals were conducted with the permission of the landowners who had previously expressed interest in selling their parcels. In total, 260 acres of land were appraised. Work Task E29: Desert Tortoise has been established as a new start in FY10 and will track future accomplishments.

The Anza-Borrego Desert State Park (located in Borrego Springs, California) and Dos Palmas Preserve were identified as having the potential to fulfill the conservation measure for the FTHL. The Dos Palmas Preserve has privately held lands occupied by FTHL; however, it was unknown whether FTHL were present on privately held lands within the Anza-Borrego Desert State Park. A FTHL survey was conducted at the Anza-Borrego Desert State Park. The state park was identified because the park's non-profit foundation maintains many large tracts of land available for acquisition and permanent protection. Trained FTHL monitors from Reclamation, BLM, and California State Parks participated in a three-day presence/absence survey. The survey showed an inconclusive presence of FTHLs. In light of the survey, the recommendation was made to focus efforts within the Dos Palmas Preserve.

Backwater Site Selection Evaluation of Step 4 for two existing backwaters in reaches 5 and 6, Headquarter Lake and Secret Lake, was completed. Further evaluations were suspended, to provide Reclamation an opportunity to formulate a backwater strategy for addressing research needs and acreage goals related to backwater development.

FY10 Activities

Conservation Areas FY10 activities focus on securing properties to satisfy the FTHL conservation measure, development of draft habitat goals by reach and state, and evaluation of backwaters created from existing dry ground. With the passing by the Steering Committee of Program Decision Document 10-001: Land Approval in October 2009, Reclamation is directed to evaluate unprotected properties within the Salt Creek ACEC of the Dos Palmas Preserve for inclusion into the program for the protection of FTHL. Secured properties would be donated to the BLM and managed as FTHL habitat. All FTHL acquisition costs prior to FY11 will be captured under this work task.

Figure 1.

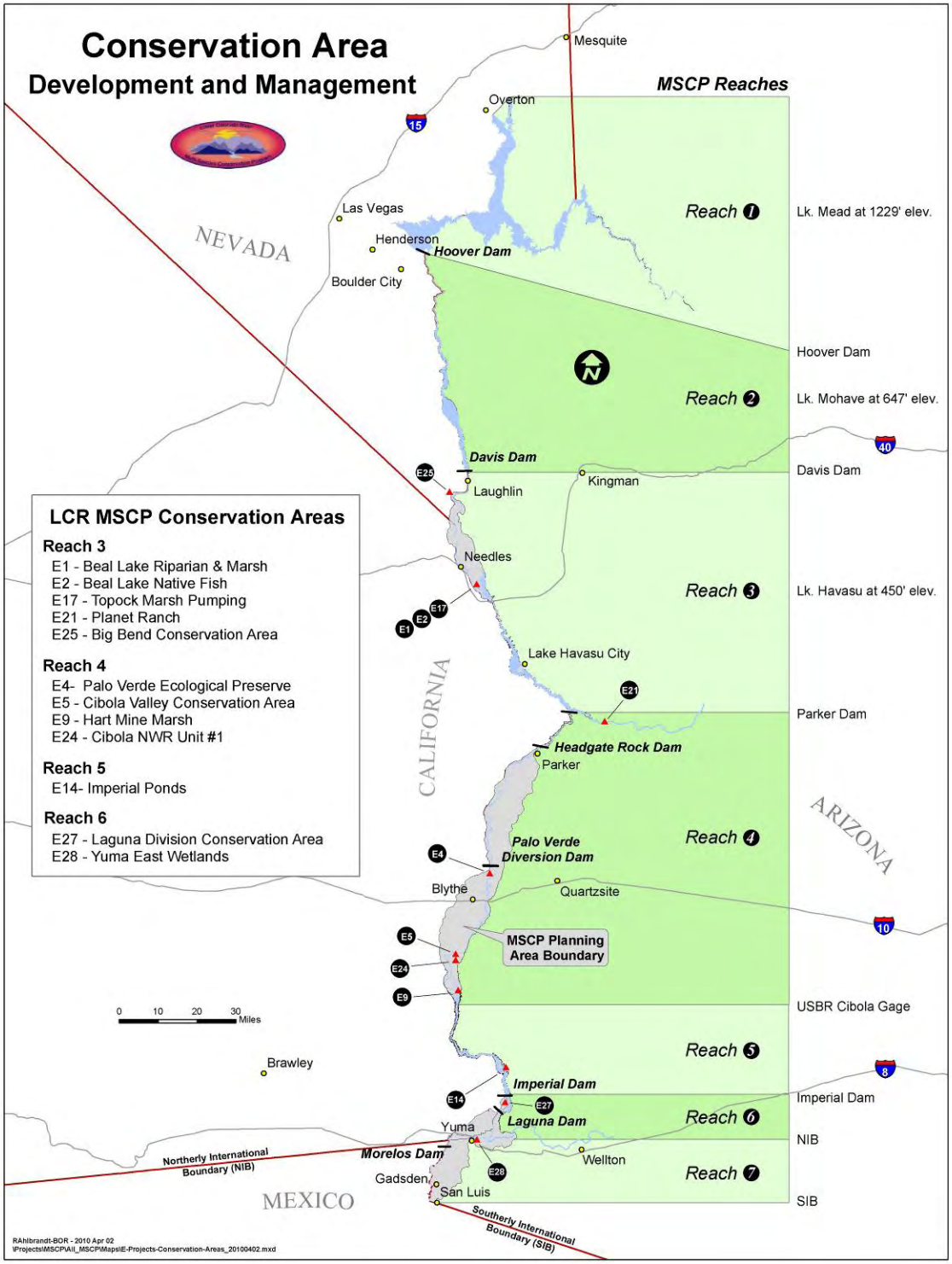

Conservation Area
Development and Management
MSCP Reaches
Mesquite
Overton
Las Vegas
Henderson
Hoover Dam
Boulder City
NEVADA
Reach 1
Lk. Mead at 1229' elev.
Hoover Dam
Reach 2
Lk. Mohave at 647' elev.
Davis Dam
Kingman
Laughlin
Davis Dam
LCR MSCP Conservation Areas
Reach 3
E1 - Beal Lake Riparian & Marsh
E2 - Beal Lake Native Fish
E17 - Topock Marsh Pumping
E21 - Planet Ranch
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
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
0 10 20 30 Miles
Reach 5
Brawley
Imperial Dam
Imperial Dam
Reach 6
Laguna Dam
Yuma
NIB
Morelos Dam
Wellton
Northerly International Boundary (NIB)
Gadsden
Reach 7
San Luis
SIB
MEXICO
Southerly International Boundary (SIB)
RAhlbrandt-BOR - 2010 Apr 02
\Projects\MSCP\All_MSCP\Maps\E-Projects-Conservation-Areas_20100402.mxd

Figure 2.

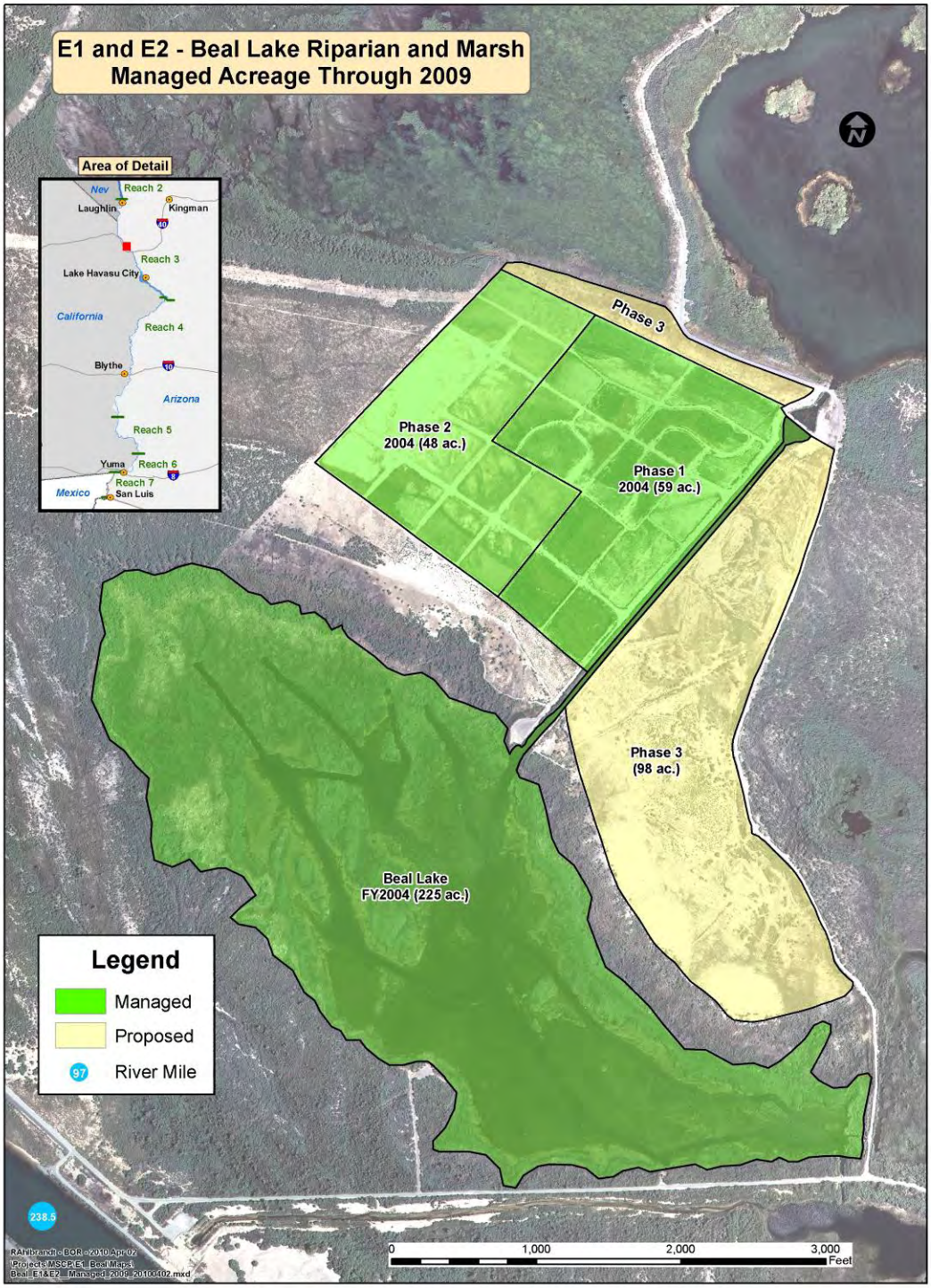

E1 and E2 - Beal Lake Riparian and Marsh
Managed Acreage Through 2009
Area of Detail
Nev
Reach 2
Laughlin
Kingman
Reach 3
Lake Havasu City
California
Reach 4
Blythe
Arizona
Reach 5
Yuma
Reach 6
Reach 7
San Luis
Mexico
Phase 3
Phase 2
2004 (48 ac.)
Phase 1
2004 (59 ac.)
Phase 3
(98 ac.)
Beal Lake
FY2004 (225 ac.)
Legend
Managed
Proposed
River Mile
97
238.5
0
1,000
2,000
3,000
Feet

Figure 3.

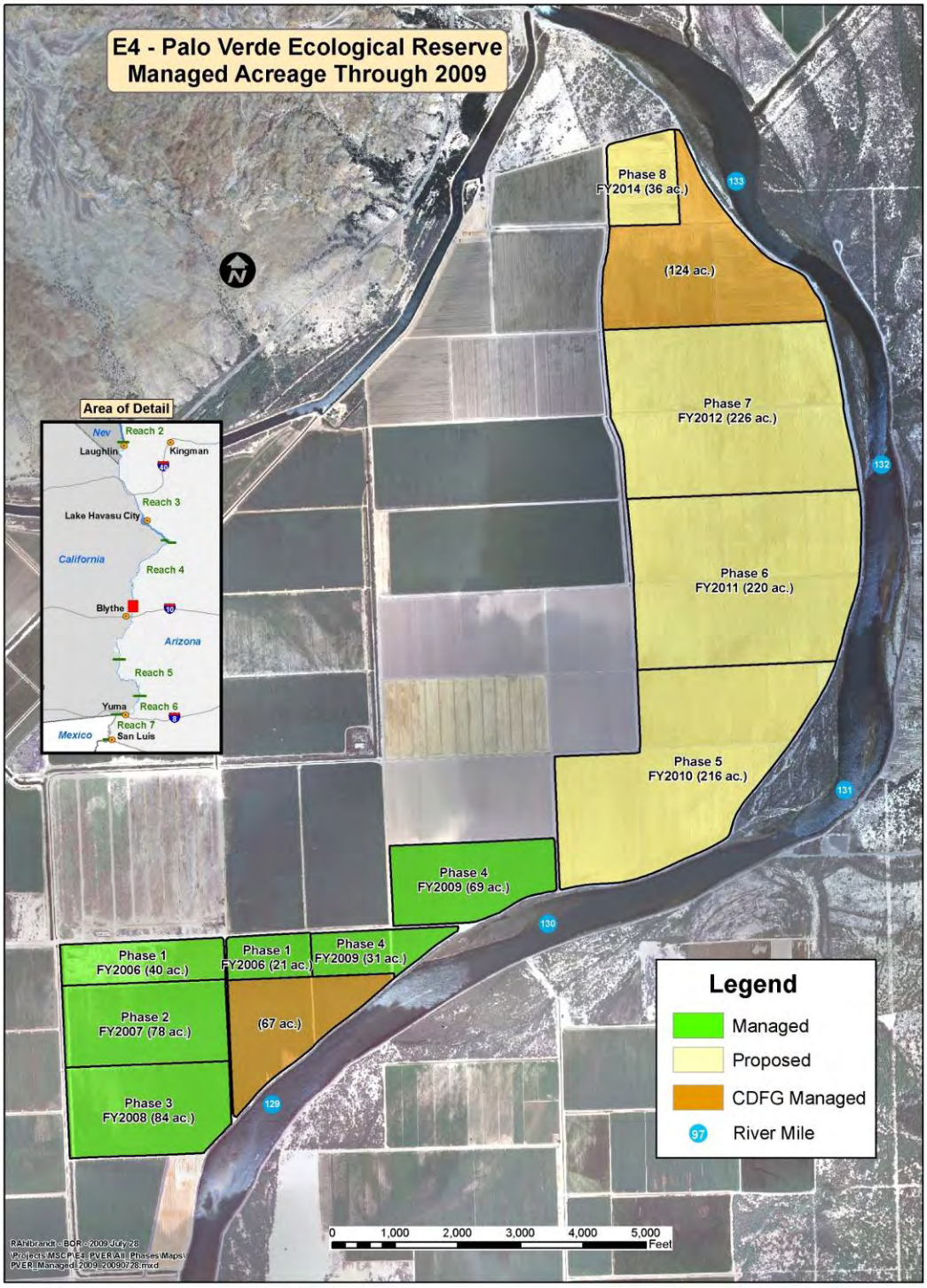

E4 - Palo Verde Ecological Reserve
Managed Acreage Through 2009
Phase 8
FY2014 (36 ac.)
(124 ac.)
Phase 7
FY2012 (226 ac.)
Phase 6
FY2011 (220 ac.)
Phase 5
FY2010 (216 ac.)
Phase 4
FY2009 (69 ac.)
Phase 1
FY2006 (40 ac.)
Phase 1
FY2006 (21 ac.)
Phase 4
FY2009 (31 ac.)
(67 ac.)
Phase 2
FY2007 (78 ac.)
Phase 3
FY2008 (84 ac.)
133
132
131
130
129
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
97
River Mile
0
1,000
2,000
3,000
4,000
5,000
Feet
RAhlbrandt - BOR - 2009 July 28
\Projects\MSC\PE4_PVER\All Phases\Maps\
PVER_Managed_2009_20090728.mxd

Figure 4.

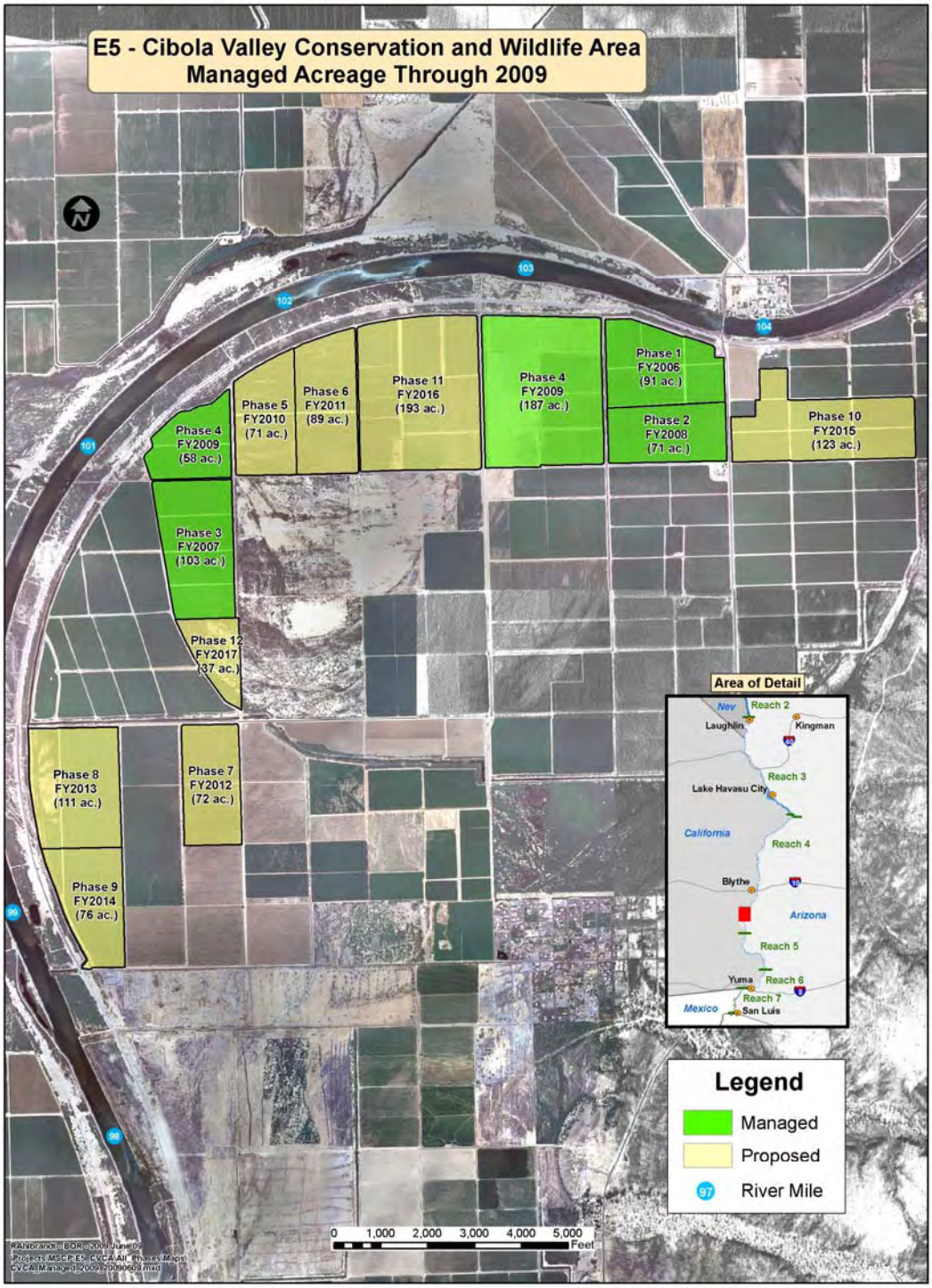

E5 - Cibola Valley Conservation and Wildlife Area
Managed Acreage Through 2009
Phase 1 FY2006 (91 ac.)
Phase 2 FY2008 (71 ac.)
Phase 3 FY2007 (103 ac.)
Phase 4 FY2009 (58 ac.)
Phase 4 FY2009 (187 ac.)
Phase 5 FY2010 (71 ac.)
Phase 6 FY2011 (89 ac.)
Phase 7 FY2012 (72 ac.)
Phase 8 FY2013 (111 ac.)
Phase 9 FY2014 (76 ac.)
Phase 10 FY2015 (123 ac.)
Phase 11 FY2016 (193 ac.)
Phase 12 FY2017 (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.

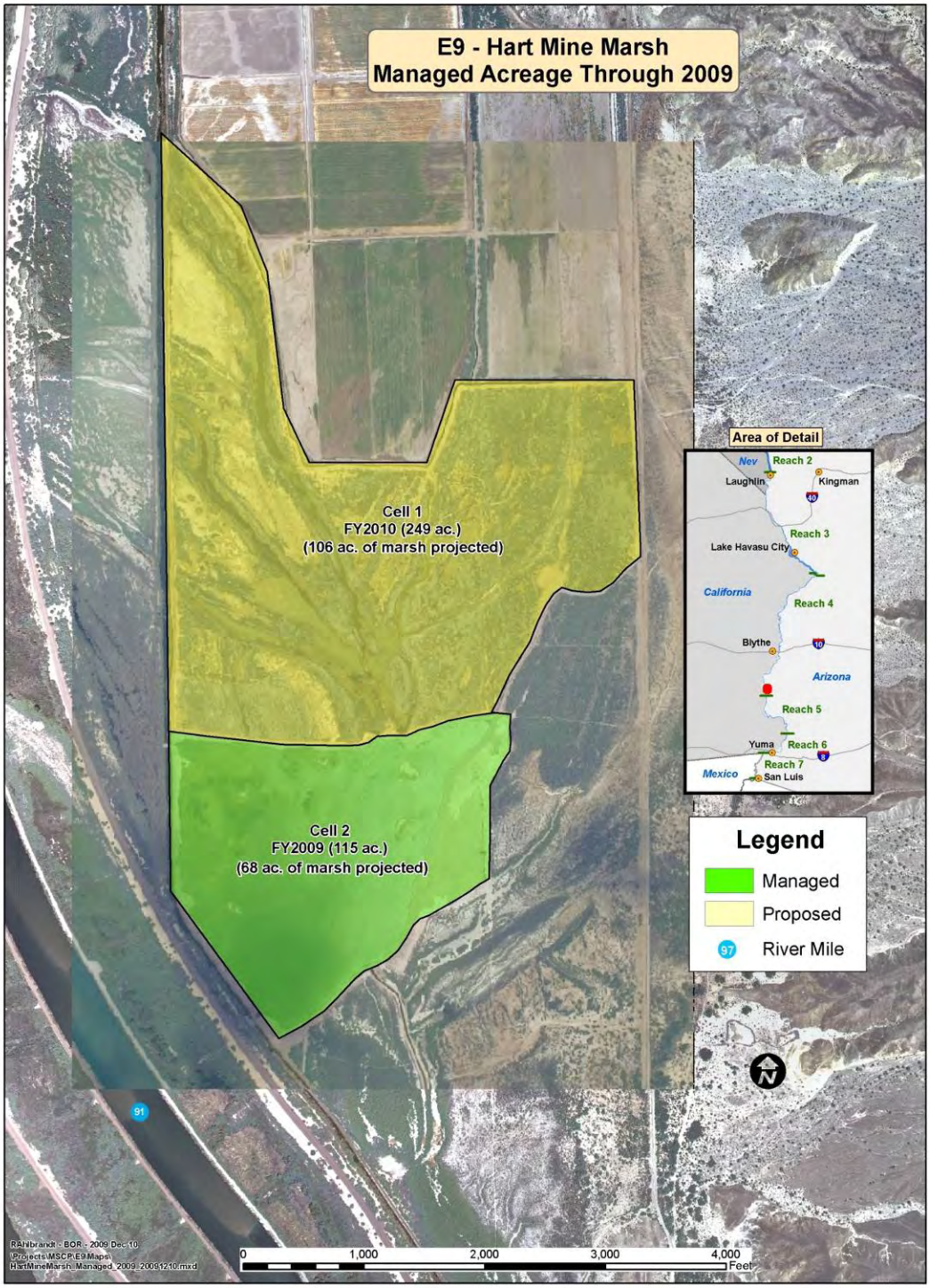

E9 - Hart Mine Marsh
Managed Acreage Through 2009
Cell 1
FY2010 (249 ac.)
(106 ac. of marsh projected)
Cell 2
FY2009 (115 ac.)
(68 ac. of marsh projected)
Area of Detail
Nev
Reach 2
Laughlin
Kingman
Reach 3
Lake Havasu City
California
Reach 4
Blythe
Arizona
Reach 5
Yuma
Reach 6
Reach 7
Mexico
San Luis
Legend
Managed
Proposed
River Mile
0
1,000
2,000
3,000
4,000
Feet

Figure 6.

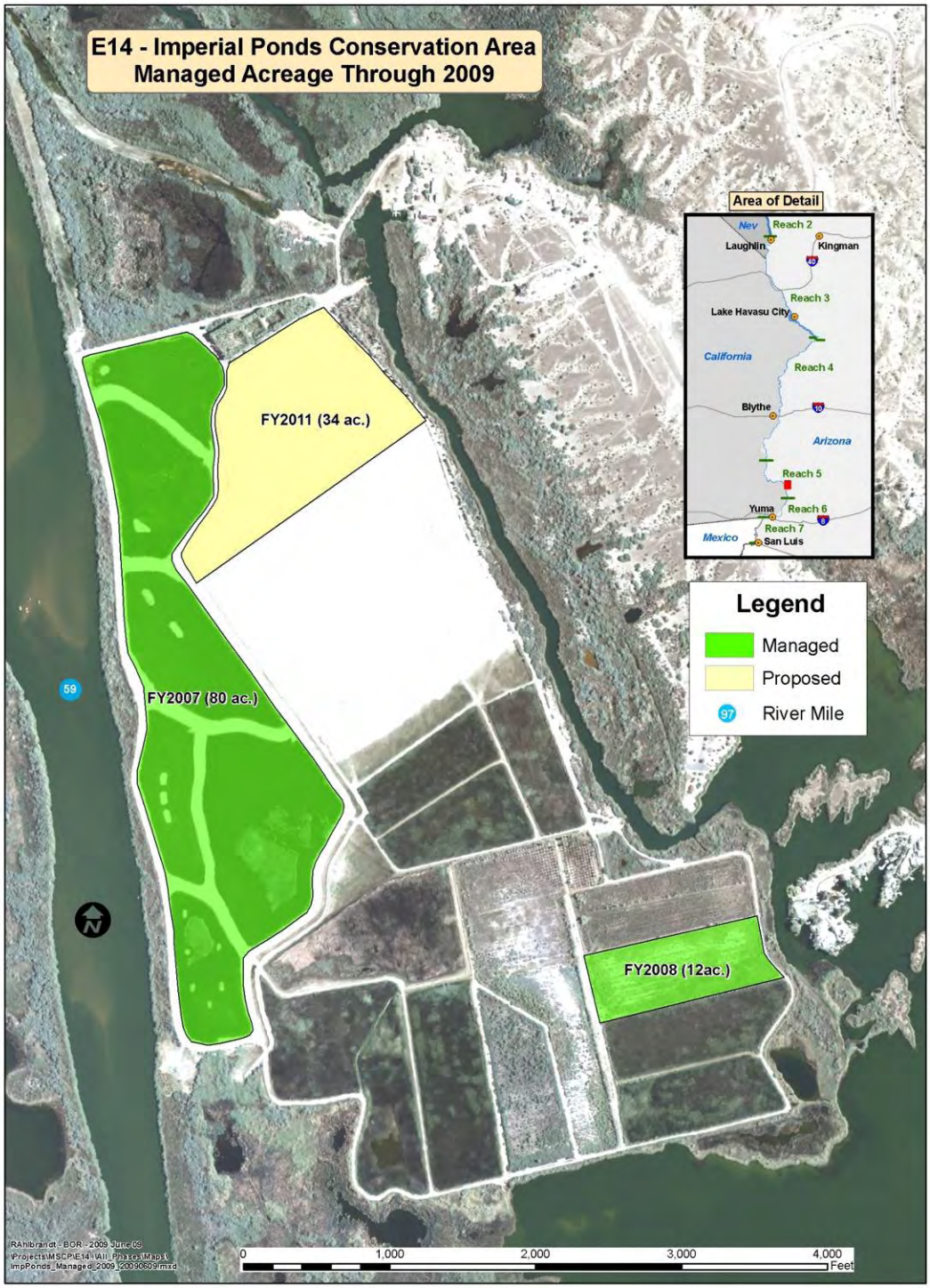

E14 - Imperial Ponds Conservation Area
Managed Acreage Through 2009
Area of Detail
Nev
Reach 2
Laughlin
Kingman
Reach 3
Lake Havasu City
California
Reach 4
Blythe
Arizona
Reach 5
Yuma
Reach 6
Reach 7
Mexico
San Luis
Legend
Managed
Proposed
River Mile
FY2011 (34 ac.)
FY2007 (80 ac.)
FY2008 (12ac.)
59
0
1,000
2,000
3,000
4,000
Feet

Figure 7.

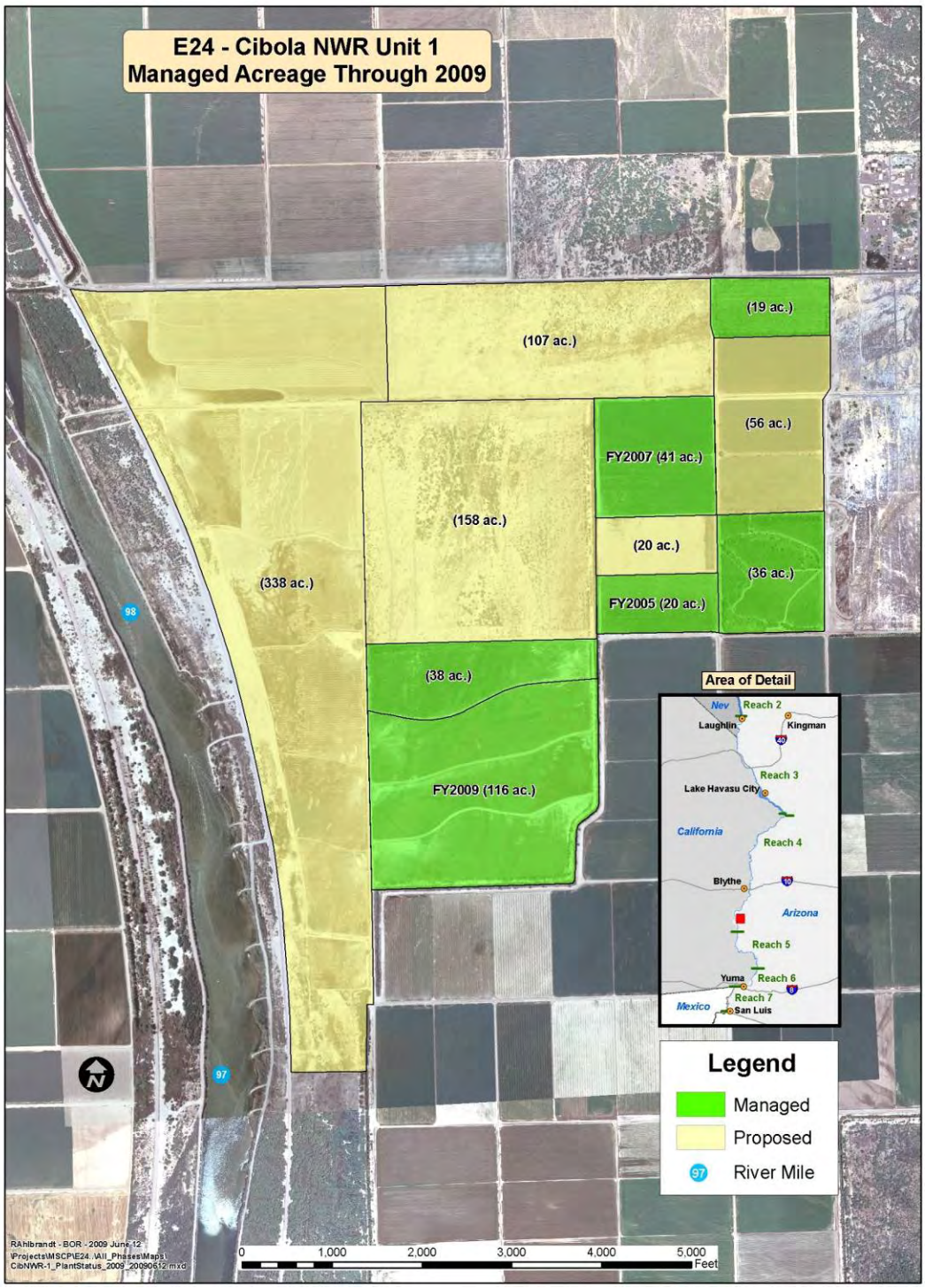
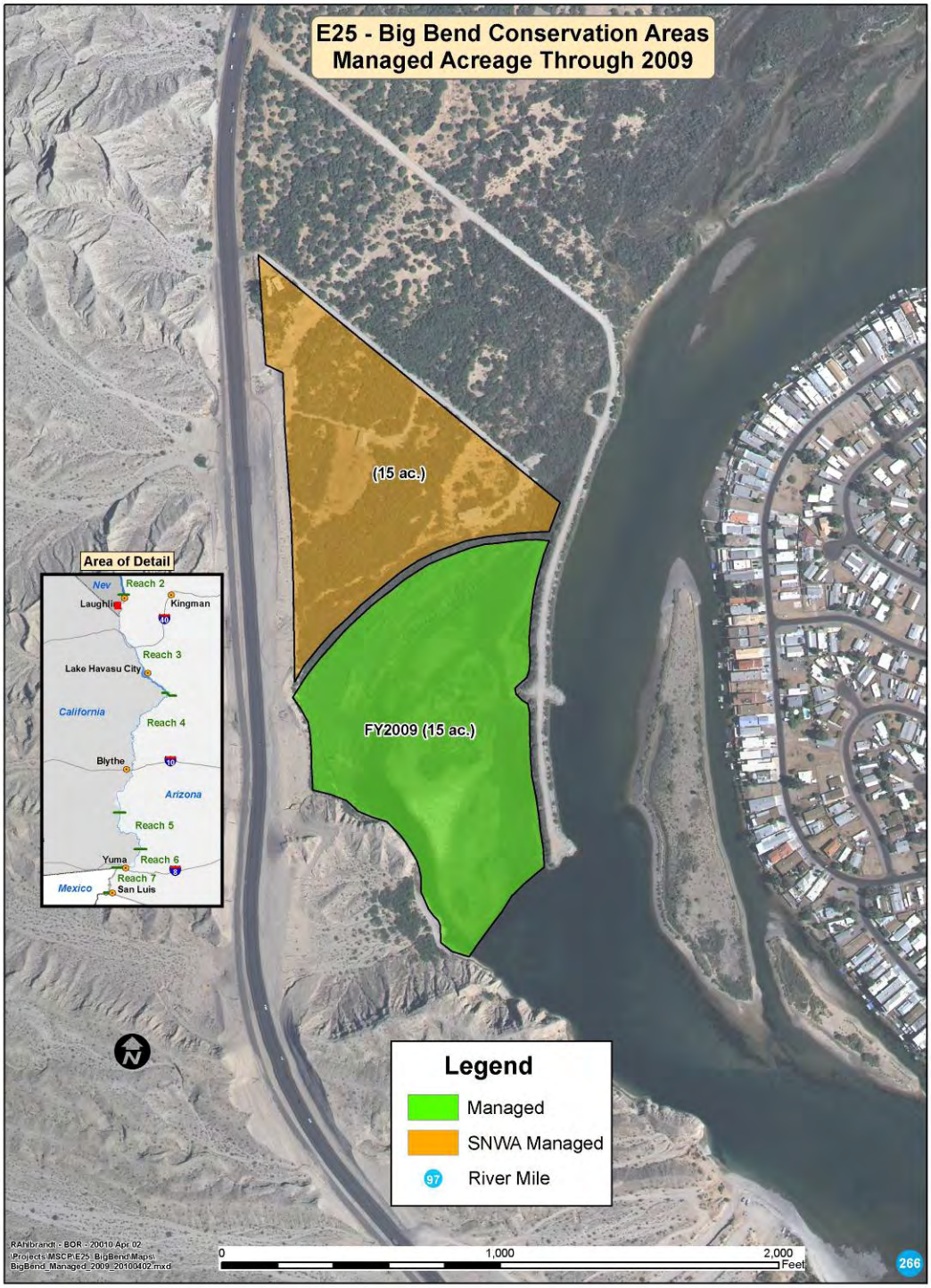

E24 - Cibola NWR Unit 1
Managed Acreage Through 2009
(19 ac.)
(107 ac.)
(56 ac.)
FY2007 (41 ac.)
(158 ac.)
(20 ac.)
(36 ac.)
(338 ac.)
FY2005 (20 ac.)
(38 ac.)
FY2009 (116 ac.)
98
97
Area of Detail
Nev
Reach 2
Laughlin
Kingman
Reach 3
Lake Havasu City
California
Reach 4
Blythe
Arizona
Reach 5
Yuma
Reach 6
Reach 7
Mexico
San Luis
Legend
Managed
Proposed
River Mile
0
1,000
2,000
3,000
4,000
5,000
Feet
RAhlbrandt - BOR - 2009 June 12
\Projects\MSCP\E24. \All_Phases\Maps\
CibNWR-1_PlantStatus_2009_20090612.mxd

Figure 8.


E25 - Big Bend Conservation Areas
Managed Acreage Through 2009
(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
266

Costs include preliminary site visits for lands and realty personnel, discussions with the BLM, working with landowners, and costs of appraisals. Beginning in FY11, Flat-tailed Horned Lizard (E30) will track expenditures to secure properties and turn over management to the BLM.

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

At least one backwater, which would be created at existing or potential conservation areas, will be identified and evaluated. This effort is being initiated to bring a backwater created from dry ground to parity with existing backwaters identified under Backwater Site Selection (E15).

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

FY11 Proposed Activities

Conservation Areas FY11 activities will focus on the identification and evaluation of potential conservation areas. Specific activities include completion of the site selection process for sites identified under the 2008 RFP. Steps 2-6 of the *Draft Final Guidelines for the Screening and Evaluation of Potential Conservation Areas* will be conducted if the sites meet the goals identified in the workshop held in FY10.

As a follow up to the workshop to define the draft habitat goals by reach and state, it is anticipated that landowners will be contacted to define their willingness to participate in the LCR MSCP and identify specific areas for evaluation. Areas acceptable to both the landowner and the LCR MSCP would be evaluated using the site-selection guidelines.

Backwater Site Selection Minimal activities are projected until the five-year backwater strategy is completed. At that time, backwater inventory and selection is anticipated to resume at increased funding levels and to focus on backwaters within the state of California.

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.

FY09 Accomplishments

Land covers created during research efforts at Beal Lake Riparian Restoration and the ‘Ahakhav Tribal Preserve were irrigated, managed, and monitored. Both projects were managed through FY09.

At the site of E8 (Seed Feasibility Study), an additional set of willow plots were established to determine whether the best treatments (most successful in terms of establishment, survival, and density) would have repeatable results and not simply be a product of random variability. The interim results indicate a higher degree of promise than for previous small plot willow trials. Establishment success was high with less establishment of saltcedar. The researchers suggest that a reduction in saltcedar seed source next to the main canal and plots may have contributed to this lower observed saltcedar establishment. Grasses and other weedy species are also abundant in these plots, but do not seem to be out-competing the willows at this stage. Growth rates for the willows in these plots are still lower than what we have observed in other mass-transplanted areas; however, this may be a site-specific (local) effect.

Using seed appears to be feasible in terms of logistics and cost-effectiveness for establishing native riparian trees. However, using seed as a large-scale restoration method for the LCR MSCP still needs to be evaluated. This evaluation will be made by using a longer-term assessment of the survival and competition of seed-established trees, as pertains to the establishment of habitat for LCR MSCP cover species. Although these

2009 willow plots are showing more promise than previous willow trials, no additional experimentation will be conducted under this work task. Reclamation will participate in longer-term monitoring and assessment of the experimental plots to make an assessment for the large-scale feasibility of this technique. The work task will be closed in FY10.

FY10 Activities

Irrigation and monitoring of lands created at Beal Lake Riparian Restoration will continue for the entire year. Irrigation and monitoring conducted by the LCR MSCP at the ‘Ahakhav Tribal Preserve ceased on January 1, 2010. A decision to continue research, manage the lands as habitat, or cease LCR MSCP involvement is anticipated at both Beal Lake Riparian Restoration and the ‘Ahakhav Tribal Preserve.

No additional seed feasibility research activities or expenditures will be undertaken for this work task for FY10. The E8 work task will be closed. Reclamation will continue to participate in monitoring of the small plots to determine whether the positive trend for seed-established natives (in terms of survival and competition versus non-native species) will continue. An assessment will also be made as to whether the seeded plots show promise for habitat creation for LCR MSCP covered species and whether the composition of native versus nonnative species is acceptable for other habitat and fire management aspects. If this longer-term assessment shows promise for large-scale seeding, a demonstration project using the techniques and protocols established by this study may be advertised and funded at a future time. At that time, the E8 work task will be reopened depending on steering committee input. Maintenance of this site will be covered under conservation area maintenance for Cibola NWR Unit #1 (E24).

FY11 Proposed Activities

FY10 is a decision point for both Beal Lake Riparian and the ‘Ahakhav Tribal Preserve. At each site, additional research, irrigation and management for habitat, or closure from the program is anticipated.

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.

FY09 Accomplishments

Conservation Area	Existing Acreage	FY09 (ac)	Total (ac)
E25: Big Bend	0	15	15
E4: PVER	223	100	323
E5: CVCA	265	245	510
E9: Hart Mine Marsh	0	68	68
E24: Cibola NWR	0	154	154

FY10 Activities

Conservation Area	Existing Acreage	FY10 (ac)	Total (ac)
E4: PVER	323	216	539
E5: CVCA	510	71	581
E9: Hart Mine Marsh	68	106	174

FY11 Proposed Activities

Conservation Area	Existing Acreage	FY11 (ac)	Total (ac)
E4: PVER	539	220	759
E5: CVCA	581	89	670

WORK TASKS SECTION A

PROGRAM ADMINISTRATION

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Work Task A1: Program Administration

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$1,231,780	$1,065,356.20	$4,650,873.21	$1,313,220	$1,212,438	$1,212,438	$1,212,438

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.

FY09 Accomplishments: Program Administration for FY09 continued the management of the LCR MSCP. Ongoing administrative activites included financial, human resources, and support for the program. Coordination with the Steering Committee continued with Steering Committee meetings held in October 2008 and April 2009. A work group meeting was held in February 2009 to review program financial status, a draft program decision document for a land and water acquisition fund, trip reports from the 2008 Request for Projects, and the Backwater Site Assessment Report. The *Final Implementation Report, Fiscal Year 2010 Work Plan and Budget, Fiscal Year 2008 Accomplishsment Report* was prepared. A work group meeting was held in September 2009 to review the upcoming actions of the Steering Committee, which included the Flat-

Tailed Horned Lizard Land Resolution and a strategy for implementing AMM2 at Topock Marsh.

FY10 Activities: Program Administration for FY10 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 2011 Work Plan and Budget, Fiscal Year 2009 Accomplishsment Report* will be prepared. Financial tracking for the program will continue and the annual financial work group meeting will be held. Processes for the program will continue to be developed including criteria for use of the Habitat Maintenance Fund, and in conjunction with the USFWS, crediting methodology for habitat mosaics will be developed. A workshop to review habitat goals was held in January 2010 and a work group meeting to review upcoming Steering Committee actions was held in March.

Proposed FY11 Activities: Program Administration for FY11 will continue the management of the LCR MSCP. Ongoing administrative activities include financial, human resources, and support for the program. Coordination with the Steering Committee will continue with biannual Steering Committee meetings, specific work group meetings, and email announcements. The *Final Implementation Report, Fiscal Year 2012 Work Plan and Budget, Fiscal Year 2010 Accomplishsment 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. Procedures for long-term maintenance will be developed.

Pertinent Reports: The *Final Implementation Report, Fiscal Year 2010 Work Plan and Budget, Fiscal Year 2008 Accomplishments* is posted on the LCR MSCP Web site. The *Implementation Report, Fiscal Year 2011 Work Plan and Budget, Fiscal Year 2009 Accomplishment Report* (Draft and Final versions) will be posted to the Web site.

WORK TASKS SECTION B

FISH AUGMENTATION

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Work Task B1: Lake Mohave Razorback Sucker Larvae Collections

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$200,000	$206,001.63	$1,016,321.45	$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 brood stock in Lake Mohave, maintain the brood stock, 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 brood stock 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 brood stock and the remaining larvae are reared for release into reaches 3-5 to accomplish augmentation goals of the program.

FY09 Accomplishments: Twenty-seven thousand five hundred and twelve (27,512) wild larvae were collected from four areas. The contribution of larvae from each zone of Lake Mohave by month of capture is presented in Table 1.

Table 1. Larval RASU Collected from Lake Mohave, 2009

Zone	January	February	March	April	Total
Nine Mile	183	2,912	2,930	0	6,025
Tequila	0	2,205	5,000	1,285	8,490
Yuma	217	3,000	4,133	1,635	8,985
AOP	0	0	570	3,442	4,012
Total	**400**	**8,117**	**12,633**	**6,362**	**27,512**

Subsamples from each zone and for each month were preserved and provided to Arizona State University for genetic analyses. A status report summarizing the larval fish collections from 2005 to 2009 was developed and is in review. This report will be finalized in 2010 and posted to the LCR MSCP Web site.

FY10 Activities: A target of 36,000 larvae has been established for 2010. Thirty-three thousand larvae will be delivered to Willow Beach NFH for initial rearing, but 3,000 of these will be transferred to NDOW's Lake Mead Hatchery. Approximately 3,000 wild larvae will be captured during March and delivered to Arizona State University for research. In addition to the four lake zones shown in Table 1, a survey will be conducted in the lowermost portion of Lake Mohave to search for additional new spawning sites. If spawning groups are located, attempts will be made to capture larvae from these areas. The status report developed in 2009 will be finalized and posted to the LCR MSCP Web site.

Proposed FY11 Activities: RASU larval collections will continue. The target level for FY11 is 30,000 to 35,000 larvae.

Pertinent Reports: A status report for the larvae collection program will be posted to the LCR MSCP Web site.

Work Task B2: Willow Beach National Fish Hatchery

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$350,000	$503,628.30	$1,457,476.07	$250,000	$250,000	$250,000	$250,000

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

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Fish Augmentation

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

Location: Reach 2, Willow Beach, Arizona

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

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

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

1. **Receive fish to be reared.** Annually receives wild RASU larvae collected from Lake Mohave and fingerling BONY (25-75 mm TL) from Dexter NFH.

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

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

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

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

FY09 Accomplishments: During 2009, some 27,512 RASU larvae were received from Lake Mohave, 10,130 fingerling BONY were transferred to Achii Hanyo for further rearing, and 1,653 RASU juveniles (>300 mm TL) were stocked to lakeside rearing ponds (B7). A total of 6,383 RASU were repatriated into Lake Mohave (Reach 2), and 198 RASU were stocked into Imperial Ponds (Reach 5). The majority of funds were for salary and consumable materials (fish feed, medicines, chemicals, etc.). Additional funds that became available in FY09 were used to acquire two gas-powered feed carts, one aluminum fish transportation tank, four high-output stainless steel UV sterilizers, stainless steel submersible pumps, diffuser stones, office furniture, flow meters, bird netting, and associated hardware. Additionally, all of the solar heating panels for warming water in the outside raceways were replaced during the year.

FY10 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 3,700 RASU of the 2006 year class, 7,700 RASU of the 2007 year class, 18,000 RASU of the 2008 year class, and 13,900 RASU of the 2009 year class. At the end of 2009 there were approximately 4,500 BONY of the 2009 year class at the hatchery. Some of these fish may be transferred to Achii Hanyo (B3). Investigations into the efficacy of potassium chloride and formalin for removing quagga mussel from transport tanks at Willow Beach NFH (C30) have been initiated. Two more raceways will be converted to form a recirculation system for production of native fish.

Proposed FY11 Activities: The hatchery will continue to receive RASU larvae from Lake Mohave and will continue to rear and distribute RASU and BONY for the LCR MSCP Fish Augmentation Program.

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

Work Task B3: Achii Hanyo Rearing Station

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$170,000	$169,669.00	$426,736.46	$100,000	$150,000	$150,000	$150,000

Contact: Andrea Montony, (702) 293-8203, amontony@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 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 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), Parker, Arizona. There are seven 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 additon, 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.

FY09 Accomplishments: At the start of the year 5,156 BONY exceeding 250 mm, and 4,000 young-of-the-year BONY were on station, along with about 500 RASU. At the end of the year, 4,579 BONY and 413 RASU were harvested, tagged, and stocked into the LCR. Also, fish research assessing RASU growth to 500 mm TL (C10) and polyculture of RASU and BONY (C11) were conducted (both research actions will be completed in 2010). Installation of a pond liner and a new generator were completed. Levee roads were graded and resurfaced with gravel around the ponds.

FY010 Activities: The BONY on station for the start of 2010 include 7,500 young-of-the-year and 10,000 yearling fish, all supplied from Dexter NFH. Production goals will remain at 4,000 BONY greater than 300 mm TL.

Proposed FY11 Activities: BONY left on station from FY10 will be reared to target size, fingerling BONY will be delivered from either Dexter NFH or Willow Beach NFH, and two additional ponds are scheduled to be put into service to increase fish production and research. The funding increase for FY11 reflects the reassignment of funds originally programmed for BONY production and research at Uvalde NFH.

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

Work Task B4: Dexter National Fish Hatchery

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$250,000	$229,364.46	$737,211.07	$180,000	$180,000	$200,000	$220,000

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

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Maintain fish-rearing capability to provide RASU and BONY for the LCR MSCP Fish Augmentaion 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 brood stock, and annually provide RASU and BONY to the LCR MSCP Fish Augmentaion Program.

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

Project Description: Dexter NFH is managed and operated by the USFWS. The facility maintains the only brood stock for BONY in the world, and maintains a backup brood stock of RASU. Funds provided will be used to maintain extant brood stock, produce fingerling BONY annually for distribution to other hatcheries, rear RASU to 500 mm TL for repatriation to the LCR for brood stock 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 2008, a total of 136 RASU have been repatriated to Reach 2, a total of 794 RASU have been stocked into Reach 3, a total of 9,911 BONY have been stocked into Reach 3, and a total of 535 BONY have been stocked into Reach 4.

FY09 Accomplishments:

BONY. Dexter NFH staff maintained 3,000 adult BONY brood stock. The stock comprises six year classes of Lake Mohave origin fish. Staff from the USFWS hormonally induced and hand-stripped eggs and sperm from 64 adult BONY, producing 170,000 larvae. In April of 2009, 10,000 eggs were provided to the Bozeman FTC for research under C11. Approximately 50,000 swim-up larvae were stocked in one 0.35-acre pond at Dexter for grow out and eventual distribution to Reach 3 of the Lower Colorado River and to Willow Beach NFH and Achii Hanyo Rearing Station for rearing. A total of 3,903fingerling BONY were transferred to Willow Beach NFH for grow out. No larvae were transferred to Willow Beach NFH or Uvalde NFH during 2009. USFWS staff wire-tagged, hauled, and stocked a total of 2,637 subadult BONY (300+ mm TL): 2,102 into Lake Havasu proper at Bill Williams NWR, and 535 into High Levee Pond at Cibola NWR (Reach 3). A new road grader was purchased to develop and maintain ponds and roadways on site. This grader will allow construction of three new ponds for production of BONY for future research.

RASU. Dexter staff maintained a refuge stock of 1,300 adult RASU. The brood stock comprises nine year classes of Lake Mohave origin fish. USFWS staff hormonally induced and hand-stripped eggs and sperm from 40 adult RASU, producing 160,000 larvae. Of these, 50,000 larvae were transferred to Bubbling Ponds SFH, and 92,000 were transferred to Uvalde NFH for rearing. Approximately 18,000 were kept 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 2,588 RASU (400+ mm TL) were repatriated to Lake Mohave (Reach 2). No RASU were stocked into Reach 3.

FY10 Activities: The BONY brood stock 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, Bubbling Ponds SFH, and Uvalde NFH); 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.

Due to an invasion of exotic quagga mussels to the Colorado River, Dexter NFH will provide 50,000 RASU larvae to Bubbling Ponds SFH from hand-spawned brood stock held on station.

Proposed FY11 Activities: The BONY brood stock 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 report, *2005-2009 Fish Augmentation Summary*, is in preparation and will be posted to the LCR MSCP Web site.

Work Task B5: Bubbling Ponds Fish Hatchery

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$335,000	$259,449.57	$1,078,127.69	$250,000	$250,000	$250,000	$250,000

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

Start Date: FY05

Expected Duration: FY55

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

Conservation Measures: RASU3 and RASU4

Location: Off-river, Cornville, Arizona

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

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

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

Previous Activities: Reclamation and AGFD have cooperatively worked to upgrade and renovate this facility since 1998. 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 2008, Bubbling Ponds SFH has reared and stocked 40,567 RASU.

FY09 Accomplishments: A total of 50,000 fry were received from Dexter NFH in April for rearing, and should reach target size in 2011 and 2012. During 2009 a total of 14,197 RASU were harvested, PIT/wire-tagged, and stocked: 2,592 were repatriated into Lake Mohave, 5,848 were stocked into Lake Havasu (Reach 3), and 5,757 were stocked at River Island State Park below Parker Dam (Reach 4).

During 2009 funds were expended for the following: salary and associated costs for fish rearing activities, coating raceways and holding tanks with epoxy, purchase of new pipe for the water supply to the hatchery, design of intensive culture plans for the hatchery, and nets and materials for live-trapping river otters.

FY10 Activities: Bubbling Ponds SFH began 2010 with approximately 76,000 RASU on station. Of this total, 1,200 stem from wild larvae captured in 2005 from Lake Mohave. These fish should reach target size during 2010 and will be repatriated back to Lake Mohave. The remaining fish on station are from Dexter NFH and are expected to reach target size in 2010 and 2011. An additional 50,000 larvae from Dexter NFH are scheduled to be delivered in spring 2010.

New production features are being designed that consolidate fish culture into a single-pass, serial-use system to improve bio-security (escapement and invasion) and predator avoidance/control, reduce pathogenic agents, and facilitate harvest. Construction of these new features is scheduled to begin in 2010.

Additional funds made available in 2010 will be used for the purchase and installation of new perimeter fence to restrict otter access, replacement of old water lines, evaluation of engineering options for developing a new artesian well on site, and construction of a new storage facility for feed and a place for sterilizing nets and boots.

Proposed FY11 Activities: RASU larvae will be received from Dexter NFH; RASU from the 2008 and 2009 year classes will continue to be reared; 12,000 RASU (300 mm TL) will be sorted, tagged, and delivered to the lower Colorado River, and annual progress reports will be produced. Construction of production design features will continue. As features are completed, normal fish culture activities will be dovetailed into the new systems.

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

Work Task B6: Lake Mead Fish Hatchery

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$50,000	$31,769.89	$234,327.35	$50,000	$50,000	$50,000	$50,000

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

Start Date: FY05

Expected Duration: FY16

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

Conservation Measures: RASU3, RASU4, RASU7, and RASU8

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

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

Connections with Other Work Tasks (past and future): Activities at Lake Mead SFH are related to B11, C13, and C26. Razorback sucker larvae are captured from Lake Mead as part of the Lake Mead Razorback Study (C13) and reared at Lake Mead SFH. Once fish reach subadult size, they are transferred to grow-out ponds at Overton WMA to complete the rearing process (B11). A portion of the subadult fish are also utilized to evaluate rearing of RASU in flowing conditions (C26).

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

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

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

rearing RASU collected from Lake Mead. Installation took place in the new native fish room and included plumbing for air and water delivery lines, standpipe and standpipe screen construction, and placement of a central drain line. The native fish room was completed in 2006 with the addition of twenty-five 10-gallon aquaria, four 240-gallon fiberglass troughs, and six 700-gallon fiberglass tanks. In both 2007 and 2008 larval RASU were brought into the facility and reared in these tanks.

FY09 Accomplishments: 1,554 larval RASU (1,497 from Las Vegas Bay, 7 from Echo Bay, and 50 from the Overton Arm) were collected from Lake Mead during the course of the spawning season and taken to Lake Mead SFH for grow out. In addition to these wild-caught Lake Mead larvae, 3,812 larval RASU from Lake Mohave (2,482 from Tequila and Yuma coves and 1,330 available from RASU studies under C32) were also taken to the hatchery for grow out. To make room for incoming larvae NDOW delivered and stocked 2,182 juvenile RASU (2007 and 2008 year classes) into Center Pond at the Overton WMA. An additional 1,194 subadult RASU were also moved out of the native fish room to provide space for incoming larvae. These subadult fish will remain on station to evaluate rearing of RASU in flowing raceways at Lake Mead SFH (C26).

FY10 Activities: 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 2008 and 2009 year classes. The 2008 RASU remaining on station and a portion of the 2009 year class will be stocked at the Overton WMA.

Proposed FY11 Activities: Continued rearing of RASU captured during previous years will occur, and hatchery stock will be augmented with 2011 year class RASU larvae from Lake Mead. Delivery of 2009 year class RASU to Overton WMA will take place.

Pertinent Reports: The scope of work for this agreement is available upon request from the LCR MSCP. Annual reports covering 2005-2009 will be posted on the LCR MSCP Web site.

Work Task B7: Lake-Side Rearing Ponds

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$175,000	$185,238.41	$930,829.50	$150,000	$250,000	$175,000	$175,000

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

Start Date: FY05

Expected Duration: FY55

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

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

Location: Reach 2, Lake Mohave, Arizona/Nevada

Purpose: Operate and maintain fish grow-out areas along the Lake Mohave shoreline to contribute to RASU 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 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 29,000 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 transferred to Yuma Cove pond or Davis Cove pond, as these two ponds are more secure and support fish life all year.

FY09 Accomplishments: In 2009, some 1,653 large PIT-tagged RASU (275-440 mm TL) were transferred from Willow Beach NFH and stocked into seven lake-side ponds. Harvest for the seven ponds was conducted in May, September, and October. A total of 520 RASU were harvested from the ponds and repatriated to Lake Mohave (note that while this represents only 29% of the fish stocked, neither Davis nor Yuma coves were completely harvested). Results are presented in the table below.

Table 1. 2009 RASU Repatriated to Lake Mohave

Ponds RASU	# Stocked	Mean Length at Stocking	# Harvested	Mean Length at Harvest	% Harvested
Yuma*	464	356	194	426	42
Willow	40	394	3	480	8
Dandy	200	394	131	458	66
Arizona Juvenile	200	394	19	465	10
Nevada Larvae	50	394	0	0	0
N. Chemehueve	200	394	145	457	73
Davis*	499	317	28	495	1.4
Total	**1,653**	**378**	**520**	**448**	**29%**

*Yuma Cove and Davis Cove ponds sustain fish all year long and have multiple year class fish.

Neither Nevada Egg nor South Sidewinder were used in 2009. Nevada Egg's earthen berm had breached, and it was invaded by non-native fish. South Sidewinder has not been successful the past few years due to poor water quality. It will be reevaluated next year. Nine Mile backwater was not stocked with large RASU from Willow Beach; however, it

did receive 1,724 young-of-year RASU (19 mm) from experiments conducted in our Boulder City, Nevada fish laboratory.

In addition to the repatriated fish, more than 4,000 young-of-year fish were generated by in situ production. These young fish were transferred into ponds at Yuma Cove (2,600 fish, 199 mm) and Davis Cove (1,442 fish, 198 mm).

Zooplankton samples were collected at these ponds under work task C31. Samples of any larvae produced by in-pond production are being captured and analyzed under work task C31.

FY10 Activities: Lake-side ponds are again being used for RASU brood stock maintenance and development. Characterization of zooplankton communities in these ponds continues under work task C34, and available larvae are being sampled for analyses under work task C31.

Proposed FY11 Activities: Lake-side ponds will continue to be used for RASU brood stock maintenance and development. An additional $100,000 is requested for this year to rebuild the earthen berm at Yuma Cove. A new research investigation will be initiated to look at ways to better manage natural food resources in these ponds (C44). Investigations will look into how origin site affects survival.

Pertinent Reports: The *2005-2009 Fish Augmentation Summary* is under development and will be posted to the LCR MSCP Web site.

Work Task B8: Fish Tagging Equipment

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$75,000	$73,421.00	$381,354.83	$75,000	$85,000	$90,000	$100,000

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

Start Date: FY04

Expected Duration: FY55

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

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

Location: N/A

Purpose: Fish released into the LCR by the LCR MSCP will be marked for identification purposes to assess survival and distribution.

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

Project Description: The LCR MSCP will rear and stock more than 1.2 million native fish into the LCR. Fish will be marked to assess distribution and survival and for effective research and decision making. Funds provide for both tagging materials and detection equipment needed during monitoring and research. Reclamation anticipates the need for fish tags and tagging equipment throughout the life of the program (FY55).

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

A decision was made in 2006 to begin using the newest PIT-tag technology, 134.2-kHz frequency tags. These new tags have a greater detection range than the previously used

tags (12 inches versus 2 inches away from fish) and will allow for testing and deployment of remote listening stations within spawning areas. Purchase of the new PIT tags, tag readers, and antennae began in 2006. A total of 19,433 RASU and 5,136 BONY were PIT-tagged and/or wire-tagged and released into the LCR during 2008.

FY09 Accomplishments: PIT tags, tagging equipment, and tag readers were purchased as needed to mark fish for monitoring and research. A total of 24,299 RASU and 6,579 BONY were PIT-tagged and/or wire-tagged and released into the LCR during 2009.

FY 10 Activities: PIT tags, tagging equipment, and tag readers will be purchased as needed to mark fish for monitoring and research.

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

Pertinent Reports: N/A

Work Task B10: Uvalde National Fish Hatchery

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	F10 Approved Estimate	FY11 Proposed Estimate	FY012 Proposed Estimate	FY13 Proposed Estimate
$60,000	$89,956.67	$481,270.53	$85,000	$0	$0	$0

Contact: Tom Burke, (702) 293-8310, tburke@usbr.gov

Start Date: FY06

Expected Duration: FY10

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

Conservation Measures: RASU3, RASU4, BONY3, and BONY4

Location: Uvalde, Texas

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

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

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

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

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

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

During routine fish health inspections in July 2007, Guadalupe largemouth bass on station tested positive for Largemouth Bass Virus, a restricted pathogen in both Arizona and California. BONY were also tested and came up negative; however, the states of Arizona and California have asked that no fish from this facility be stocked into the Colorado River until the hatchery receives a Class A rating. As a result, no BONY were stocked from Uvalde NFH into the LCR during 2007. The fish are being held at Uvalde NFH for future research. These fish are now in the 400+ mm size range.

BONY growth studies were repeated in 2008 using similar densities to those used in 2007; however, most of the fish were smaller to begin with (94 mm). Some 7,500 fish were stocked into six ponds in early May and harvested in late October. Over the 173 days in the pond, there was 72% survival with most fish attaining target size. In July 2008 the hatchery was tested for Largemouth Bass Virus and was clean.

FY09 Accomplishments: BONY growth research continued at Uvalde NFH. The FY09 study compared stocking densities of 1,500 fingerlings per acre with 2,000 fingerlings per acre. The study used four lined ponds, all covered with bird deterrent netting to minimize the predation variable. All fish spent approximately 200 days in the ponds. Average size of all fish at time of stocking was 207 mm TL. Average size of harvested fish from 1,500 fish per acre study ponds was approximately 361 mm TL (1.08 fish/lb). Average size of fish harvested from the 2,000 fish per acre study ponds was 372 mm TL (1.05 fish/lb). Fish stocked at 1,500 fish per acre attained a survival rate of 96%, with 99.7% of those individuals reaching or exceeding target size. Fish stocked at 2,000 fish per acre had a survival rate of 94%, with 99.7% of those individuals reaching or exceeding target size.

It should be noted that FY09 was recorded as one of the worst draught periods on record with exceedingly high temperatures throughout the study period. Results of the growth study may have been influenced by these high temperatures.

In July 2009, the hatchery received its second annual consecutive clean fish health report. With this clean report the facility returns to Class A status.

FY10 Activities: Growth and survival research has been temporarily halted and will not continue until resolution of stocking issues for BONY already reared and on station. Should approval be received for this stocking, growth and survival studies will continue. Development of a specific diet formulation for BONY is being conducted under C11. BONY on station at Uvalde NFH will be used to test effectiveness of this new diet.

Proposed FY11 Activities: No production activities are planned for Uvalde NFH for FY11. Any work being conducted at Uvalde will be associated with species research actions covered under section C. Production funds originally scheduled for Uvalde have been shifted to Achii Hanyo (B3).

Pertinent Reports: A report summarizing BONY research activities at Uvalde NFH will be developed and posted to the Web site.

Work Task B11: Overton Wildlife Management Area

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$175,000	$119,439.72	$243,033.51	$50,000	$50,000	$75,000	$75,000

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

Start Date: FY06

Expected Duration: FY16

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

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

Location: Reach 1, Overton, Nevada

Purpose: Provide additional rearing capacity for RASU, 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. Funds were reallocated from B9. This work is closely related to B6 and C13. Once developed, the rearing ponds may receive fish from Willow Beach NFH (B2).

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 TL) for eventual repatriation to Lake Mead. 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 were carried out in 2007, and prior to stocking native fishes, Reclamation assisted with sampling these ponds to determine species composition. To curtail aquatic vegetation and maintain ponds with sufficient open water areas, a 14-ft aluminum boat with a chemical spray unit was purchased in 2008.

FY09 Accomplishments: A total of 2,182 juvenile RASU (2007 and 2008 year classes) reared at Lake Mead SFH were delivered and stocked into Center Pond during FY09. Associated field work was performed and included periodic monitoring of pond water quality as well as multiple sampling events to assess RASU pond stock. A single sampling event was completed to remove adult RASU from Center Pond and transfer them to Mulberry Pond at Floyd Lamb State Park. RASU removed from Center Pond will support future research efforts associated with the Lake Mead Razorback Sucker Study (C13).

FY10 Activities: RASU reared at Lake Mead SFH will be transferred to Overton WMA ponds for further rearing. Sampling and monitoring of fish and ponds will be conducted periodically throughout FY10 and pond stock may be repatriated to Lake Mead or made available for research purposes. Further improvements to the water delivery system for Center Pond will be made, and a boat ramp will be installed to improve both RASU sampling efforts and management of pond vegetation.

Proposed FY11 Activities: Razorback sucker from Lake Mead SFH will be stocked for grow out and future repatriation to Lake Mead. Overton WMA ponds, principally Center Pond, will continue to be monitored through sampling efforts. Improvements to existing ponds and infrastructure will continue as needed.

Pertinent Reports: The scope of work for this agreement is available upon request from the LCR MSCP. Annual reports covering 2005-2009 will be posted on the LCR MSCP Web site.

WORK TASKS SECTION C

SPECIES RESEARCH

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Work Task C2: Sticky Buckwheat and Threecorner Milkvetch Conservation

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$11,000	$10,000.00	$40,000.00	$11,000	$11,000	$11,000	$11,000

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

Start Date: FY06

Expected Duration: FY30

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

Conservation Measures: STBU1 and THMI1

Location: Reach 1, Nevada

Purpose: Provide funding to support existing conservation programs for sticky buckwheat and threecorner milkvetch.

Connections with Other Work Tasks (past and future): These are stand-alone conservation measures described in the HCP.

Project Description: Sticky buckwheat and threecorner milkvetch are covered species within the Clark County MSHCP, as well as the LCR MSCP. Funding in the amount of $10,000 per year will be provided to the NPS to support implementation of conservation measures for these two plant species, which are beyond the permit requirements of the Clark County MSHCP. Funding may be advanced for up to five years, depending on availability, to keep administrative costs at a minimum.

Previous Activities: In FY07 and FY08, $10,000 was provided each year to the NPS via a five-year agreement between Reclamation and the NPS. A pilot year study was implemented in 2007 to determine an effective monitoring protocol for sticky buckwheat and threecorner milkvetch.

FY09 Accomplishments: In FY09, $10,000 was provided to the Clark County MSHCP Rare Plant Workgroup via a five-year agreement between Reclamation and the NPS. The pilot year monitoring data were evaluated and the experimental design was modified in order to increase the statistical power of the data. The objective of the monitoring was to assess the status of select populations of sticky buckwheat and threecorner milkvetch and to gain a greater understanding of the important abiotic and biotic factors that influence

population condition. The monitoring objectives for the monitored populations occurring on NPS and BLM lands within Clark County are:

1. Maintain the current density (within 30% of the baseline measurement calculated from a year of average to above average rainfall) over the next 10 years. The sampling objective is to be 80% sure of detecting a 30% change in density of sticky buckwheat and threecorner milkvetch in average or above average rainfall years.
2. Correlate the abiotic factors of rainfall, temperature, relative humidity, and soil chemistry with the density (measured in average to above average rainfall years) of sticky buckwheat and threecorner milkvetch.
3. Detect changes in species richness and cover of native and non-native plant species over the next 10 years. The sampling objective is to be 80% sure of detecting a 30% change in species richness and cover of native and non-native plant species in average or above average rainfall years.

FY10 Accomplishments: Funds in the amount of $10,000 were transferred to the NPS through a five-year agreement. An annual report will be provided to Reclamation summarizing the current monitoring of threecorner milkvetch and sticky buckwheat.

Proposed FY11 Activities: Funds in the amount of $10,000 will be transferred to the NPS through a new five-year agreement. A report will be provided to Reclamation summarizing the current monitoring of threecorner milkvetch and sticky buckwheat.

Pertinent Reports: The scope of work is available upon request. The 2009 report on results of monitoring *Astragalus geyeri* var. *triquetrus* (threecorner milkvetch) and *Eriogonum viscidulum* (sticky buckwheat) will be posted on the LCR MSCP Web site.

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$15,000	$11,547.48	$260,325.04	$15,000	$15,000	$15,000	$15,000

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

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Species research

Conservation Measures: MRM1, MRM2, MRM3, CLRA1, CLRA2, WIFL1, WIFL2, DETO1, DETO2, BONY2, RASU2, WRBA1, WRBA2, WYBA1, WYBA3, DPMO1, CRCR1, CRCR2, YHCR1, YHCR2, 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

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.

FY09 Accomplishments: New information was incorporated into the species accounts. Information collected by Reclamation and others was utilized in the preparation of the draft habitat credit process. Literature searches, literature acquisition, and data compilation were conducted to update species accounts as needed.

FY10 Activities: Information will be gathered from recent literature and will be incorporated into the species accounts on a five-year cycle.

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

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

Work Task C4: Relict Leopard Frog

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$11,000	$15,557.23	$54,133.52	$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

Purpose: Provide funding to support existing relict leopard frog conservation programs.

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

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

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

FY09 Accomplishments: Funds in the amount of $10,000 were transferred to the NPS through the fourth year of a five-year agreement. In 2009, a report was generated to document 2009 activities. Major relict leopard frog conservation activities supported by these funds included:

1. 848 tadpoles and 438 juvenile frogs were released at five translocation sites.
2. Diurnal and nocturnal surveys were conducted year-round at established and experimental sites; egg masses were seen at 10 of 14 sites.
3. Seven potential sites have been discussed for future translocation of frogs.

Additional funds were used for administration costs of the agreements for C2 and C4.

FY10 Activities: Funds in the amount of $10,000 will be transferred to the NPS through the fifth year of a five-year agreement. A report will be provided to Reclamation summarizing calendar year 2010 monitoring of experimental and natural populations of relict leopard frogs, and frog rearing and relocation activities.

Proposed FY11 Activities: Funds in the amount of $10,000 will be transferred to the NPS through a new five-year agreement. A report will be provided to Reclamation summarizing calender year 2011 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 from the LCR MSCP. *Annual 2009 Relict Leopard Frog Monitoring and Management* will be posted on the LCR MSCP Web site.

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$90,000	$83,428.78	$222,409.92	$90,000	$90,000	$90,000	$0

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

Start Date: FY06

Expected Duration: FY12

Long-term Goal: Species Research

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

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

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

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

Insect densities will be estimated on different species of restored plants grown under different irrigation and fertilizer treatments. Water and nitrogen will be manipulated, depending on soil conditions, by controlling plant irrigation and fertilization. Water and

nitrogen contents will then be measured in tissue samples taken from insect-sampled plants. Relationships between plant water and nitrogen contents, plant species, and insect density will be determined. The contribution of insects immigrating into restoration plots also will be evaluated. Field work will be performed at LCR MSCP habitat creation sites listed above.

Previous Activities: Two studies were conducted during 2007 on the effects of nitrogen and water on arthropod (spider and insect) populations. The first study examined the effects of plant water and nitrogen contents on arthropod numbers and masses on branches cut from cottonwood trees in a restoration plot (mass transplanting demonstration site) at Cibola NWR. The second study examined the effectiveness of small pools, installed to retain irrigation water, on increasing taxa of arthropods at Beal Lake, Havasu NWR. Artificial pools are not effective for increasing insect abundance at Beal Lake where restoration plots are bordered by large marshes that produce abundant, emigrant insects.

Examination of the effects of plant water and nitrogen contents on arthropod abundance and mass was repeated at the Palo Verde Ecological Reserve. 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.

FY09 Accomplishments: 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 2009. Nitrogen concentrations were measured in collected arthropods. Most variation in nitrogen concentration was due to body size, with larger arthropods containing more nitrogen. Nitrogen concentrations also differed among arthropod orders, with herbivorous flies containing low nitrogen concentrations and spiders containing high nitrogen concentrations. Overall, arthropod herbivores and predators contained similar nitrogen concentrations.

FY10 Activities: Work during FY10 will examine the fraction of nitrogen in insects that is assimilated into the cuticle (exoskeleton) and not available as a nutrient to insectivorous birds. Insectivorous birds cannot digest the cuticle of arthropods. This is how arthropods are identified in bird fecal samples; undigested bits of arthropod cuticle are identified. The objective of this project will be to determine how much of an arthropod's nitrogen content cannot be assimilated by birds. Arthropods used in the nitrogen analyses will be collected from one or two of the MSCP restoration sites. Potential sites may include Beal Lake, CVCA, PVER, and Cibola NWR Unit #1.

An additional project may be to examine the effect of plant water content on arthropod abundance. This project depends on locating species of riparian plants, such as cottonwood, that are growing in different soil moistures.

Proposed FY11 Activities: The effects of plant water content, controlled by irrigation, may again be examined if a study site becomes available. Other research during FY11 may begin to look at nutrients in arthropods other than nitrogen. Possibilities include phosphorus (P), needed by arthropods and birds primarily in energy metabolism and in some structural compounds. Similar to nitrogen, phosphorus is a limiting nutrient in plants, and plant phosphorus concentration may influence arthropod abundances. Sulfur (S) may also be a limiting nutrient. Two amino acids, cysteine and methionine, contain sulfur. Spiders have unusually high concentrations of these amino acids. Some bird species appear to selectively feed on spiders, thereby increasing their sulfur intake.

Pertinent Reports:

Wiesenborn, W.D. 2009. Sampling riparian arthropods with flight-interception bottle traps. Florida Entomologist 92(4):535-692.

Wiesenborn, W.D. 2009. Biomasses of arthropod taxa differentially increase on nitrogen-fertilized willows and cottonwoods. Restoration Ecology.

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$145,000	$129,403.53	$488,583.74	$80,000	$0	$0	$0

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

Start Date: FY06

Expected Duration: FY10

Long-term Goal: Species research

Conservation Measures: MNSW1 and MNSW2

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

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

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

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

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

1. plant water and nitrogen content
2. plant species used as nectar sources

3. availability of nearby nectar sources (distances, amounts)
4. area of *A. lentiformis* stands
5. elevation and latitude

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

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

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

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

FY09 Accomplishments: Two studies were performed examining the habitat requirements for MacNeill's sootywing. In the first study, oviposition and larval survival were compared on *Atriplex lentiformis*, the sootywing's known host plant, and *Atriplex canescens*, a related species also found along the lower Colorado River. The numbers of ovipositions on six potted plants of each species were compared at Cibola NWR. Sootywings only oviposited on *A. lentiformis*. Larval survival was compared on the two plant species by transferring 15 first-instar larvae to three potted plants of each species.

Larvae only survived on *A. lentiformis*. Oviposition and survival only on *A. lentiformis* confirms the species as the sootywing's primary host plant.

In the second study, the visual and olfactory attraction of sootywing adults to flowers was examined by comparing responses to flower models. Sootywings were most attracted to models presenting blue and yellow together, followed by blue models and yellow models. Sootywings were not attracted to floral scent. Adult sootywings appear to locate flowers primarily by color. Attraction to these two colors agrees with our observations of the plant species producing flowers visited by sootywings.

FY10 Activities: Most work during this period will consist of analyzing data collected during summer 2009 and writing reports. An additional project during 2010 will be to examine sootywing movement or dispersal. Designing habitat would be aided by knowing how far sootywings move around within host plant patches, and by determining patch size needed to retain sootywing populations.

Proposed FY11 Activities: Closed

Pertinent Reports: *Survey and Habitat Characterization for MacNeill's Sootywing 2009 Annual Report* will be posted to the LCR MSCP Web site.

Pratt, G.F., and W.D. Wiesenborn. 2009. MacNeill's sootywing (*Hesperopsis gracielae*) (Lepidoptera: Hesperiidae) behaviors observed along transects. Proceedings of the Entomological Society of Washington 111:698-707.

Work Task C8: Razorback Sucker Survival Studies

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$25,000	$23,606.34	$820,609.25	$0	$0	$0	$0

Contact: Tom Burke, (702) 293-8310, tburke@usbr.gov

Start Date: FY05

Expected Duration: FY09

Long-term Goal: Assess overall effectiveness of stocking program and acquire data for adaptive management program.

Conservation Measures: RASU6

Location: Reaches 4-5, river miles 50-175, Imperial Dam to Parker Dam.

Purpose: Assess survival and distribution of RASU released into the LCR.

Connections with Other Work Tasks (past and future): The work is connected to B5, as fish being studied are reared at Bubbling Ponds SFH. Data collected during this work are utilized in D8.

Project Description: Reclamation has stocked more than 100,000 RASU into the Colorado River below Parker Dam since 1997. This project is an assessment of survival, growth, and distribution of these fish. The work is being performed by ASU in cooperation with Reclamation and AGFD. The work consists mainly of netting, electro-shocking, and radio/sonic tagging and tracking of stocked fish to determine survival and distribution. Field sampling is conducted monthly from September to May (nine trips). No sampling occurs during June, July, or August, because high water temperatures exceed safe handling protocols for these fishes. Trip reports are provided to Reclamation following each of the nine sampling trips, and these are summarized into an annual report covering the calendar year (January through December).

Previous Activities: Lower Colorado River fish monitoring efforts during 2005, 2006, and 2007 typically resulted in the capture of tens of thousands of fish each year, of which hundreds were recently stocked RASU (roughly 12,000 RASU stocked each year). However, less than 10 of the RASU captured have been in the river longer than 3 months. The only indication of survival past this first 3 months has occurred in backwater A-10, which is isolated by culverts. RASU larvae were captured in several backwaters, but there was no evidence of recruitment to the juvenile stage. Among 847 different RASU

handled, 500 contained PIT tags. Growth of marked fish was rapid, and similar to that recorded for RASU of similar size at other locations including Lake Mohave.
Data for backwater A-10 indicate a population decline between spring and autumn, suggesting over-summer mortality. Actions were taken to assess three possible sources for these losses: water quality, bird predation, and fish predation. Because backwaters may have low oxygen levels, reduced dissolved oxygen may be a factor in mortality. Bi-weekly measurements were taken at established stations during the summer. In general, the backwater always had ample areas of adequate dissolved oxygen, suggesting this factor alone is not the likely cause of summer mortality. Summer water temperature was greater than 25°C in all locations and depths, and effects may be compounded with parasitism or disease to stress fish, but again, water temperatures alone were not sufficiently high enough to have been the primary cause for over-summer mortality.

The database for fish recaptured showed that greater than 21% of fish handled had wounds, suggesting attacks by birds. An investigation on surface imprinting due to surface feeding in the hatchery was initiated. Final results and recommendations are summarized in the FY08 report.

To assess the role of fish predators, a mark-recapture survey for largemouth bass was performed in A-10. The population estimate was 459, and few fish were greater than 40 cm long. While exceptionally large largemouth bass specimens may impact smaller RASU, this seems unlikely in the A-10 backwater. Attempts were also made to assess flathead catfish numbers in these areas, but insufficient numbers of flathead catfish were captured to support population estimation. This result is consistent with regular monitoring efforts, which suggest few flathead catfish occupy the A-10 backwater.

Dispersal of fish from A-10 via the downstream culvert pipe was continuously monitored with a remote PIT antenna and scanner. Few fish were recorded exiting the backwater despite much nearby spawning activity.

A project report was completed and reviewed. The report concluded that overall, survival of RASU in the mainstem Lower Colorado River downstream of Parker Dam is extremely poor to non-existent, and recommends that stocking be limited to flood-plain ponds.

FY09 Accomplishments: The project was completed in FY08. Site visits were made with the contractor and the final project report was accepted. A formal oral presentation was made by the contractor to the LCR MSCP Steering Committee in early FY09.

FY10 Activities: N/A

Pertinent Reports: The final project report is available on the LCR MSCP Web site.

Work Task C10: Razorback Sucker Rearing Studies

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$125,000	$132,905.58	$461,806.82	$125,000	$125,000	$125,000	$125,000

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

Start Date: FY06

Expected Duration: FY26

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

Conservation Measures: RASU3, RASU4, and RASU6

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

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

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

Project Description: Provides funding for investigations into rearing and culture of RASU. The goal is to investigate ways to accelarate 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.

FY09 Accomplishments: Survival of three native Colorado River fish species including razorback sucker were documented post-netting. Fish captured in trammel nets experienced higher mortality than fish captured in the other type of net. Fish captured in water temperatures exceeding 20ºC had elevated blood cortisol levels as compared to fish captured with the same methods below 15ºC.

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

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

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

FY10 Activities: The USFWS will conduct the second year of polyculture for RASU and BONY in the same ponds at Achii Hanyo Rearing Station and raceways at Willow Beach NFH used during the first year of the study. The USFWS will continue conducting RASU growth studies at Willow Beach NFH to determine density levels and feeding rates for rearing RASU from 300 mm up to 500 mm TL to accelerate brood stock development in Lake Mohave. AGFD will continue to study factors affecting growth of RASU at Bubbling Ponds SFH.

Proposed FY11 Activities: Research investigations on RASU growth will continue to be implemented through various research projects with cooperating hatcheries. A second workshop will be organized and held locally to review status of culturing native Colorado River fishes.

Pertinent Reports: Reports received during 2009 will be posted to the LCR MSCP Web site, including: *The Effects of Capture By Trammel Nets On Native Arizona Fishes; Growth of Razorback Sucker at Bubbling Ponds Fish Hatchery*; and *Growth Studies of Razorback Sucker and Bonytail at Willow Beach NFH and Achii Hanyo*. A report providing a summary of research projects conducted under C10 and C11 will be completed during FY10.

Work Task C11: Bonytail Rearing Studies

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$165,000	$135,376.13	$502,139.95	$165,000	$150,000	$150,000	$150,000

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

Start Date: FY06

Expected Duration: FY26

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

Conservation Measures: BONY3, BONY4, and BONY5

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

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

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

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

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

2007 for fish culturists to review survey findings and prioritize research actions. Research hypotheses were formulated for study designs and investigations are being carried out. Findings and results will be documented and reported. Dexter NFH developed and initiated an alternative rearing strategy to assist with BONY restoration in Lake Mohave. Hatchery staff investigated the potential for increased growth and resource conservation by rearing larval BONY within the same pond as adult 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. Arizona State University conducted a comprehensive review of available published and gray literature, compiled an annotated bibliography, and submitted a report tilted, *BONY Rearing Studies: Literature Review*.

FY09 Accomplishments: Dexter NFH with assistance from the USGS New Mexico Cooperative Fish and Wildlife Research, the USDA ARS Hagerman Fish Culture Experiment Station, and the USFWS Bozeman FTC completed the second year of research associated with the development of a formulated species-specific diet for BONY.

A study was initiated to look at rearing BONY and RASU together; however, water quality problems caused the study to be terminated. An investigation into handling stressors in BONY at Achii Hanyo was completed and a report is available on the LCR MSCP Web site. The primary recommendation was that fish tagging should be done at temperatures below 16°C.

FY10 Activities: Investigations into the formulation of a species-specific diet for BONY will continue. Survival and growth of juvenile and subadult BONY will be evaluated based on the findings from the studies completed in 2009. Dexter NFH will conduct a 12-week diet/growth study in sixteen 0.10- acre outdoor ponds using the top three performing experimental diets and current densities used for grow out of BONY at Dexter NFH. The 2007 workshop for fish culturists to review survey findings and prioritize research actions will be revisited. Planning will begin for convening a second workshop on rearing and culturing BONY and RASU in 2011. Research hypotheses will be formulated for study designs. A planning process will be completed to evaluate stress measures in BONY related to transport.

Proposed FY11 Activities: Field testing will be implemented, and procedures evaluated to examine relationships between BONY growth and physical, chemical, and biological characteristics of their hatchery rearing environment. A workshop will be held to discuss the status of rearing endangered Colorado River fishes, including BONY and RASU.

Pertinent Reports: The scopes of work and completed work project reports are available upon request. *Passive Integrated Transponders in Gila elegans: Location, Retention, Stress, and Mortality*, and *BONY Rearing Studies: Literature Review* are available on the LCR MSCP Web site. A report providing a summary of research projects conducted under C10 and C11 will be completed during FY10.

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY012 Proposed Estimate	FY13 Proposed Estimate
$200,000	$184,842.91	$717,832.93	$200,000	$200,000	$0	$0

Contact: Tom Burke, (702)293-8310, tburke@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 radio and sonic tracking of fish were 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.

The sonic studies initiated in 2007 were continued in 2008 and a second, six-month interval of the sonic telemetry portion of this task was completed. This work compared post-stocking survival of subadult (avg. TL 380 mm) and adult (avg. TL 500 mm) RASU repatriates. At the conclusion of the study, 1 of 15 (7%) tagged subadult fish and 5 of 14 (36%) tagged adult fish remained active. For subadult fish in the telemetry study, first-week survivorship was estimated at 82%. For adult fish in the telemetry study, first-week survivorship was estimated at 95%. Mortality was likely due to predation by nonnative striped bass.

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

FY09 Accomplishments: The sonic telemetry study initiated in 2008 was completed in 2009. Twenty adult and 10 subadult razorback sucker were implanted with sonic transmitters and released at Fortune Cove on November 6, 2008. One fish was removed from analysis because it was contacted only once immediately after release. At the conclusion of the study (over the six-month study period), 6 of 9 (67%) subadult and 16 of 20 (80%) adult razorback sucker remained active. Five transmitters were recovered from the bottom of the lake by a SCUBA diver. No fish remains were observed near any recovered transmitters.

Based on monitoring data from 2008 and 2009, the current wild razorback sucker population in Lake Mohave is 70 fish. The repatriated razorback sucker population is estimated to number 1,502 with a 1% estimated survival of all repatriates released as of March 2008. The current total population estimate for razorback sucker in Lake Mohave is 1,572.

FY10 Activities: Work will continue to focus on monitoring larger RASU stocked during FY09 to refine the relationship between survival and size at release. Contingent on the results of remote sensing evaluation (C23), remote PIT-scanning units will be deployed in conjunction with annual RASU monitoring efforts on Lake Mohave. Post-stocking demographics for the repatriate population will be estimated using mark-recapture data, and additional statistical analyses of the LCR MSCP database (G1) will continue in order to assess factors affecting post-stocking survival.

Proposed FY11 Activities: PIT-scanning results will be evaluated and the usefulness of this technique as an assessment tool will be made. A review of Lake Mohave Native Fish Work Group goals will be made and recommendations for continued monitoring will be

made. Data collected over the entire period will be summarized for inclusion into a final report. Final modeling activities to assess survival and replacement rates for Lake Mohave RASU brood stock will be completed. A final report will be prepared and submitted for review.

Pertinent Reports: *Demographics and Post-stocking Survival of Repatriated Razorback Suckers in Lake Mohave 2008 Final Report* is posted on the LCR MSCP Web site.

Work Task C13: Lake Mead Razorback Sucker Study

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$150,000	$149,876.40	$963,379.63	$300,000	$125,000	$125,000	$125,000

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

Start Date: FY05

Expected Duration: FY15

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

Conservation Measures: RASU7

Location: Reach 1, Lake Mead, Nevada/Arizona

Purpose: Assess RASU population and recruitment in Lake Mead.

Connections with Other Work Tasks (past and future): This work task was previously included in the Draft FY05 Work Tasks as Lake Mead Razorback Study (D7). Larvae collected during this effort are to be reared at Lake Mead Hatchery (B6) and Overton WMA (B11).

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

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 LCR MSCP adaptive management program.

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

has happened in the face of extensive non-native fish populations and declining lake elevations. A summary report of the first 10 years of the study was completed and posted to the LCR MSCP Web site.

FY09 Accomplishments: Trammel netting surveys during the spawning season resulted in the capture of 80 RASU: 4 from Echo Bay, 49 from Las Vegas Bay, and 27 from the Muddy River/Virgin River inflow area. Thirty-five of the RASU collected were subadult fish, and 28 were recaptures. Aging and growth information was obtained from captured RASU, and evaluation of captured fish suggests continued, recent recruitment in Lake Mead. Eight hundred and eighty larval RASU were also captured during the spawning season. All larvae were subsequently delivered to the Lake Mead SFH for grow out (B6). Monitoring of sonic-tagged fish continued to gather information on habitat use and movement patterns of RASU. Data obtained from monitoring sonic-tagged fish provided valuable information including the general location of the RASU population, the location of spawning sites, and the movement patterns of RASU within and between spawning areas. An additional 12 RASU were implanted with sonic tags and released at identified spawning locations during this study year to allow for continued monitoring of the Lake Mead population for the next several years.

FY10 Activities: All RASU monitoring actions are expected to continue. These actions will include larval sampling, adult trammel netting, monitoring of sonic-tagged fish, evaluating growth rates of recaptured fish, and fin-ray collection and aging of subadult and adult RASU. Data obtained through these monitoring actions will further assist in understanding the size and habitat use of the RASU populations in Lake Mead, help document the exchange of fish between the major spawning areas, identify problems or habitat shifts associated with the known spawning aggregates, and provide information on recruitment patterns in Lake Mead.

A cooperative research study between Reclamation and the Glen Canyon Dam Adaptive Management Program will take place in the Colorado River inflow area of Lake Mead. Investigations in this area of the lake are being performed to determine the presence or absence of an additional population of Lake Mead RASU.

Proposed FY11 Activities: Monitoring of RASU ecology in Lake Mead will continue. However, this work has been separated from the research task and has been reassigned to an existing work task under the System Monitoring portion of the LCR MSCP (see D8). Investigations will continue in the Colorado River inflow area of Lake Mead in conjunction with researchers from the Grand Canyon area.

Pertinent Reports: The *Razorback Sucker Studies on Lake Mead, Nevada and Arizona 2008-2009 Final Annual Report,* the *2007-2008 Final Annual Report,* the 10-year comprehensive report, *Razorback Sucker Studies on Lake Mead, Nevada and Arizona 1996-2007,* and *Lake Mead Razorback Sucker Monitoring Recommendations* are available on the LCR MSCP Web site.

Work Task C14: Humpback Chub Program Support

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$200,000	$65,136.31	$103,433.31	$70,000	$75,000	$20,000	$20,000

Contact: Tom Burke, (702) 293-8310, tburke@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 these same parties (Glen Canyon Dam AMP, USFWS, and LCR MSCP) agreed to fund the development of a refugia brood stock for HUCH. The agreement will be in place for FY09-FY11.

FY09 Accomplishments: This marks the first year of a three-year agreement to develop a refuge population/captive brood stock of Grand Canyon HUCH (*Gila cypha*) at the Dexter National Fish Hatchery and Technology Center, Dexter, New Mexico. 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. In 2009 Dexter successfully maintained 597

juvenile HUCH. Survival for the year was 97% and the average length (TL) of fish was 120 mm. All the fish were PIT-tagged, and in June, 300 fish were provided for translocation to Shinumo Creek in Grand Canyon National Park. The remaining 287 fish were used to begin establishing the (500-1000) refuge population at Dexter. On 15 January 2009, Dexter received the remaining 38 adult and 37 F1 HUCH from Willow Beach NFH. The fish were quarantined for 60 days and treated for potential diseases, pathogens, and aquatic invasive species. Also under this three-year agreement, Dexter staff completed the draft USFWS *Genetic Management Plan for Captive and Translocated Endangered Humpback Chub* in the Lower Colorado River Basin. The total amount of the agreement is $200,000, obligated over a three-year period.

FY10 Activities: Development of the refuge population/captive brood stock for HUCH at Dexter NFH will continue. Dexter will receive up to 600 young-of-year HUCH for grow out, tagging, and incorporation into the captive stock. A site visit to Dexter NFH to review progress on refugia development will be conducted. The captive management plan will be finalized and posted to the LCR MSCP Web site.

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

Proposed FY11 Activities: Continue support for HUCH conservation in coordination with USFWS and Glen Canyon AMP, and conduct a site visit to Dexter NFH.

Pertinent Reports: N/A

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$80,000	$80,882.78	$405,693.75	$80,000	$25,000	$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, and D8 as all FLSU and RASU captured are providing tissues for aging and for genetic analyses, and the capture data are covered in the System Monitoring program.

Project Description: Flannelmouth sucker were reintroduced into the Colorado River below Davis Dam by AGFD in 1976 by transfer of fish captured at the confluence of the Colorado and Paria rivers at Lee's Ferry, Arizona. This stock has persisted for three decades and now represents the only known population of this native species in the Colorado River downstream of Grand Canyon.

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

Web site. 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. We also conducted sampling for all life stages of FLSU with an emphasis on early life stages. These sampling trips focused on the locations and habitats used by aggregations of young-of-year FLSU. Twenty-eight adult flannelmouth suckers were fin clipped for aging purposes and averaged 15 years of age (range 7-26).

FY09 Accomplishments: Telemetry work continued with tracking of about seven active transmitters. An additional 122 fin clips were taken from adult flannelmouth for aging and these sampled fish averaged 14 years old (range 2-24). We also conducted sampling for all life stages of FLSU with an emphasis on early life stages. These sampling trips focused on the downstream distribution, locations, and habitats used by aggregations of young-of-year FLSU. Sampling methods consisted of small mesh trammel nets, boat electrofishing, beach seining, larval lights, and dip nets. This effort resulted in the capture of 123 adults (fin clipped for aging purposes), 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 slackwater 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. Survey results will be overlaid on a base map to show relative distribution of various life stages throughout this reach.

FY10 Activities: Continuation of FY09 sampling is planned. This includes telemetry, larval/juvenile surveys, electrofishing, and trammel netting with smaller meshed nets to increase contacts with juvenile life stages. Relative abundance surveys for young juvenile congregations will expand south of the California state line.

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

Pertinent Reports: N/A

Work Task C23: Evaluation of Remote Sensing Techniques for PIT-Tagged Fish

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$60,000	$70,985.95	$385,138.21	$0	$0	$0	$0

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

Start Date: FY07

Expected Duration: Closed in FY09

Long-term Goal: Conduct long-term system monitoring and adaptively manage augmentation stockings of RASU and BONY.

Conservation Measures: BONY5 and RASU6

Location: Reaches 2 and 3 and Willow Beach NFH; Arizona, Nevada, and California

Purpose: Monitor augmentation stockings in a cost-effective and passive manner.

Connections with Other Work Tasks (past and future): This work task migrated out of G3. This action is related to B8 as results may influence future PIT-tag equipment purchases. This technique will be incorporated into the system monitoring work task (D8).

Project Description: Current efforts to contact repatriated native fish are labor intensive and require direct handling of fish during the spawning season. Remote sensing may prove to be less costly, more efficient, and less stressful on these sensitive native fish species. Under this work task, Reclamation will test the effectiveness of flat plate, circular, and directional antennae, and associated hardware and software for remote sensing of PIT-tagged RASU and BONY. The project will evaluate designs for guided as well as non-guided systems for the detection of PIT-tagged fish at spawning areas. Methods for collecting, storing, and retrieving contact data will be investigated.

Previous Activities: Starting in FY07, Passive Integrated Transponder (PIT) antennae and receivers were purchased from suppliers and deployed under controlled laboratory conditions at Willow Beach NFH. Results were very promising for the new 134-kHz tags. PIT-tag receivers were then tested in Lake Mohave. In the field, the flat-plate antennae, attached to receivers by 5-m cables, were deployed at known RASU congregating sites on gravel shoals below Hoover Dam. These tests evaluated both contact efficiency and field readiness of the deployment package. Deployment and data

collection were also conducted in conjunction with RASU larvae collection trips around Cottonwood Basin. Between 13 February and 30 April 2008, remote sensing units logged 1,400 channel hours of deployment time, resulting in 1,731 contacts with PIT-tagged RASU at four spawning locations representing 167 unique RASU.

FY09 Accomplishments: Remote detection units were deployed at known RASU spawning sites as either free-floating or shore-based stations with a maximum antennae depth of 5 meters and battery life of up to 48 hours. Deployment and data collection were again conducted in conjunction with RASU larvae collections. Between February and April 2009, remote sensing units logged 1,049 channel hours of deployment time, resulting in 3,083 contacts with PIT-tagged RASU at four spawning locations, representing 191 unique RASU. Total contacts between 2008 and 2009 nearly doubled due in large part to a new experimental antennae design that increased detection area six-fold. In addition, 20 PIT-tagged RASU were detected at two spawning sites, indicating a level of spawning site migration that previously could only be detected with sonic tag telemetry. Modifications made during 2009 incorporated solar battery chargers, which doubled deployment time (now up to 96 hours).

FY10 Activities: Closed in FY09.

Proposed FY11 Activities: Closed in FY09.

Pertinent Reports: The final report will be posted to the LCR MSCP Web site.

Work Task C24: Avian Species Habitat Requirements

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$375,000	$377,198.25	$464,133.38	$200,000	$175,000	$250,000	$200,000

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

Start Date: FY08

Expected Duration: FY14

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

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

Location: System-wide

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), 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 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.

Previous Activities: The habitat sampling methods used for this study were developed under System Monitoring for Riparian Obligate Avian Species (D6) in 2007 and 2008. 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.

Twenty territories (depending on the species' rarity) per covered species were paired up with 20 non-use sites from the same geographic and habitat type over a two-year period. In 2008, habitat data was gathered at 46 sites for Bell's vireo and yellow warbler. A combination of landscape variable assessment, basic characterization of the vegetation cover types, and a microhabitat description with a point intercept method were used to assess habitat. This follows an earlier, rapid habitat assessment protocol implemented by USGS in 2007, for which more detailed methods are designed to provide complementary information.

FY09 Accomplishments:

System-wide and created habitat avian research. In 2009, habitat data was gathered at an additional 145 sites, for a total of 191 use and non-use sites for the two-year period (2008-2009).The sample sizes for each species were as follows: Bell's vireo (31), yellow warbler (31), Gila woodpecker (12), vermilion flycatcher (9), and summer tanager (2), with the same number of non-use sites paired with each use site. The Bell's vireo and yellow warbler were the only species abundant enough to achieve the goal of 20 use and non-use sites per species.

Gila woodpeckers were associated with the presence of large-diameter snags, anthills, and patches of upland habitat. Vermilion flycatchers were associated with cover by large trees and presence of mid-canopy mesquite and the avoidance of saltcedar. Arizona Bell's vireo were associated with the presence of large canopy cover, particularly cottonwood, and shrub-sized mesquite, but avoided large patches of upland habitat. Sonoran yellow warblers were associated with overall dense woodland covers, particularly cottonwood and willow, but largely avoided mesquite and patches of upland habitat. Gilded flickers were not detected in the LCR MSCP planning area during the last three years; therefore, no habitat assessments for this species were possible. The Great Basin Bird Observatory submitted a final report to Reclamation that included detailed results for activities under C24, D6, and F2.

Restoration of managed marsh units to benefit black rail and other marsh birds. Vegetation surveys were conducted in April, May, and June and water depth data were downloaded from all monitoring wells in April and May. Bi-weekly marsh bird surveys were conducted at Imperial NWR in fields 16 and 18 throughout the breeding season. The locations of all black rails, clapper rail, and least bitterns were mapped in both fields. Water management in the fields was coordinated with refuge personnel, based on the effect of water depth changes on rails that were detected.

Black rails were first detected in fields 16 and 18 in April. No additional black rails were detected until July, when two were detected in Field 16 and four were detected in Field 18. Yuma clapper rails were consistently detected in Field 16 throughout the summer, with a high of 21 birds on 9 April. In Field 18, one to three clapper rails were detected in all but the final July survey, including one juvenile seen with an adult in May. Between one and three least bitterns were detected in Field 16 on four occasions, and one was detected in Field 18 in July.

Equipment calibrations may have made the water depth data unreliable. Data that were collected from the data loggers are being analyzed to determine what can be used in the final analysis. Depending on the outcome of the analysis, new monitoring equipment may be installed prior to next season.

Yellow-billed cuckoo habitat modeling. The following steps have been taken toward the development of the GIS-based model for quantifying occupied yellow-billed cuckoo breeding habitat:

1. Digital (GIS) layers have been developed from the 2006 Reclamation vegetation classification.
2. Vegetation classification layers for the Bill William National Wildlife Refuge were obtained.
3. Vegetation classes have been extracted and stored in a unique grid comprising 30-m by 30-m cells.
4. GIS variables such as NDVI and proximity to features for the LCR YBCU model have been created from 2003, 2005, and 2007 TM imagery.
5. Landscape variables for the LCR YBCU model, such as amount of mesquite within a given radius, patch size, and distance to water, have been created from the Reclamation vegetation layers.
6. The LCR MSCP 2006 and 2007 YBCU locations have been attributed with GIS data.
7. Physical and biological associations with LCR MSCP YBCU occurrence are being explored using logistic regression and/or Mahalanobis distance modeling.

Two preliminary multivariate models of yellow-billed cuckoo breeding habitat have been developed based on the above steps.

FY10 Activities: Avian surveys under D6 will continue to provide data for the Avian Habitat Assessments. Habitat assessments will continue for the vermilion flycatcher, summer tanager, Gila woodpecker, and gilded flicker. Habitat assessments are complete for the yellow warbler and Bell's vireo. The habitat assessment protocol will be assessed.

The marsh bird habitat study will continue through the 2010 breeding season, with a final report due in September 2010. Depending on the outcome of the analysis of depth data obtained in 2009, new monitoring equipment may be installed prior to the FY10 field season.

Two preliminary multivariate models of yellow-billed cuckoo breeding habitat have been completed and are in the final stages of analysis and evaluation. A final report for the cuckoo modeling study is due in September 2010.

FY11 Proposed Activities: Area search surveys conducted under D6 will continue in 2011 to provide data for Avian Habitat Assessments. Species that were not detected in sufficient numbers (i.e., gilded flicker) for habitat suitability modeling will be surveyed utilizing species-specific surveys to determine specific habitat use, and to obtain sufficient data for habitat modeling.

Additional marsh bird habitat studies may include, but are not limited to, studies on seasonal movement of marsh birds, black rail habitat management implementation, or other related work to further understand habitat use for those species.

Pertinent Reports: The *Annual Report on the Lower Colorado River Riparian Bird Surveys, 2009* is posted on the LCR MSCP Web site. Final reports for Marsh Bird Habitat Monitoring and Yellow-billed Cuckoo Modeling will be posted when available.

Work Task C25: Imperial Ponds Native Fish Research

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$225,000	$228,412.27	$439,253.69	$235,000	$235,000	$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: Monitor six ponds created as native fish refugia on Imperial NWR to ascertain the overall success of each pond in producing viable populations of native fish, and evaluate the role and contribution of various structures and features developed within the ponds in attaining this success.

Connections with Other Work Tasks (past and future): The RASU and BONY to be stocked into the ponds are provided through B1, B2, B3, B4, and B5. Ponds were developed under E14, and additional monitoring support will be provided through F5. Data are maintained in part under 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 accomplishing successful communities of native fishes. The design includes an initial fish stocking strategy for the ponds, and a monitoring program for selected features of the habitat and fish.

Previous Activities: Water quality is currently 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.

A total of 1,601 BONY and 834 RASU were stocked in five of the six ponds. One pond 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. Five 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 all four ponds were documented.

FY09 Accomplishments: Monitoring of pond temperature, conductivity, pH, and dissolved oxygen will continue along with the deployment of remote PIT-tag scanning units. Spawning activity will be monitored using a combination of remote PIT-tag scanning units and direct observation. Pond 6 was stocked with 198 RASU in January 2009. Renovation of pond 1 through dewatering to eliminate nonnative fish species was unsuccessful as western mosquitofish (*Gambusia affinis*) are still present. Mapping software and aerial photography were used to map discrete habitats in each pond and habitat use data was acquired using remote PIT-tag scanning units.

FY10 Activities: Monitoring and research activities will continue with increasing emphasis on habitat use, recruitment dynamics, individual and population growth, and effects of non-native species. Habitat use will be assessed in context with pond components such as hummocks, riprap, gravel substrate, aquatic vegetation, and pond survival and recruitment. Renovations will continue on the ponds. Treatment techniques will be tested and evaluated at full pool to compare with treatments conducted following draw downs.

Proposed FY11 Activities: Monitoring and research activities associated with stocked fish populations will continue. Evaluation of spawning gravels and artificial cover added in 2009 and 2010 will be completed. Tests will be conducted to evaluate water quality management systems. Quarterly team meetings will continue to be held on site.

Pertinent Reports: The scopes of work are available upon request, and completed work project reports are posted to the LCR MSCP Web site.

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$100,000	$74,709.00	$75,330.85	$70,000	$70,000	$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 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 B6.

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

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

waiting to acquire water from deeper, cooler areas of Lake Mead. In the meantime, all or parts of the Lake Mead SFH will be idle. This work proposes to use RASU from lakes Mead and Mohave to examine and evaluate the practicality and cost effectiveness of feeding and growing RASU in flowing raceways at Lake Mead SFH.

Previous Activities: Reclamation, SNWA, and NDOW have been cooperatively rearing Lake Mead RASU in tanks at the Lake Mead State Fish Hatchery (B6).

FY09 Accomplishments: Construction of the test apparatus began with the purchase of four large fiberglass raceways. Parts were purchased to construct and test the inflow manifold that will be used to control flow during rearing trials. A portion of the subadult RASU reared under B6 were PIT tagged and kept on station for use as research subjects. PIT tagging and collection of biological data (length, weight, and condition) of RASU was done so that growth and performance of individual fish could be accurately evaluated over the course of this study.

FY10 Activities: Construction of the inflow manifold and testing of the four experimental raceways will be completed in early FY10. Flowing raceways will first be evaluated without RASU present to determine whether the inflow manifold design is sufficient for rearing trials. Following initial evaluation of the test apparatus, any necessary design changes will be made and additional testing will be performed. Rearing trials are expected to begin in May when hatchery water temperatures become favorable. Trials will be run for up to five months and will evaluate such parameters as growth rate, condition factor, and food conversion efficiency.

Proposed FY11 Activities: Results from the previous study year will be analyzed, and methods for evaluating growth rate, condition factor, and food conversion efficiency will be refined as necessary. Rearing trials for juvenile and subadult RASU will continue, beginning in spring and summer months as warm water becomes available.

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

Work Task C27: Small Mammal Population Studies

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$65,000	$110,074.68	$203,265.36	$35,000	$70,000	$70,000	$0

Contact: Sean Neiswenter, (702) 293-8221, sneiswenter@usbr.gov

Start Date: FY08

Expected Duration: FY12

Long-term Goal: Species research to determine distribution, genetics, and habitat requirements, and establish monitoring protocols for 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 (*Sigmodon hispidus eremicus*) and the Colorado River cotton rat (*Sigmodon arizonae plenus*), and to determine habitat requirements for these species. Data will be used to coordinate surveys of conservation areas 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 aid in developing a long-term population monitoring protocol for small mammals and a habitat model for *Sigmodon* spp. that can be used for 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 (*Sigmodon arizonae plenus*) and Yuma hispid cotton rat (*Sigmodon hispidus eremicus*). 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.

The genetics work will be completed in FY10. Additional time and funding will be utilized to develop a habitat model and a population demography study to determine habitat usage and establish a protocol for population monitoring at conservation areas. Population monitoring protocol development and habitat model development research has been designed and will begin in FY10 under G3. These studies will then be moved to this work task in FY11.

Previous Activities: *Sigmodon* spp. have been captured at seven localities along the LCR. 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. One population of *Sigmodon* was found at the Cibola Nature Trail site on Cibola National Wildlife Refuge, and several small populations were found near Yuma, Arizona. Distribution and population genetic analyses have been conducted for these covered species.

FY09 Accomplishments: Genetic samples have been collected from the seven sites that have confirmed populations of *Sigmodon*. All samples collected for each species have been sequenced and analyzed for the population genetic analysis. The geographic ranges of the two species have been better defined and populations have been identified for the habitat analysis and population demographic study.

Additional funds were provided to gather data and genetic samples of populations in multiple localities in Arizona, to compare with genetic samples taken along the LCR in order to determine connectedness or isolation of populations.

FY10 Activities: The final report for the genetic analysis will be completed and will be posted on the LCR MSCP Web site. Habitat analysis and development of a population monitoring protocol for *Sigmodon* is being designed under G3 and will be completed in FY11.

Proposed FY11 Activities: Permanent sampling grids will be established at known *Sigmodon* localities to develop a habitat model for quantifying restoration efforts, determine habitat usage, and establish a permanent protocol for population monitoring of *Sigmodon* at restoration sites. Population monitoring design and habitat analysis research will continue at several sites along the LCR to determine habitat use for duplication and implementation at restoration sites.

Pertinent Reports: The final report for the population genetic analysis will be posted on the LCR MSCP Web site. A habitat modeling and population monitoring study design is available upon request from the LCR MSCP.

Work Task C28: Nest Predation Effects on Riparian Bird Species

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	
$145,000	$130,739.27	$130,739.27	$25,000	$0	$0	$0

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

Start Date: FY09

Expected Duration: FY10

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

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

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

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

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

Project Description: This study will gather information pertaining to relative nest predation pressures and predator communities by: 1) determining identity of nest predators at real and artificial nests, 2) determining interaction between patch size, surrounding landscape matrix, and potential for nest predation, 3) linking female behavior and nest microclimate with nest predation, and 4) evaluating the potential for nest predation to be offset if nest microclimate can be manipulated to reduce predation pressure. Nest predator communities will be assessed by documenting predator visits to real nests of species such as the SWFL, BEVI, and YWAR by utilizing nest cameras. In

addition, artificial nests with cameras will be placed at sites differing in size and landscape characteristics. An additional set of artificial nests with plasticine (clay eggs) and quail eggs, but without cameras, will be used to determine whether relative nest predation rate differs among areas that differ in size and broader habitat context.

Utilizing both real and artificial nests will not only allow this study to economically cover more areas, but will also test the validity of utilizing artifical nest technique. Nest cameras will record nest predation events as well as female behavior associated with nesting (such as time incubating, time off nest). Nest microclimate will be measured utilizing temperature/humidity data loggers once the nests have been vacated. Three habitat types will be compared for predator pressure.

Previous Activities: This was a new start in FY08 under G3.

FY09 Accomplishments: Video cameras were installed at natural and artificial nests to determine predator composition on nests of LCR open cup nesting passerines. Cameras were camouflaged to reduce visual impact, and utilized infrared to detect night predators. Artificial nests contained plasticine eggs designed to retain distinctive tooth or beak marks, allowing identification of potential nest predators. Nests were monitored in several areas of the three habitat types. Microclimate was measured at each nest utilizing temperature/humidity data loggers directly below the nest once it was vacated, either due to predation, abandonment, or successful fledging. Cameras were also utilized to determine female behavior at the nest.

Results indicate that nests placed in mesquite trees had higher rates of nest predation by rodents than those placed in tamarisk, cottonwood, or willow. Brown-headed cowbirds and yellow-breasted chats were the two most common species recorded at artificial nests, followed by Bewick's wrens and Bullock's orioles. The overlap in nest predators recorded at artificial and real nests indicates that artificial nests may be an effective rapid-assessment technique that could be used to assess potential nest predators at sites of management interest.

FY10 Activities: A final report is due in 2010.

Proposed FY11 Activities: Closed in FY10.

Pertinent Reports: The final report will be posted on the LCR MSCP Web site. The study plan is available upon request.

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$125,000	$80,464.99	$80,464.99	$125,000	$0	$0	$0

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

Start Date: FY09

Expected Duration: FY10

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

Conservation Measures: RASU6

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

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

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

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

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

stocking events and to assess differential successes or failures. The final report will summarize these data and provide recommendations and guidance to the LCR MSCP Fish Augmentation Program.

Previous Activities: In FY08 more than 50 fin ray samples were collected and analyzed as part of G3. The purpose of this work was to assess the ability to age fish from tailwaters; due to its success, the research was expanded and incorporated into a separate work task.

FY09 Accomplishments: Specimens were collected from field activities in Reach 3, and upwards of 300 RASU fin ray samples for aging were obtained. Fin ray sections were analyzed and fish ages were determined. Aging data along with past stocking information were used to determine disparate stocking successes and identify the age structure/hatchery origins of the RASU population between Davis Dam and the Lake Havasu delta in Reach 3. A draft report was completed.

FY10 Activities: The draft report is under review. Results suggest that while fish can accurately be aged, this information could not be correlated to stocking records. While originally expected to continue into FY11, the project will now be completed in FY10. Results will be summarized into a final report.

Proposed FY11 Activities: Closed in FY10.

Pertinent Reports: The final report will be completed in 2010 and posted to the LCR MSCP Web site.

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$100,000	$94,554.39	$94,554.39	$70,000	$150,000	$150,000	$150,000

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

Start Date: FY09

Expected Duration: FY13 (Original duration was FY11)

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 lakeside 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. Some of these transfers have been halted until such time that assurances can be made that quagga mussels are not being carried along with these fish. This study will attempt to develop measures to allow such certification.

Previous Activities: During January 2007, the exotic quagga mussel was discovered in Lake Mead, and subsequently found in both Lake Mead SFH (B6) and Willow Beach NFH (B2). Larval RASU that were to be transferred to Bubbling Ponds SFH (B5) were not collected (B1) and no RASU of any size or year class were delivered to waters outside the Lower Colorado River corridor. Quagga mussels have not severely impacted the maintenance or operation of the facility. However, quagga mussels continue to have an impact on delivery of fish. Preventing further movement or transfer of quagga mussels is a priority for state and federal agencies. Fish transport protocols for the lower Colorado River corridor have been developed and are under review by cooperating resource agencies.

FY09 Accomplishments: 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 under the water conditions at Willow Beach NFH. Even with KCl concentrations six times greater and formalin concentrations four times greater than suggested in the protocol, 100% veliger mortality was not reached. Also, Dexter NFH conducted KCl acute toxicity tests on RASU and BONY and determined that these elevated concentrations may have negative impacts on native fish.

FY10 Activities: Investigations will continue in order to find alternative treatment methods and to establish a protocol that is effective at killing quagga mussel larvae without harming native fish.

Proposed FY11 Activities: Investigations will continue until a suitable treatment regime can be found. As protocols must be rigorously tested prior to approval, this work task is being extended in both time and funding.

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

Work Task C31: Razorback Sucker Genetic Diversity Assessment

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$125,000	$103,693.22	$103,693.22	$125,000	$125,000	$125,000	$125,000

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

Start Date: FY09

Expected Duration: FY15

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

Conservation Measures: RASU2, RASU3, RASU5, RASU6

Location: Arizona State University, Tempe, Arizona

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

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

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.

Larval fish from each stock will be captured, preserved, and delivered to ASU's genetics research laboratory for analyses. Results will be used to determine the genetic health of these communities, to assess effectiveness of the Fish Augmentation Program, to continue monitoring of the Lake Mohave repatriation effort, and to provide guidance on management of RASU populations developing in newly constructed floodplain habitats within the LCR MSCP area.

Previous Activities: Genetic evaluation of the Lake Mohave Razorback Sucker Repatriation Program, funded by Reclamation prior to the LCR MSCP, was completed in 2008. These studies resulted in genetic characterization of the Lake Mohave RASU population, including the larval fish being used by the LCR MSCP Fish Augmentation

Program. This base of information will be the reference point against which the genetic diversity of all future RASU populations will be measured.

FY09 Accomplishments: Analyses of larval fish samples collected in 2009 showed that genetic variation among and within larval samples of razorback sucker on Lake Mohave continues to be passed to the adult repatriate population, indicating that the Native Fish Work Group program is functioning as originally designed.

FY10 Activities: Reclamation will continue to assess razorback sucker genetics for the LCR through analyses of RASU fin clips and larvae collected from all spawning areas, reservoirs, river reaches, and off-channel habitats within the LCR MSCP area.

Proposed FY11 Activities: Collection of larval RASU, fin clips, and muscle plugs will continue from all spawning areas within the LCR MSCP area.

Pertinent Reports: The study plan for Razorback Sucker Gentic Diversity Assessment is available upon request. The 2009 interim report, *Razorbacker Sucker Genetic Divesity Assessment,* is posted to the LCR MSCP Web site.

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$85,000	$87,893.04	$87,893.04	$85,000	$100,000	$125,000	$125,000

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: Native Fish Laboratory, Boulder City, Nevada

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

Connections with Other Work Tasks (past and future): This work began under 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 investigate single parameter thresholds (oxygen, pH, salinity). Reclamation has now extended the study for five years to allow investigation of double-parameter tests for eggs, larvae, and fingerlings.

Previous Activities: Laboratory research began in March of FY07 under G3. Salinity concentrations evaluated during this first study year indicated that upper salinity tolerances ranged from 10,000 to 15,000 µS/cm and from 23,000 to 26,000 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.

Research to determine RASU early life stage salinity thresholds continued in FY08 under G3. During this second study year, slight modifications were made to the experimental

design to further test the role of acclimation. Refined values for upper salinity tolerances were observed to range from 11,000 to 12,000 μS/cm for eggs and from 27,300 to 27,750 μS/cm for larvae.

Initial research, including a detailed review of available literature, was performed and a study design to evaluate threshold levels of dissolved oxygen was generated. Design concepts for an apparatus to control various levels of dissolved oxygen were also developed based on available information. Construction and testing of the apparatus were scheduled for the following year prior to experimental trials.

FY09 Accomplishments: FY09 was the first year this continuing research was accomplished under C32. Initially slated for investigating the salinity tolerance of fingerling RASU, work was continued with earlier life stages of RASU due to the current laboratory set up and the availability of spawning adults. An apparatus for evaluating threshold levels of dissolved oxygen was developed and tested, and research to determine RASU early life stage dissolved oxygen limits was conducted.

RASU eggs and larvae were evaluated through exposure to a full range of dissolved oxygen concentrations. Results from egg trials indicate that the lower dissolved oxygen limit for this life stage is in the 2.5-3 mg/L range. Egg development below this range was either totally disrupted or resulted in underdeveloped protolarvae. Some deformity of hatch larvae was also observed within this range, while larvae hatched at higher concentrations displayed none. These deformities suggest that although a percentage of eggs can develop and hatch at 2.5-3mg/L, these conditions are not ideal. The limit observed for RASU larvae was slightly lower, with increased mortality occurring at dissolved oxygen concentrations near 2 mg/L. Larvae exposed to concentrations of 3mg/L or greater showed low levels of mortality and displayed no behavioral abnormalities (e.g., aquatic surface respiration).

In addition to determining threshold levels of dissolved oxygen, comparative growth of larval RASU was also evaluated. Larvae were exposed to different concentrations of dissolved oxygen for a 20-day period, and only concentrations that had been shown to support larval RASU (3-8mg/L) were evaluated. After 20 days of exposure, no significant differences in growth were observed.

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

It was thought that FY10 may be the first year of research focused on determining the thermal limits of early life stage RASU. This research, however, has been postponed until

future study years for a number of reasons. The current pH levels found in many of the backwater habitats used to rear or support these fish are becoming a point of concern. There are currently no guidelines in place for site managers or project managers to follow, so the results obtained from laboratory testing of pH tolerances may be of great use in the near future.

As for testing thermal limits of RASU eggs and larvae, a considerable amount of literature is already available. Existing literature has focused primarily on the thermal tolerance of RASU eggs, and multiple authors have had similar results. Less information is available on larval tolerances, but various growth studies have exposed larvae to a wide range of temperatures. Many of these temperatures exceed those found naturally during the spawning season, so at this time defining thermal tolerances of early life stage RASU is a lower priority. Additional background information will be gathered to determine if and when this research will be performed.

Proposed FY11 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. Possible actions for this study year include defining thermal tolerances for early life stages of RASU, initiating salinity, dissolved oxygen, pH, or temperature research on fingerling RASU, or initiating research to define limits for early life stages of BONY. The increased funding request is to cover costs of evaluating more life stages of RASU and the addition of BONY to the investigations.

Pertinent Reports: The final report for the 2007-2008 research, *Salinity Tolerances for Egg and Larval Stages of Razorback Sucker*, has been completed. A report summarizing the 2009 dissolved oxygen study is in development.

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$75,000	$205,229.84	$205,229.84	$75,000	$100,000	$100,000	$100,000

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 ulitmately, 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. All of these fish are being PIT tagged to provide research subjects for this study. This will continue through FY13 (there are no study costs allocated for this work, as this rearing is already accounted for under B2 and B5). 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 26,000 RASU (>300 mm TL) have been PIT tagged and released into Reach 3 since October 2006, and all are research subjects for this study. The stockings have been distributed into the numerous access points within this reach, from Laughlin Lagoon to Bill Williams River NWR, as well as various off-channel habitats that are currently being managed by the USFWS.

FY09 Accomplishments: A total of 5,847 RASU (>300 mm TL) were PIT tagged and stocked into Reach 3. 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. Large impoundment nets were purchased for test deployment at off-channel grow-out sites in 2010. Monitoring of growth of RASU in various off-channel habitats has continued.

An interagency agreement was initiated between the Reclamation and the USFWS to cover costs at off-channel habitats that the USFWS currently manages. These off-channel habitats are the source of 500-mm plus RASU that will be used to complete this work task. As end-of-year funds were available in FY09 and as there are administrative costs associated with annual agreements, funding transfers to the USFWS anticipated for FY10 and FY11 were included when the current IA was executed in August 2009.

FY10 Activities: Activities for this year include coordinating and scheduling stock assesment surveys, harvesting of 500-mm plus RASU, and restocking of off-channel grow-out ponds. We continued the PIT tagging of RASU greater than 300 mm TL that were released into Reach 3. The final design of field investigations for FY11-13 will also be completed. Impoundment nets have been deployed and tested in Beal Lake and other off-channel habits. Monitoring of the Reach 3 population of RASU relative to differential survival was initiated. Monitoring is conducted using electro-fishing and trammel netting of known congregations of RASU. A yearly report will be written to summarize the year’s efforts.

Proposed FY11 Activities: The activities listed in FY10 will be continued and expanded in order to maximize the number of RASU available as research subjects for this work task. Monitoring surveys will be increased in an effort to contact released RASU.

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

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$60,000	$42,196.13	$42,196.13	$60,000	$10,000	$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 B7, B11, C25, F5, and G3.

Project Description: This study will characterize the existing zooplankton communites 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 two-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 on Lake Mohave (B7). This effort was used 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.

FY09 Accomplishments: Quarterly zooplankton samples were collected from a total of 33 native fish ponds during FY09. Sampling sites included: one pond at Floyd Lamb State Park; two ponds at the Overton WMA (B11, Reach 1); nine Lake Mohave lake-side rearing ponds (B7, Reach 2); two Needles Golf Course ponds, Beal Lake, and Office Cove Pond (Reach 3); seven ponds at the Achii Hanyo Rearing Station (B3); three Emerald Canyon Golf Course ponds, and Parker Dam Pond (Reach 4); and six ponds at Imperial NWR (C25, Reach 5). Sample analysis to identify and enumerate the zooplankton community structure was conducted each quarter following sample collection. Samples were also analyzed to determine seasonal trends in the zooplankton community. A progress report for the first full study year is in development.

FY10 Activities: Zooplankton sampling will continue on a quarterly basis. A subset of the ponds listed above will be sampled with increased frequency to provide a more complete picture of the zooplankton community throughout the year. This increased sampling effort will be performed on a monthly basis, often in conjunction with other work occurring at these sites. Water quality parameters (temperature, dissolved oxygen, conductivity, and pH) will also be recorded during each sampling event to provide additional habitat information. Samples will be analyzed for identification and enumeration of zooplankton as well as determination of seasonal trends in the zooplankton community structure.

Proposed FY11 Activities: This last year of study will correlate observed zooplankton community densities and composition to feeding and optimum foraging densities for young-of-year native fishes. Literature reviews will be conducted to glean extant information on foraging needs of native fishes. Feeding trials will be carried out in a laboratory environment using young-of-year RASU and BONY fed zooplankton captured from lake-side ponds. Results will be used to characterize the utility of extant zooplankton communities to grow native fish. This work will migrate into work task C44.

Pertinent Reports: A progress report summarizing the 2009 and 2010 study years is in production.

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$50,000	$150,000	$150,000	$150,000

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

Start Date: FY10

Expected Duration: FY13

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

Conservation Measures: MRM1 (WRBA, WYBA)

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

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

Connections with Other Work Tasks (past and future): Work tasks D9 and F4 determine the distribution of each species and determine areas in which to capture the target species.

Project Description: Radio transmitters will be attached to both western red bats and western yellow bats. These bats will then be tracked to their roosting sites (in trees) during the day to pinpoint their roosting locations. Vegetation measurements will be collected at both known roost sites as well as random non-use sites to determine whether these bat species have specific roosting characteristics. These data will be used to design habitat creation projects for these species. Few western red bats have been captured within the LCR MSCP program area. It may be necessary to include other riparian areas in the study in order to increase sample size.

Previous Activities: Locations where enough of these species can be captured to obtain a large enough sample size are being determined in D9 and F4.

FY09 Accomplishments: This is a new start in FY10.

FY10 Activities: Preliminary work will include developing a study design, determining sampling protocol, and evaluating survey areas.

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

Pertinent Reports: N/A

Work Task C36: Elf Owl Detectability Study

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$50,000	$50,000	$ 50,000	$0

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

Start Date: FY09

Expected Duration: FY12

Long-term Goal: To determine modifications needed to the current tape-playback presence/absence elf owl survey protocol and to develop a long-term elf owl monitoring plan for the LCR MSCP.

Conservation Measures: MRM1 (ELOW)

Location: Bill Williams River

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

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

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

The objectives of this study are to 1) systematically test how varying the parameters of call-playback surveys (distance to owl, time of night, decibel level of call playback, habituation, duration of call playback) affects the response type and response time of elf owls in known locations, 2) recommend survey protocols that optimize detectability, and recommend the number of seasonal surveys and amount of long-term survey effort required for effective population monitoring, and 3) quantify the liklihood 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: None

FY09 Accomplishments: Elf owl protocol evaluation began in FY09 during system monitoring activities initiated under D6.

FY10 Activities: A study plan was completed in January 2010. The study will begin in early March and take place at the Bill Williams River National Wildlife Refuge.

The goals of this study are to quantitatively determine the detectability of elf owls using standard call-playback methods, and to identify the survey parameters that produce the best results. To accomplish this, a minimum of 12 elf owls will be radio-tagged to determine their location with a relatively high degree of precision. Call-playback surveys will be conducted using a variety of different protocol parameters, and responses will be recorded. During the first season, data will be collected and analyzed for distance to bird, time period of survey, and playback volume. The first field season will provide data on detectability under several different permutations of survey design. Data will be analyzed and an annual report will be written.

Proposed FY11 Activities: The study will continue for a second year with field work beginning in March. The second season will be devoted to fine tuning of the protocol, and confirming conclusions from the first season's findings. Data will be analyzed and a final two-year project report will be submitted to Reclamation. This report will include suggested changes to the current protocol.

Pertinent Reports: The study design is available upon request.

Work Task C37: Hydrology Studies for Avian Riparian Obligate Species

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$150,000	$50,000	$50,000	$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 determine hydrologic conditions such as soil moisture, depth to groundwater, 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 obigate riparian species, such as summer tanagers, yellow warblers, and Bell's vireos that may benefit from these type of studies are being addressed under D6. This study was initiated under G3 in 2009.

Project Description: Based on information gathered since 1997 during surveys for southwestern willow flycatchers on the LCR, 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 cuckoo, summer tanager, vermilion flycatcher, yellow warbler, 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 River and lower Colorado River systems in order to quantify them.

Previous Activities: This is a new start in FY10.

FY10 Activities: Site selection will be completed and random plots will be selected in known willow flycatcher and yellow-billed cuckoo habitats at Bill Williams River National Wildlife Refuge, Topock Marsh, Mormon Mesa, and at the Cibola Valley Conservation Area. Piezometers will be placed at each site and transects will be established to measure each point for various hydrologic characteristics. Depth to water table, soil texture, soil organic layer, soil moisture and temperature, and standing water, will be measured and indices for evapotranspiration will be created.

Piezometer installation will begin in March 2010. Data will be collected in the first year from March to August and will be used to determine the appropriate sample size for year two. Information gathered in the first year will be used to make adjustments, if necessary, to the measurements taken in the second year of the study.

The data collected will be used along with data collected in year two to characterize hydrologic conditions of breeding yellow-billed cuckoo and southwestern willow flycatcher habitat.

Proposed FY11 Activities: The second year of sampling will take place at the same areas sampled in year one. Sample size and methods may be adjusted based on an analysis of the data from year one. After the second year of data has been collected, a final report will be drafted.

Pertinent Reports: An annual report will be completed in 2011 summarizing the first-year results. The study design is available upon request.

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$80,000	$0	$0	$0

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

Start Date: FY10

Expected Duration: FY10

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

Conservation Measures: RASU3, RASU6

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

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

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

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

Previous Activities: N/A

FY09 Accomplishments: RASU fin ray samples were obtained under C29 (fin ray tissues) for aging analyses.

FY10 Activities: Samples from more than 300 RASU collected from Reach 3 of the Colorado River in FY09, along with water samples collected throughout Reach 3 (river, backwaters, hatcheries, etc.), were provided to the University of California, Davis for quantifying ^{86}Sr:^{88}Sr isotopic ratios. An oral presentation of results was given at the CRAB meeting in Laughlin, Nevada. Results from analyses suggest that there is too little separation between sites and that fish did not appear to spend enough time in any one habitat or water mass to allow differentiation at a level that would be useful to LCR MSCP researchers. A completion report will be prepared.

Proposed FY11 Activities: The project will be completed in FY10.

Pertinent Reports: A research report titled, *Using Strontium Isotope Microchemistry Analyses of Fin Rays to Determine Hatchery Origin of Razorback Sucker (Xyrauchen texanus),* by Donald E. Portz (Reclamation), James A. Hobbs, and Naoaki Ikemiyagi (Interdisciplinary Center for Plasma Mass Spectrometry) is in preparation and will be available in FY10.

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$90,000	$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: Initially, this study will follow stocked fish to determine their fate after being released into Reach 3 of the Colorado River. Techniques for monitoring will include marking, tagging, netting, electro-fishing, and visual observations. Results of this initial work will be used to design and test ways to improve post-stocking survival. A final report will make recommendations for future BONY augmentation stockings.

Previous Activities: N/A

FY09 Accomplishments: N/A

FY10 Activities: Several groups of BONY will be sonic tagged and stocked into Reach 3 under the fish augmentation program. Released fish will be monitored weekly and all movements will be recorded and any presumed mortalities will be noted. Distribution will also be assessed using remote PIT scanners, which will be placed within habitats being used by sonic-tagged fish.

Initial monitoring is aimed at learning general distribution and habit use. Findings will be used to assess techniques and to finalize the study design for FY11-12 research (a control group of BONY will be tagged and held to assess tagging effects).

Proposed FY11 Activities: Intensive monitoring of BONY tagged and released in FY09 will be carried out. Locations where fish congregate will be agressively monitored using underwater cameras, graphs, nets, and SCUBA divers. Additional release of tagged fish will also occur. Should tracking and data collection warrant, techniques will be modified to maximize data collection effectiveness.

The substantial increase in funding for FY11 is due in part to FY10 work having been a preliminary action. The principal research will be conducted in FY11 and FY12.

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

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$75,000	$100,000	$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 to other work tasks (past and future): This work is related to Imperial Ponds Native Fish Research (C25) and RASU Genetic Diversity Assessment (C31).

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 effective population sizes 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 populations dynamics. The study will require multiple years of data collection and analyses; final recommendations are anticipated by 2018. Numbers of samples will be fewest during the first two years of the study, but estimated costs are initially high to cover purchase of specialized, analytical equipment.

Previous Activities: N/A

FY09 Accomplishments: Initial study design was reviewed under G3. Tissues from reared RASU and BONY were collected under C31. Larvae from lake-side ponds (B7) were also collected.

FY10 Activities: Specific numbers of adult RASU will be selected and stocked into lake-side ponds at Lake Mohave, and samples from any young produced will be collected and analyzed. Samples from young produced in ponds with extant populations elsewhere in the LCR MSCP project area will be collected. Additional native fish refuge ponds and grow-out ponds having populations of these fishes will be assessed for possible inclusion in this study. Annual and progress reports will be provided.

Proposed FY11 Activities: Sample collections and analyses from both stocked fish and their offspring in refuge and grow-out ponds will be continued so as to build family trees and assess genetic material transfer.

Pertinent Reports: N/A

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$25,000	$25,000	$25,000	$0

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

Start Date: FY10

Expected Duration: FY12

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

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

Location: Reaches 2 and 3

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

Connections to 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. 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 attempt to determine whether these structures provide a benefit or hazard to native fishes being released through the LCR MSCP area. The information may be used to determine future stocking locations. For example, if structures provide a benefit and are used as cover by native fishes, fish could be released in the vicinity of these structures.

Previous Activities: N/A

FY09 Accomplishments: N/A

FY10 Activities: Existing artificial reefs on Lake Havasu and Lake Mohave are being selected as study sites. PIT-tag antennae are under construction and will be deployed on and around structures during July and August. Marked fish will be released during fall

2010 in the vicinity of these structures and observed. Use of artificial structures by the fish will be recorded. Data will be analyzed and results developed into annual reports.

Proposed FY11 Activities: Monitoring use of artificial reefs on Lake Havasu and Lake Mohave by stocked RASU and BONY will continue. Data will be analyzed and developed into annual reports.

Pertinent Reports: N/A

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$200,000	$100,000	$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 habitat quality and management options at habitat creation sites.

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

Location: Controlled experiments will be conducted at Reclamation's Denver Technical Service Center and field experiments will be conducted at various conservation areas where appropriate.

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.

Project Description: After a review of soil amendments and their associated costs, availability, and water retention capabilities, Lassenite Pozzolan was identified as the most feasible and appropriate product for improving water retention and irrigation practices for sandy soils. Although this material has been tested for use on golf courses in desert environments, further examination into its ability to create moist soil conditions in riparian areas is required. Depending on results from these controlled experiments, application demonstrations may be conducted on sites where sandy soil conditions exist.

The study will explore the following in a laboratory setting: 1) movement of product through the soil profile under flood irrigation, 2) application rates and soil moisture effects at the surface and upper root zones of targeted riparian plants, and 3) facilitation of surface water movement from irrigation source to distant areas compared to untreated soils. Small-scale models will be constructed to conduct simulation experiments under controlled conditions.

Previous Activities: In FY07 under G3, a preliminary literature and product search was conducted to gather information on soil amendments for use in habitat restoration projects. In FY08-09, additional information was gathered on Lassenite Pozzolan, and a study proposal was written.

FY09 Activities: None; see G3 for FY09 activities.

FY10 Activities: Soil amendment experiments were initiated to determine the feasibility of Lassenite Pozzolan for restoration purposes. Results from these controlled experiments are expected by May 2010.

Proposed FY11 Activities: Field trials of the amendment may be conducted, depending on the results of laboratory experiments completed in FY10.

Pertinent Reports: *Feasibility of Using Soil Amendments to Increase Water Retention at Restoration Sites on the LCR* is available on the LCR MSCP Web site. The study design is available upon request.

Work Task C43: Population Demographics and Habitat Use of the California Leaf-Nosed Bat

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$0	$20,000	$60,000	$40,000

Contact: Sean Neiswenter, (702) 293-8221, sneiswenter@usbr.gov

Start Date: FY11

Expected Duration: FY13

Long-term Goal: Determine the population demographics and habitat use of an LCR MSCP evaluation species, the California leaf-nosed bat (*Macrotus californicus*).

Conservation Measures: CLNB1, CLNB2

Location: Reaches 3-5

Purpose: This work task is being initiated to evaluate the status of *M. californicus* along the LCR. This research is designed to determine the population history of *M. californicus* along the LCR, including geographic structuring, evolutionary history, and other population demographic parameters, using modern molecular techniques. This study is also designed to determine the distribution of genetic variation in *M. californicus* roost sites and identify where individuals from different roosts are foraging. 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. Doing so will provide important information for use in developing future conservation efforts for this species.

Connections with Other Work Tasks (past and future): Data on roost site location and samples collected from Conservation Areas will come from surveys conducted under D9. This data will also incorporate work from F4 by identifying nightly movement patterns from the different roosts to the various conservation areas, and possibly pinpointing foraging sites that are preferred. Initial study design and collection of genetic samples in FY10 will be conducted under G3.

Project Description: Genetic samples taken from bats from each of the known roost sites near the LCR and from individuals captured during regular system and post-restoration monitoring will be collected, and DNA sequencing and microsatellite analyses will be performed. This will document the genetic structure 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 restoration site monitoring will be assigned to the 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: This is a new start in FY11.

FY09 Accomplishments: This is a new start in FY11.

FY10 Activities: Study design and initial genetic sampling from individuals will begin at roost locations and conservation areas under G3.

Proposed FY11 Activities: A protocol will be developed for microsatellite analysis. Sequencing candidate genes will begin and preliminary genetic data will be generated. Collection of genetic samples will continue from conservation areas. Distance to the nearest roost will be determined from known conservation areas, and what roost bats are most likely coming from will be determined.

Pertinent Reports: A summary of results will be posted on the LCR MSCP Web site. The study design is available upon request.

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$0	$60,000	$100,000	$100,000

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 floodplain ponds being used within the LCR to hold or rear RASU and BONY. Off-channel habitats, including both manmade and natural floodplain 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 evaluates ways to manipulate zooplankton communities to benefit native fishes, and develops recommendations for adding feed or fertilization to maintain food levels needed by native fish to attain targeted growth rates.

Previous Activities: This effort builds upon research conducted under C34.

FY09 Accomplishments: This is a new start in FY11.

FY10 Activities: This is a new start in FY11.

Proposed FY11 Activities: The first year of the study will investigate effects of pond fertilization on composition, density, and duration of zooplankton communities in lake-side ponds on Lake Mohave. Preliminary investigations identifying the role of larger macroinvertebrates in RASU and BONY diets will also begin. The study designs for out years will be finalized during FY11. 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: N/A

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$0	$170,000	$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 and determine the need for continued fish augmentations.

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 to determine needs for continued stocking, 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. These fish are surviving and are being contacted throughout the year. 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.

FY09 Accomplishments: None; this is a new start FY11.

FY10 Activities: The study design for this new FY11 start will be developed under G3.

Proposed FY11 Activities: The first year of the study will focus on habitat mapping of Reach 3 and superimposing RASU monitoring data onto these maps. GIS expertise within Reclamation will be coordinated with extant GIS resources from the Lake Havasu office of BLM and from USFWS refuge offices. Field investigations will focus on gaps in geographic coverage of netting, shocking, and telemetry data. Findings will be used to focus study actions for FY12 and FY13.

Pertinent Reports: N/A

Work Task C46: Physiological Response in BONY and RASU to Transport Stress

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$0	$120,000	$120,000	$70,000

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: Fish stocking sites in reaches 2 and 3; Dexter NFH and Uvalde NFH

Purpose: To assess effects of hauling and transport on RASU and BONY.

Connections with Other Work Tasks (past and future): B4, B10, C10, and C11.

Project Description: This three-year study will characterize the physiological stress response of BONY and RASU before, during, and after transport from Dexter NFH and Uvalde NFH to stocking sites along reaches 2 and 3 of the LCR. Results from the first year will be used to develop and test revised hauling procedures to minimize stress.

Previous Activities: This effort builds upon research conducted under C10 and C11.

FY09 Accomplishments: None; this is a new start in FY11.

FY10 Activities: The study design for this new FY11 start will be developed under C10 and C11. Site visits to Dexter and Uvalde will be carried out to meet with principals and establish protocols.

Proposed FY11 Activities: The first year of the study will measure and record levels of blood plasma cortisol, glucose, osmolality, and chloride levels in RASU and BONY before, during, and after hauling from the hatchery to the LCR. Subsamples of fish from each haul will be held at stocking sites to evaluate post-stocking mortality. Results will be evaluated and used to design the second year of the study.

Pertinent Reports: N/A

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$0	$220,000	$250,000	$250,000

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

Start Date: FY11

Expected Duration: FY13

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

Conservation Measures: BONY3, BONY4, and BONY5

Location: Off-site rearing stations (Dexter and Uvalde NFHs)

Purpose: To assess the effects of volunteer spawning by BONY in holding ponds on the genetic integrity of the population, and on the goals of the captive management plan for this species.

Connections with Other Work Tasks (past and future): This work is related to B2, B4, B10, and C11.

Project Description: This three-year study will characterize the genetic diversity of volunteer-spawned BONY in ponds at Dexter NFH and Uvalde NFH and compare this population to the founder population of BONY brood stock at Dexter. This project will determine average diversity of pond recruitment. The final year will assess the utility of using a biological control (piscivorous fish) to reduce or eliminate inadvertent spawns in grow-out ponds.

Previous Activities: This effort builds upon research conducted under B4, B10, and C11.

FY09 Accomplishments: None; this is a new start in FY11.

FY10 Activities: The study design for this new FY11 start will be developed under C10 and C11. Site visits to Dexter and Uvalde will be carried out to meet with principals and establish protocols.

Proposed FY11 Activities: The first year of the study will measure and record genetic diversity of BONY recruits in holding ponds. Results will be compared to genetic information from parents and data will be evaluated and reported.

Pertinent Reports: N/A

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$0	$60,000	$60,000	$0

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

Start Date: FY11

Expected Duration: FY12

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

Conservation Measures: RASU3, RASU4

Location: Off site, Dexter NFH

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. These stocks will be assessed for genetic similarity and compared to wild stocks from the lake. Information from captive stocks held at Ouray NFH and Grand Valley Endangered Fish Facility will also be included in the comparison. 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.

FY09 Accomplishments: None; this is a new start in FY11.

FY10 Activities: The study design for this new FY11 start will be developed under C11. Site visits to Dexter will be carried out to meet with principals and establish protocols.

Proposed FY11 Activities: The first year of the study will measure and record genetic diversity of RASU stocks at Dexter NFH. Results will be compared to genetic information of parents and data will be evaluated and reported.

Pertinent Reports: N/A

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$0	$125,000	$150,000	$150,000

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

Start Date: FY11

Expected Duration: FY13

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

Conservation Measures: BONY3, BONY 4, BONY5, RASU3, RASU4, and RASU6

Location: Reach 4, Colorado River, between Parker and Palo Verde dams

Purpose: Assess distribution and habitat use of stocked RASU.

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.

FY09 Accomplishments: This is a new start in FY11.

FY10 Activities: This is a new start in FY11.

Proposed FY11 Activities: The first year of the study will consist of fish surveys, water quality assessments, and sonic tracking. Literature reviews will be conducted and fish sampling data from previous state and federal studies will be reviewed and compiled.

Base mapping of fish habitat will be initiated to provide a template for overlay of field data and development of a habitat use model.

Pertinent Reports: N/A

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$0	$60,000	$75,000	$0

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

Start Date: FY11

Expected Duration: FY12

Long-term Goal: To maintain an 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 C12 and 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 utilize Reclamation's dive team to video-record feeding activities of the fish 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 from activities conducted under C12 and D8.

FY09 Accomplishments: None; this is a new start in FY11.

FY10 Activities: This is a new start in FY11.

Proposed FY11 Activities: The first year of the study will focus on capture of feeding activities by underwater video and collection of substrate-bearing food items.

Pertinent Reports: N/A

WORK TASKS SECTION D

SYSTEM MONITORING

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Work Task D1: Marsh Bird Surveys

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$35,000	$27,400.01	$146,230.28	$35,000	$25,000	$35,000	$35,000

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

Start Date: FY05

Expected Duration: FY55

Long-term Goal: System monitoring for marsh birds

Conservation Measures: MRM1 AND MRM2 (CLRA, BLRA)

Location: Havasu National Wildlife Refuge, Arizona and California

Purpose: Monitor Yuma clapper rail (CLRA), California black rail (BLRA), and western least bittern (LEBI) along a designated reach of the LCR as part of the inter-agency system monitoring program.

Connections with Other Work Tasks (past and future): Data obtained from F2 may also be used in the marsh bird system monitoring program described in D1. The protocol developed for D1 will also be used for F2.

Project Description: Yuma clapper rail surveys and other marsh bird surveys have been conducted annually since the 1980s by multiple agencies. The LCR MSCP portion of these surveys are 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 1995.

FY09 Accomplishments: Marsh bird surveys were conducted between the I-40 bridge, near Needles, California, and Lake Havasu during March, April, and May 2009. Total CLRA detections ranged from 34 to 60 individuals per survey period. Total LEBI

detections ranged from 11 in March to 33 during the May survey period. CLRA detections were similar to those of 2008 surveys while LEBI detections were slightly higher. BLRA were detected five times during the 2009 survey period with three detections during the April survey. This is the most BLRA detections in Topock Gorge since the beginning of organized surveys. In August, data were compiled and entered in the National Marsh Bird database at http://www.pwrc.usgs.gov/point/mb/, which is maintained by the USFWS.

FY10 Activities: Marsh bird surveys are being conducted in Topock Gorge and the upper reaches of Lake Havasu using the multi-species marsh bird survey protocol. Data will be submitted to the USFWS. Information obtained through this work task may be used in planning future marsh bird habitat creation activities. Reclamation will enter historical CLRA survey data, currently stored by the USFWS, into the LCR MSCP database.

Proposed FY11 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 – 2009* will be posted to the LCR MSCP Web site.

Work Task D2: Southwestern Willow Flycatcher Presence/Absence Surveys

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$690,000	$1,274,835.64	$4,445,162.48	$650,000	$675,000	$700,000	$700,000

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.

FY09 Accomplishments: Presence/absence surveys were conducted at 71 sites in 15 study areas along the LCR and its tributaries in 2009. 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 River NWR, Arizona. Sites were not surveyed in the Grand Canyon in 2009 due to low water and inaccessibility.

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

Willow flycatchers were detected on at least one occasion at 41 sites. Resident, breeding SWFLs were detected at 19 sites within the following 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 16 June 2009, 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. Thus, a study and demonstration is being conducted to monitor the hydrology closely underneath the stand and to place additional water underneath a portion of the stand to determine the effects this would have on increasing nesting pairs and potentially successful nests. Pre-monitoring for this study was conducted in 2009.

A total of 25 adult flycatchers were captured in 2009; 17 were new captures, and 8 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 55 adults banded in previous years were resighted. A total of 44 nestlings from 21 nests were banded. Flycatchers were banded opportunistically at Key Pittman Wildlife Management Area and St. George, Utah. Six new adults and a recaptured returning nestling were color banded, and 12 nestlings were also banded at these two areas. A total of 75 territories were recorded with 50 territories consisting of paired flycatchers and 21 consisting of unpaired individuals. Of the 75 adult flycatchers identified in 2008, 41 (55%) were located in 2009. Of the 73 banded juveniles from 2008, 12 (16%) were recaptured and identified in 2009. Four individuals originally banded as nestlings in previous years were identified for the first time in 2009.

Nest success was calculated for 65 SWFL nests. Twenty-three (35%) nests were successful and fledged young, 40 (62%) failed, and 2 were unknown (3%). Depredation was the major cause of nest failure, accounting for 40% of all failed nests and 48% of nests that failed after flycatcher eggs were laid. Brown-headed cowbird brood parasitism was observed in 16 of 56 nests (17%). Overall, although there are additional threats to the breeding habitat along the Virgin River that may affect populations in the future, monitoring has shown that the populations continue to be stable during the 2009 breeding season.

Vegetation and microhabitat data were collected from the territories of the 56 territorial male flycatchers to further define habitat characteristics. Areas that were unoccupied in 2009 but that had been occupied in previous years between 2003 and 2007 were investigated for changes in vegetation or microclimate that may have contributed to

abandonment of some areas. The vegetation data showed a decrease in the proportion of live stems 2.5-8 cm DBH at Mormon Mesa and Topock.

Funding for the FY10 presence/absence studies was obligated in FY09 due to additional funds available.

FY10 Activities: Presence/absence SWFL surveys will be conducted at approximately 80-100 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 be reviewed from the air to determine habitat status. If the habitat has improved, and there is access, this area will once again be surveyed.

Life history 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.

Water will be moved to a subset of formerly occupied SWFL sites at Topock Marsh, and monitoring of hydrology, presence of breeding pairs, and nest success will occur.

A study of the effects of tamarisk beetles on nesting willow flycatcher habitat in the areas of St. George, Utah, and Mormon Mesa, Nevada will be initiated. The tamarisk beetle has been detected defoliating plants in the St. George area, and may be moving south into Nevada. The defoliation caused by the beetle could have detrimental effects to willow flycatcher nesting success in areas where saltcedar is used as nesting habitat. The study will be used to evaluate the possible impact that southward expansion of the beetle's range may have on willow flycatcher populations along the LCR.

Proposed FY11 Activities: Reclamation will continue to conduct presence/absence SWFL surveys along the Virgin River, Pahranagat NWR, and the LCR to the SIB. Grand Canyon below Separation Canyon will be reviewed from the air to determine habitat status. If the habitat has improved and there is access, this area will once again be surveyed.

Life history data will continue to be collected at four sites, including Pahranagat NWR, Mesquite, Mormon Mesa, and Topock Marsh. Monitoring activities will concentrate on collecting demographic data including banding and nest monitoring, and habitat data including vegetation and microclimate, but at a reduced level from previous efforts. Existing brown-headed cowbird control has been discontinued and post-trap data will be collected and analyzed to determine trapping frequency.

Pertinent Reports: *Southwestern Willow Flycatcher Surveys, Demography, and Ecology along the Lower Colorado River and Tributaries, 2009. Annual Report* is posted on the LCR MSCP Web site.

Work Task D3: Southwestern Willow Flycatcher Habitat Monitoring

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$90,000	$222,500.41	$610,465.20	$90,000	$90,000	$95,000	$95,000

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 FY09, all water transfers had 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: Continue to monitor SWFL habitat condition five 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 2005, Reclamation began monitoring 372 acres of SWFL breeding habitat to document changes in habitat conditions specifically attributable to covered SIA activities, and will continue to do so until five years after implementation of all water transfers covered under the SIA.

Previous Activities: 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 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. The seasonal cycle in groundwater levels mirrors the seasonal fluctuations in river flow. Analysis of groundwater data indicates a strong correlation between piezometer water levels and releases from Parker Dam. Data did not show strong correlations between piezometer water level and soil moisture within the habitat monitoring sites.

FY09 Accomplishments: Each site was monitored for temperature, relative humidity, soil moisture, vegetation, and groundwater. There were several between-year differences in vegetation variables at the habitat monitoring sites. The variables that exhibited a constant change across time were percentage of live stems less than 2.5 cm DBH, which declined steadily from 2005 to 2009, and percentage of live stems 2.5-8 cm DBH, which was lower in 2008 and 2009 than in previous years.

Funding for the FY10 presence/absence studies was obligated in FY09 due to additional funds available.

FY10 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. Data will be analyzed and results will be included in an annual report. An evaluation of the complete five-year database will be conducted.

Proposed FY11 Activities: Based upon the results of the evaluation being completed in FY10, a determination will be made on whether this level of monitoring effort is appropriate to monitor effects of water transfer actions.

Pertinent Reports: *Southwestern Willow Flycatcher Surveys, Demography, and Ecology along the Lower Colorado River and Tributaries, 2009. Annual Report* is posted on the LCR MSCP Web site.

Work Task D5: Monitoring Avian Productivity and Survivorship

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$300,000	$282,279.28	$1,314,917.66	$250,000	$275,000	$300,000	$300,000

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

Start Date: FY05

Expected Duration: FY55

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

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

Location: Cibola NWR and Havasu NWR

Purpose: To collect intensive, site-specific data on avian species demographics, physical condition, species composition and diversity, and site persistence at existing and created habitat sites.

Connections with Other Work Tasks (past and future): Data from this work task are used in conjunction with data collected from the system-wide bird monitoring program (D6) to monitor overall bird use of the LCR. Data collected at MAPS (Monitoring Avian Productivity 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, are 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 are collected by conducting intensive banding throughout the breeding season. Data collected are analyzed by the Institute for Bird Populations, and long-term population trends are determined on a regional and continental level. 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, near 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 Institute for Bird Populations recommends conducting MAPS stations a minimum of five years to acquire site-specific data. After five years, each site will be evaluated and a decision will be made to continue, discontinue, or move the MAPS station to a new location.

Data on fall migration and winter use are also being recorded using an adapted MAPS protocol similar to protocols from migration banding projects throughout the western United States and the MoSI (Monitoreo de Sobrevivencia Invernal) protocol used in Mesoamerica. Data from these surveys will help define habitat use by birds during the non-breeding season.

Previous Activities: Winter banding was conducted from 2002 through 2005 at the Pratt restoration site, 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 Cibola NWR site since 2002 and at Havasu NWR (HAVA) from 2005 to 2008. In addition, a MAPS station (HERO) was run for five 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 at the banding sites in August 2008 to monitor site persistence during the breeding and winter banding seasons. Two Bell's vireos were color banded at the Cibola NWR site.

FY09 Accomplishments: During the winter, banding was conducted at Cibola NWR and at Havasu NWR, for two days a month, from October to February. Banding was conducted for six hours a day, and twelve, 12-meter nets were operated at each site. During the winter banding period, 301 individuals were captured at the Cibola site and 72 individuals were captured at the Havasu site. One Bell's vireo was color banded at the Cibola NWR site in November.

In late September 2008, a fire occurred at the Havasu NWR site (HAVA) and burned a significant portion of the area. This site (HAVA) was still used for winter banding but was abandoned as a MAPS site. A new location (BERS) was selected at the Beal Lake riparian restoration site on Havasu NWR.

During the summer, banding was conducted at both sites using the MAPS protocol. Banding was conducted for five hours a day, beginning one-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 181 captures at the Cibola site and 276 total captures at the Beal site. Four LCR MSCP listed species were captured,

including willow flycatcher (three captures of undetermined subspecies at Cibola and one southwestern subspecies and two undetermined subspecies captures at the Beal site), yellow warbler (six captures at Cibola, and 13 captures at the Beal site), summer tanager (five captures at the Havasu site), and Bell's vireo (12 captures at the Beal site). All of the yellow warblers, summer tanagers, and Bell's vireos were color banded except for one yellow warbler at the Cibola NWR site. Resightings of yellow warbler, Bell's vireo, and summer tanager were made at the Beal site after the MAPS season.

FY10 Activities: Winter banding will be continued in 2010 at the Cibola Nature Trail and Beal sites. The MAPS banding stations will be continued at both sites during the 2010 breeding season. Color banding of LCR MSCP covered species will continue to be implemented to increase the effective recapture rate. A visual identification of a color-banded bird qualifies as a recapture for statistical purposes. Other restoration sites such as CVCA and PVER will be reviewed as potential banding stations.

Proposed FY11 Activities: Intensive winter and breeding season monitoring will continue in 2011. Information obtained will be used for the system monitoring program and to inform habitat creation projects listed in Section E. The current station at Cibola Nature Trail may be moved to one of the conservation areas such as CVCA or PVER based on the review conducted in FY10.

Pertinent Reports: *Operation of Two Monitoring Avian Productivity and Survivorship (MAPS) and Winter Banding Stations Along the LCR, 2009* will be posted to the LCR MSCP Web site.

Work Task D6: System Monitoring for Riparian Obligate Avian Species

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$135,000	$300,988.48	$761,772.55	$210,000	$210,000	$210,000	$210,000

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

Start Date: FY06

Expected Duration: FY55

Long-term Goal: System monitoring for avian covered species

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

Location: System-wide

Purpose: Monitor riparian obligate avian species covered under the LCR MSCP to document long-term population trend and habitat use.

Connections with Other Work Tasks (past and future): Information obtained through this work task will be used in conjunction with data from D5 to conduct system monitoring for avian covered species. Data collected during post-development monitoring of habitat conservation areas (F2) may also be used in this work task. Information obtained through this work task will also be used in association with C24 to help define habitat requirements for riparian obligate bird species.

Project Description: The LCR MSCP includes conservation measures for 26 covered species and 5 evaluation species, including 9 neo-tropical migratory bird species. It is inefficient to monitor every covered species individually throughout the entire LCR MSCP planning area. Many bird populations can be monitored effectively using multi-species survey protocols.

Avian system monitoring protocols have been developed that can incorporate data into a coordinated bird monitoring network. Data from the LCR can be incorporated into a larger, regional database, which makes the data more powerful during analysis. Population trends can be derived over time, thus enabling Reclamation to monitor existing avian populations. The avian multi-species protocol described below is designed to monitor six LCR MSCP covered species as well as non-covered neo-tropical migratory

bird species. The six LCR MSCP covered species are gilded flicker, Gila woodpecker, summer tanager, vermilion flycatcher, Sonoran yellow warbler, and Arizona Bell's vireo.

Single-species surveys for the elf owl are necessary due to the nocturnal nature of this species and its rarity along the LCR. Single-species tape playback surveys of the elf owl will be conducted in suitable habitat in the LCR MSCP planning area. Suitable habitat includes known historical locations, locations of incidental sightings, and all HMIII, CWI, and CWII habitat.

Previous Activities: 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 and 2008 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. In 2008, system monitoring, post-development monitoring, and habitat suitability modeling were combined into one agreement to more efficiently manage avian monitoring programs.

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. Suitable habitat was defined as historical locations, incidental sightings, and HMIII, CWI, and CWII habitat. Surveys were conducted from 27 March to 1 May 2008, and used a tape-playback presence-absence survey protocol. No elf owls were detected during surveys.

FY09 Accomplishments:

In 2009, 80 plots were randomly selected, using the same sample design and stratums as in 2007 and 2008. Each rapid area search plot was surveyed twice in 2009; 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 2009. 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 a three-year period (2007-2009).

During system-wide rapid area searches in 2009, 21,789 adults of 149 species were recorded. Of these, 83 species were presumed breeders and 66 were migrants or presumed non-breeders. During system-wide intensive area searches, 527 breeding territories of 43 species were recorded. The most common of the focal species in 2009 was the Bell's vireo, the rarest was the vermilion flycatcher, and the gilded flicker was absent during all surveys. The population estimates for the focal species in the LCR MSCP planning area from 2007 to 2009 were: 1) Arizona Bell's vireo (4,027), 2) Sonoran yellow warbler (3,610), 3) Gila woodpecker (2,774), 4) summer tanager (720),

and 5) vermilion flycatcher (197). The gilded flicker was absent from the LCR MSCP planning area in all three years. The 10 most abundant species in the LCR MSCP planning area in 2007-2009 were: 1) Abert's towhee, 2) brown-headed cowbird, 3) black-tailed gnatcatcher, 4) common yellowthroat, 5) Gambel's quail, 6) marsh wren, 7) mourning dove, 8) verdin, 9) white-winged dove, and 10) yellow-breasted chat.

The Great Basin Bird Observatory submitted a final report to Reclamation that includes detailed results for activities under C24, D6, and F2. A software program to automate the calculation of the detection ratios was developed by the USGS.

Elf owl surveys in 2009 utilized the same protocol as in 2008, and were conducted at the same 21 sites and 45 single call stations as in 2008, plus an additional three sites that were not surveyed in 2008. One elf owl was detected near Blankenship Bend. An annual report was written. An elf owl detectability study was initiated and will continue in FY10 under work C36. This study will evaluate the current protocol to make it more efficient and effective.

FY10 Activities: Area searches will be conducted during the breeding season of 2010 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 breeeding season. Eight of these plots will be surveyed intensively with each plot being surveyed eight times during the breeding season.

The Great Basin Bird Observatory will submit a final four-year report (FY07, FY08, FY09, and FY10) to Reclamation for the avian systemwide study (D6), habitat creation monitoring (F2), and avian habitat monitoring (C24).

Elf owl surveys using the same protocol as in FY09 will be conducted on two sites of potential habitat that were skipped in FY08. A final three-year project report for elf owl monitoring will be written.

Proposed FY11 Activities: Area search surveys for riparian obligate species including the six focal species will continue in 2011. Area searches will be conducted during the breeding season of 2011 following the double sampling intensive/rapid area search protocol used in previous years.

Pertinent Reports: *Annual Report on the Lower Colorado River Riparian Bird Surveys, 2009* and *System-wide Surveys of the Elf Owl (Micrathene whitneyi) Along the Lower Colorado River, 2009* are posted on the LCR MSCP Web site. The study plan is available upon request.

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$540,000	$526,939.86	$1,958,567.46	$540,000	$550,000	$550,000	$550,000

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

Start Date: FY06

Expected Duration: FY55

Long-term Goal: Acquire yellow-billed cuckoo data as part of the system monitoring program.

Conservation Measures: MRM1, MRM2 (YBCU)

Location: General presence/absence surveys are conducted in approximately 55 sites of suitable habitat within the LCR MSCP project boundary.

Purpose: Conduct surveys to determine existing yellow-billed cuckoo (YBCU) populations along the LCR from the Grand Canyon to the Southerly International Boundary with Mexico and monitor long-term trends.

Connections with Other Work Tasks (past and future): Data collected in this work task will be utilized in the YBCU modeling being conducted under C24.

Project Description: Yellow-billed cuckoos 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.

FY09 Accomplishments: Monitoring and research activities 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 58 sites within the LCR MSCP area in potentially suitable habitat. Cuckoos were detected 178 times during surveys, estimated to represent 44 potential breeding pairs. Breeding was confirmed at four sites: Bill Williams River NWR; Palo Verde Ecological Reserve, Phase 2; Cibola Valley Conservation Area, Phase 1; and Cibola NWR. Ten cuckoos were mist-netted and banded, including nine at restoraiton sites. One bird captured at Palo Verde Ecological Reserve was banded as a nestling in 2008 at the Cibola Valley Conservation Area, 35 km to the south of PVER. This is the first time such a capture has been noted at any restoration site or conservation area along the LCR. Populations appear to be stable along the LCR, and more detailed results, as well as vegetation, habitat, microclimate, and prey selection data will be included in the 2009 annual report.

FY10 Activities: Activities in FY10 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. As many cuckoos as possible will be captured, banded, and tracked using telemetry. Nest searching will be conducted and nests found will be monitored. Vegetation and microclimate data will be collected.

Proposed FY11 Activities: Activities in FY11 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. 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.

Pertinent Reports: *Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use on the Lower Colorado River and Tributaries, 2009 Annual Report* will be posted to the LCR MSCP Web site.

Work Task D8: Razorback Sucker and Bonytail Stock Assessment

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$350,000	$469,412.71	$1,614,377.31	$400,000	$575,000	$600,000	$650,000

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

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Conduct long-term system monitoring of RASU and BONY

Conservation Measures: RASU6 and BONY5

Location: Lower Colorado River within the LCR MSCP planning area, including reservoirs and connected channels, from Lake Mead downstream to Imperial Dam.

Purpose: Supplement and maintain sufficient knowledge and understanding of RASU and BONY populations within the LCR MSCP planning area to have an effective AMP.

Connections with Other Work Tasks (past and future): Monitoring data for RASU and BONY have been or will be gleaned from work accomplished under 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.

Under the first strategy, LCR MSCP staff will gather and organize data from existing monitoring programs. For example, sport-fish surveys and native-fish surveys are conducted annually on lakes Mead, Mohave, and Havasu by multi-agency teams, with LCR MSCP fishery staff participating in each survey. In each survey, the lake is divided into different zones with one survey group assigned to each zone. All zones are sampled within a set time period using similar equipment. When the survey is complete, each participating agency receives information for the entire lake at a reduced cost incurred by only needing to survey a portion of the whole system.

Also under the first strategy, data will be gleaned from ongoing species research actions. For example, a RASU study is being conducted on Lake Mead (C13) and another study is being conducted in the lower river below Parker Dam (C8). Data for RASU population status and distribution will be gathered from these studies.

Under the second strategy, areas not being sufficiently surveyed through ongoing activities will be surveyed either by LCR MSCP fishery staff or another entity. For example, the current surveys for RASU between Davis and Parker dams are being conducted jointly by USGS and Reclamation and are financially supported through D8. Another major monitoring action funded by this work task is the survey work conducted on Lake Mohave to assess survival and distribution of repatriated RASU. Areas along the lower two-thirds of the lake are netted monthly between October and May. The upper third of the lake, including the area above Willow Beach and up to Hoover Dam, are electro-fished and netted during the June to September period (due to cool water releases from Lake Mead).

In some cases, LCR MSCP fishery staff conduct native fish surveys to fill in seasonal gaps left by other research activities. For example, USGS surveys for RASU between Davis Dam and Lake Havasu are only conducted during the January to April spawning period. Staff from the LCR MSCP monitor sonic-tagged fish in this reach during the summer and conduct electro-fishing in the fall to provide a more complete assessment of the fishery.

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).

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 by Reclamation and ASU as part of the Razorback Sucker Survival Study (C8) annually since 2003. Reclamation financially supports the Colorado River Fishes database maintained by ASU through G1.

FY09 Accomplishments: Accomplishments for this work task are summarized by river reach:

Reach 1 (Lake Mead). Reclamation, in cooperation with the AZGFD and NDOW, 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 lakewide effort included gill netting and electro-fishing and resulted in the capture of 10 different species, including four RASU.

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 1,497 larvae from Las Vegas Bay, 7 larvae from Echo Bay, and 50 larvae from the Muddy River/Virgin River inflow area for a lakewide total of 1,554 larvae. Larvae were subsequently delivered to Lake Mead State Fish Hatchery for rearing (B6).

Species monitoring of the Lake Mead RASU population (C13) also continued. During December 2008, 12 adult RASU were sonic-tagged and released into Lake Mead near the three major spawning locations (4 fish at each location). In addition to these 12 fish, 5 sonic-tagged RASU also remained from a previous tagging event. These fish were tracked using sonic telemetry, and information on movement patterns, habitat use, and ultimately the location of spawning aggregates was obtained. This information allowed researchers to deploy trammel nets more efficiently and resulted in capturing a total of 80 RASU, including 35 subadult fish. Capture data, along with aging and growth data obtained during this study year, have once again indicated continued, successful recruitment in Lake Mead.

Reach 2 (Lake Mohave). Reclamation repatriated 12,496 RASU into Lake Mohave in 2009. This stocking effort marks the return to stocking RASU that have achieved a minimum size of 300 mm TL as established by the MSCP. This is a significant increase in the number of RASU stocked in 2008 (771), indicative of availability of the largest RASU obtainable (overall average of 456 mm TL) from all sources in 2008.
Lake-wide surveys for native fish were conducted, including trammel netting (62 net nights, 27 RASU contacted), electro-fishing (5,546 seconds, 75 RASU contacted), and remote sensing (for a more detailed overview see C23), which resulted in 3,083 total PIT-tag (RASU) contacts from 1,049 hours of deployment time representing 191 RASU contacted. All native fish contact data were provided to Marsh & Associates LLC (formerly ASU Native Fish Lab) for analysis and were used to derive the current population estimate of 1,579 adult RASU (C12). Reclamation also assisted with stocking and tracking sonic-tagged RASU.

Annual RASU (May and November) and BONY (May) roundups were conducted. The LCR MSCP partners and cooperators for these efforts included USFWS, AGFD, NDOW, ASU (Marsh & Associates LLC), and NPS. 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 27,512 RASU larvae were collected and delivered to Willow Beach NFH for rearing (B2).

Reach 3 (Davis Dam to Parker Dam or Lake Havasu). Under the Fish Augmentation Program, 5,848 RASU and 4,073 BONY were stocked into Reach 3 during calendar year 2009.

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 by Reclamation through Topock Gorge to look for young-of-year native fishes. Large numbers of RASU continue to be contacted in the riverine portions of Reach 3 (>280 RASU). Younger, recently released RASU dominate the catch from the numerous backwaters within the reach, while more mature RASU are contacted during surveys of the numerous spawning aggregations. A limited number of BONY contacts were made during the 2009 survey year. Sixteen BONY were contacted near the Bill Williams River inflow by USFWS personel; all of these BONY were recently stocked fish. The non-native fish community did not show any significant changes and was represented by 15 different species.

A population estimate of 1,201 adult fish was generated as a result of the RASU aging work, which was initiated in 2008 under G3 and was captured by C29 in 2009. The previous estimate was higher (1,659 fish), but still falls within this year's range. Estimates are expected to stabilize as this population continues to be monitored.

Reclamation conducted eight trips to monitor movements of sonic-tagged razorback suckers between Davis and Parker dams in 2009. BLM searched Lake Havasu on two additional occasions. No additional mortality was observed in the fish originally sonic tagged at the Needles and Laughlin spawning sites. As in 2007, all of these fish had returned to the spawning sites where they were originally captured by December 2008. They remained at the spawning sites until mid-March. From March until late summer/early fall, these fish continued to use the same locations that they utilized outside the spawning season in previous years. By the end of July some had returned to their spawning sites and all had returned by December. This was very similar to 2007. The one remaining razorback sucker released at Cattail Cove in January 2008 was also detected numerous times at the Needles spawning site. Outside of the spawning season, this fish was detected upstream of Needles on two occasions.

Five sonic-tagged male razorback suckers were released at Standard Wash in December 2008. The purpose of this release was to look for spawning sites being used by razorback suckers in Lake Havasu. Two of these fish had joined the spawning group at Needles by early February. The other three fish appeared to have died within two months of their release. These fish had remained in the lower end of the reservoir between Cattail Cove and Bill Williams Delta.

The fourth field season of FLSU surveys associated with C15 was completed. Data were collected using numerous techniques. The 2009 field season remained focused on the distribution and abundance of young-of-year FLSU, with additional emphasis on increasing adult contacts via electrofishing, which will facilatate a more robust population estimate.

Reaches 4 and 5 (Parker Dam to Imperial Dam). During calendar year 2009, Reclamation stocked 5,757 RASU and 2,506 BONY into Reach 4 (between Parker and Headgate Rock dams), and 198 RASU were stocked into Imperial Ponds (C25) Reach 5. Field sampling of fish within the confines of the Colorado River Indian Tribes Reservation (CRIT) on Reach 4 was not initiated due to permitting issues. However, multiple ocular surveys were conducted in Reach 4. A winter survey focused from Parker Dam to Headgate Rock Dam located a small group of RASU in the main channel downstream of River Island State Park. A summer survey was also conducted for all of Reach 4; no native fish were identified. There were no surveys conducted in the river portions of Reach 5 due to poor survival estimates, which have been documented in C8. All fisheries surveys in Reach 5 were restricted to Imperial Ponds (C25).

An interagency acquisition was initiated between Reclamation and the USFWS to allow for greater cooperation and assistance along the river in reaches 3, 4, and 5. The USFWS has an established working relationship with CRIT and it is expected that this relationship should facilitate the expansion of native fish work into the CRIT boundaries.

FY10 Activities: Monitoring will continue in all reaches. Monitoring activities are summarized by river reach:

Reach 1. Representatives from Reclamation, AZGFD, NDOW, and NPS will collaborate to perform annual fall surveys of Lake Mead. RASU larval collections will be conducted at all major spawning sites, and captured larvae will be transported to Lake Mead SFH for grow out (B6). Species research will continue on the Lake Mead RASU population (C13) with efforts focused on trammel netting adult and subadult RASU during the spawning season, acquiring age and growth data from recaptured RASU, and monitoring sonic-tagged RASU to identify movement patterns, habitat use, and shifts in RASU spawning site locations. Population dynamics will be assessed through analysis of year-end data sets.

Reach 2. Monitoring will continue with effort similar to 2009. Lake-wide surveys for native fish will continue to include trammel netting, electro-fishing, and remote sensing. A RASU larval collection goal of approximately 25,000 with an additional goal of approximately 2,500 for Lake Mead as needed has been established. Sonic tracking of native fishes in Reach 2 will continue. Use of remote sensing equipment for PIT-tag detection (C23) will be incorporated into routine monitoring actions. LCR MSCP staff will continue to participate in multi-agency field surveys. Increased visual surveys will be conducted below Hoover Dam in search of spawning aggregations of native fishes released through the Fish Augmentation Program.

Reach 3. Monitoring will continue with effort similar to 2009. There will be an increase in effort relative to the BONY as a result of C39.

Reach 4/5. Monitoring will be expanded to include netting and electrofishing. A statement of proposed activities will be presented to the CRIT in an effort to gain permission to conduct native fish surveys on their lands.

Proposed FY11 Activities: System monitoring work to be performed on Reach 1 is described in the report, *Lake Mead Razorback Sucker Monitoring Recommendations,* available on the LCR MSCP Web site. Monitoring activities for RASU previously conducted under research C13 are being relocated to this work task. The funding increase for FY11 reflects this change. Monitoring data will be collected for reaches 2 through 5. Sonic tracking of adult RASU in Reach 3 will be completed. LCR MSCP staff will continue to participate in multi-agency field surveys. Increased visual surveys will be conducted below Hoover Dam, Davis Dam, Parker Dam, Headgate Rock Dam, and Palo Verde Diversion Dam in search of spawning aggregations of native fishes released through the Fish Augmentation Program.

Pertinent Reports: *Lake Mead Razorback Sucker Monitoring Recommendations* is available on the LCR MSCP Web site.

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$130,000	$139,417.88	$485,314.17	$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.

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.

FY09 Accomplishments: The Arizona Game and Fish Department (AGFD) coordinated the collection and analysis of acoustic bat data for system-wide monitoring of the LCR. AGFD finished sampling the first 72 sampling locations and started sampling the second set of 72 sampling locations, each of which is active for two-night periods during each of four seasons. Placement of these detectors was stratified in three reaches of the LCR across four vegetation types likely to be affected by restoration activities. All four covered species have been detected in all three reaches, although detection rates are fairly low. 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.

Data collected from permanent stations suggest that bat activity was low during the winter but increased in early spring and remained high through fall. AGFD also conducted mist-netting surveys at five different non-restoration site areas. Western yellow bats were captured at Planet Ranch and on the Bill Williams River NWR. California leaf-nosed bats were captured at Planet Ranch, the Bill Williams River NWR, and Betty's Kitchen. Townsend's big-eared bats were captured at the Bill Williams River NWR, and one western red bat was captured at Planet Ranch. Out-flight counts were conducted in January and April 2009 at most of the known roosts of California leaf-nosed bats and Townsend's big-eared bats.

FY10 Activities: The initial system-wide monitoring project will finish collecting data by May and a draft final report will be prepared and submitted. Once the initial monitoring is finished, recommendations will be made to determine a protocol and frequency for full system-wide bat monitoring. Four permanent Anabat monitoring stations will continue to operate to provide year-round data.

Outflight counts will be conducted at various mines and bridges along the LCR in the winter and early summer. These counts will be used to determine trends in California leaf-nosed bat and Townsends big-eared bat populations.

Proposed FY11 Activities: The four permanent Anabat monitoring stations will continue to operate. Data will be collected and analyzed. The Sonobat software that is used to analyze and identify calls from a different type of bat detector is now becoming automated. This new technology will be researched and tested, which may result in switching from Anabat to another bat detector that uses this new technology. Bat populations will also continue to be monitored at maternity sites and mines to determine abundance and distribution of covered and evaluation bat species.

Depending on analysis and recommendations from the FY10 report, changes to the system monitoring for covered bat species may be implemented. Outflight counts will be conducted at various mines and bridges along the LCR in the winter and early summer.

These counts will be used to determine trends in California leaf-nosed bat and Townsends big-eared bat populations.

Pertinent Reports: *Monitoring of Covered and Evaluation Bat Species for the Lower Colorado River Multi-Species Conservation Program, Annual Report, 2009* will be posted to the LCR MSCP Web site. A final mine survey summary report for years 2004-2009 will be prepared and posted to the Web site.

Work Task D10: System Monitoring of Rodent Populations

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$52,197.81	$0	$65,000	$65,000	$65,000

Contact: Sean Neiswenter, (702) 293-8221, sneiswenter@usbr.gov

Start Date: FY11 (re-opened from FY07 closed work task)

Expected Duration: FY55

Long-term Goal: System monitoring studies to document presence of possible source populations of LCR MSCP covered rodents along the LCR and at nearby historic localities.

Conservation Measures: AMM1, AMM6, MRM2, DPMO1, CRCR1, CRCR2, YHCR1, and YHCR2

Location: System-wide along the Lower Colorado River, including the Bill Williams and Gila tributaries and the nearby Imperial Valley.

Purpose: Implement systematic presence/absence sampling for system monitoring of LCR MSCP covered rodent species. This study is being conducted to determine the extent of the geographic range limits of the covered rodent species the Yuma hispid cotton rat, the Colorado River cotton rat, and the desert pocket mouse. Another goal of this study is to document all possible source populations of immigrants to restoration sites, to the extent practicable. The Yuma hispid cotton rat 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): Due to lack of information on genetics of the species and distributional locations, system monitoring was delayed until populations could be located utilizing species research under C27. System monitoring will begin in FY11 utilizing a long-term population monitoring protocol currently being designed under C27. 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 study is designed to determine the presence of 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. Reclamation is also interested in

the geographic limits of the desert pocket mouse and how future restoration activities may affect the habitat of this species.

Ecological niche models (ENM) for each of the species will be developed by Reclamation 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. Particular attention will be given to the area surrounding the proposed barrier between the two cotton rat species, the Trigo Mountains and the Chocolate Mountains, to determine whether 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.

Previous Activities: This is a new start in FY11.

FY09 Accomplishments: This is a new start in FY11.

FY10 Activities: This is a new start in FY11.

Proposed FY11 Activities: Work will be coordinated with state and federal resource agencies and other interested parties to implement system-wide rodent surveys for covered species. Emphasis will be on aerial and ground surveys for Yuma hispid cotton rat habitat from the Trigo and Chocolate mountains south to the Mexican border. Other surveys will include the Bill Williams River and Gila River tributaries for the Colorado River cotton rat and northern Lake Mead for the desert pocket mouse.

Pertinent Reports: Final reports for other rodent work tasks (C27 and F3) are available on the LCR MSCP Web site.

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

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$20,000	$120,000	$150,000	$75,000

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: This is a new start in FY10.

FY09 Accomplishments: This is a new start in FY10.

FY10 Activities: A study design will be finalized and survey areas will be identified.

Proposed FY11 Activities: The first year of the surveys will be implemented and an annual report will be completed. Both species will be surveyed using multiple methods

(e.g., visual encounter surveys, call surveys, road surveys). Using multiple methods to survey for rare and potentially extirpated species will maximize the likelihood of finding either species. Surveys will begin in January and will be repeated once each month through September (skipping June). Surveys from January through May will focus on the lowland leopard frog, and surveys from July through September will focus on the Colorado River toad. Once populations are located, habitat assessments will begin.

Pertinent Reports: N/A

WORK TASKS SECTION E

CONSERVATION AREA DEVELOPMENT AND MANAGEMENT

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Work Task E1: Beal Lake Riparian Restoration

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$180,000	$195,931.36	$2,412,492.71	$130,000	$200,000	$200,000	$200,000

Contact: Ashlee Rudolph, (702) 293-8178, arudolph@usbr.gov

Start Date: FY04

Expected Duration: FY55

Long-term Goal: Habitat creation

Conservation Measures: WIFL1, WRBA2, WYBA3, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, MNSW2, CLNB2, PTBB2, MNSW2

Location: Reach 3, Havasu NWR, Arizona, 0.5 miles east of river miles 238 and 239

Purpose: Create and manage a mosaic of native land cover types for LCR MSCP covered species.

Connections with Other Work Tasks (past and future): Dredge material from Beal Lake Native Fish (E2) was leveled in 2001 to create the substrate for planting the riparian habitat adjacent to Beal Lake. Vegetation and species monitoring are being addressed under F1-F4.

Project Description: Reclamation has partnered with the USFWS to conduct restoration research at Beal Lake until FY09. In April of FY10, a decision will be made to continue research activities, manage any habitat created during the research for the life of the program, or discontinue funding.

In this restoration research project, planting, irrigation, and management techniques, coupled with vegetation and species monitoring, are being demonstrated along with the creation of more than 100 acres of native riparian land cover types. Planting includes clearing, root plowing, and leveling areas previously consisting of sparse arrowweed and saltcedar, and replanting these areas with cottonwood, willow, and mesquite. Irrigation, as needed, is through a pump, pipe, and valve system with dates and volumes documented and reported to Reclamation monthly.

The site has provided an opportunity to test various methods of seeding combined with flood irrigation such as direct hand seeding, whole branch seeding, hydro-seeding, and perimeter seeding. Perimeter seeding refers to the fields where trees were planted around

the perimeter to create a barrier against wind-borne weed seeds and to allow for natural seeding of the center of the field once the trees are mature.

Future management of any created habitat for targeted species such as SWFL and YBCU may include increased irrigation to specific areas and cutting and clearing to re-establish and maintain high vegetation density. Monitoring data will provide guidance on future riparian establishment and management procedures.

Previous Activities: Restoration began in 2001. Site preparation and planting for Phase 1 (59 acres) and site preparation for Phase 2 (48 acres) were completed. Phase 3 (80 acres) was cleared but not planted and has subsequently developed into a mix of screwbean mesquite, saltgrass, tumbleweed, arrowweed, and sparse saltcedar. In FY04-05, honey mesquite seed was collected and placed in piles in Phase 3 for scarification and distribution by resident wildlife. 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.

FY09 Accomplishments:

Maintenance/Management. A permanent in-line fertigation system with a 24-inch check valve was installed on the main irrigation pipe. Fertilizer is now introduced in the irrigation water, and can be applied any time of the season without interfering with species breeding or nesting. Soil samples were taken twice a season to determine fertilizer needs and the prescribed amount of fertilizer was applied. Irrigation and other maintenance duties such as mowing, and cleaning the Beal Lake fish screens were completed as needed.

Monitoring. Post-development monitoring was conducted in the cottonwood-willow and mesquite habitat at Beal Lake. Ground water depth was monitored monthly at 14 piezometers. Temperature and relative humidity were measured using 15 HOBO H8 data loggers.

Vegetation measurements were collected at 15 permanent plots. Canopy closure ranged from 0 to 100% with an average of 49.36%. The average height and DBH of the stand (combination of cottonwoods and willows) were 6.0 m and 16.0 cm, respectively. Land cover type classification included cottonwood-willow types I-III, and screwbean mesquite-saltcedar types III and IV. Overall classification of the site is cottonwood-willow type I.

Small mammal surveys were conducted in the spring of 2009. No cotton rat species were detected. A permanent bat monitoring station was established in April 2008. Acoustic bat surveys utilizing six Anabats placed in various locations was conducted quarterly. All four covered bat species were detected acoustically: California leaf-nosed bat, pale Townsend’s big-eared bat, western red bat, and western yellow bat.

Avian species were surveyed using an intensive area search method. There were 97 pairs of birds comprising 17 species that were detected breeding, including two LCR MSCP covered species, the Arizona Bell's vireo, and the Sonoran yellow warbler.

Single species surveys were conducted for the southwestern willow flycatcher and western yellow-billed cuckoo during their respective breeding seasons. Yellow-billed cuckoos were detected on July 3, July 4, and July 17 at Beal Lake, but breeding was not confirmed. One banded southwestern willow flycatcher was detected utilizing Beal Lake in May, but it nested elsewhere on Topock Marsh. Two migratory willow flycatchers were also detected at Beal Lake.

Avian mist netting following the Monitoring Avian Productivity and Survivorship protocol was conducted from May 1 to July 31. Sonoran yellow warblers, Arizona Bell's vireos, and summer tanagers were color banded to better monitor their breeding activities at Beal Lake.

FY10 Activities: This project has been evaluated as a conservation area in the LCR MSCP and the Program Manager is recommending the project be included into the program. A report summarizing the results of wildlife and vegetation monitoring, evaluation of habitat potential, recommendations for existing land cover modifications or management approach, and anticipated credit towards species-specific conservation measures is anticipated to be presented to the Steering Committee in April 2010. With the passing of Resolution 10-0005, the Steering Committee concurs with bringing Beal Lake Riparian into the Lower Colorado River Multi-Species Conservation Program pending the signing of a Land Use Agreement.

Management/Maintenance. Management through irrigation and fertilization will continue. It is anticipated that money transferred through a 2005 Service Agreement with the USFWS will pay for the irrigation and maintenance personnel; thus, less money was requested for the FY10 budget.

If perimeter trees are mature and seeding, the inner portions of those areas will be managed to encourage germination. Contingent upon Beal Lake Riparian Restoration being confirmed as a conservation area to the LCR MSCP, the site will be evaluated to determine whether structural management or replanting is needed. Additionally, the site will be assessed as a possible candidate for a soil amendment study being developed (C42).

Monitoring. Ground water depth will be monitored. Temperature, rainfall, and relative humidity will be monitored at the previously established HOBO H8 data logger stations. Vegetation monitoring will occur at the same points established in 2007. General avian surveys utilizing intensive area searches will be conducted. Single species surveys for the southwestern willow flycatcher and yellow-billed cuckoo will be conducted during their respective breeding seasons. Acoustic bat surveys will be conducted quarterly and acoustic data will be collected from the permanent bat monitoring station.

Proposed FY11 Activities: Management through irrigation and fertilization will continue. The fields planted around the perimeter will continue to be monitored and measures will be taken to encourage germination when the trees are mature enough to seed. Habitat creation research may continue on site with a potential soil amendment study designed to encourage understory growth and surface soil moisture in sandy soils.

Abiotic and biotic habitat monitoring will be conducted. Surveys for all covered species that are associated with cottonwood-willow habitat will be conducted. General avian and bat surveys will be conducted.

Pertinent Reports: *Beal Lake Riparian Restoration Development and Monitoring Plan* is posted on the LCR MSCP Web site, and *2008 Beal Lake Riparian Annual Report* is in review prior to posting on the Web site.

Work Task E2: Beal Lake Native Fish

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$70,000	$86,242.83	$689,426.52	$50,000	$120,000	$80,000	$80,000

Contact: Ashlee Rudolph, (702) 293-8178, arudolph@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Habitat creation

Conservation Measures: BONY2 and RASU2

Location: Reach 3, Arizona, Havasu NWR, one-half mile east of River Mile 237

Purpose: Reclamation maintains the backwater created for native fishes under the 1997 Biological Opinion (BO). Reclamation is simultaneously making improvements to the backwater and conducting restoration research at the site. Information from this research will be used to adaptively manage the backwater and increase efficiency and effectiveness in future backwater habitat creation projects.

Connections with Other Work Tasks (past and future): Monitoring of native fish is being addressed under F5. Portions of restoration research at Beal Lake are funded under G3.

Project Description: Beal Lake was approximately 225 acres of shallow, low-quality aquatic habitat that was dredged beginning in 2001 to create a functioning backwater dedicated to native fish. The Beal Lake restoration project is a continuation of the commitment to construct habitat for protected native fish under the 1997 BO. Continued maintenance and management of Beal Lake as well as research and development of the backwater as native fish habitat have been included in LCR MSCP activities.

Previous Activities: The costs of initial backwater creation, including dredging and isolating the backwater with a semi-permeable rock structure, were incurred prior to FY05 and implementation of the LCR MSCP. The restoration research and management of Beal Lake included the installation of a cylindrical wedge-wire screen system. Beal Lake was initially isolated from Topock Marsh with a passive rock filtration system. However, after several months of the system not allowing enough water to pass through the structure to compensate for the evaporative losses in Beal Lake, Reclamation decided to test a new technology that would supplement water flow into the lake and effectively

exclude life stages of nonnative fishes. A cylindrical wedge-wire screen system was selected because of its potentially easy maintenance and long-term performance.

Because cylindrical wedge-wire screen technology had never been used for this application, information was needed to estimate the hydraulic capacity of the system and its true exclusion capabilities. A two-phase investigation, including in situ hydraulic testing and a laboratory exclusion evaluation, was contracted to provide these data. Results from these studies have provided a clearer picture of how appropriate this technology is for this and future application.

A number of existing water control structures at Beal Lake were replaced during the screen system installation. The existing features were not adequately sized to supply the necessary water volume to the irrigation pump or to Beal Lake.

Additional improvements were made to allow for more effective management of water in Beal Lake: a water management system enabling large-scale water removal, water level control for fisheries management, and large-scale water circulation capabilities were installed. The system consists of a permanent platform, ramp, and discharge pipe that allows for the intermittent deployment of various pumps, depending on the specific management need. The water management system was successfully used to assist the irrigation pump in lowering the water level in Beal Lake for lake renovation (this process included pre-treatment fish salvage, chemical treatment of the water to kill remaining nonnative fish, post-detoxification sampling, and restocking with native fish). In addition, the system can be used to circulate water from the south end of Beal Lake and induce freshening flows into the lake from Topock Marsh to maintain adequate levels of water quality for native fish.

FY09 Accomplishments: On-site activities included monthly cleaning of the wedge-wire screens, opening and closing of water control structures, calibration of water elevation sensors, and visual inspection of the backwater. These tasks were coordinated with on-site activities associated with Beal Lake Riparian Restoration (E1) to avoid redundancy.

As projected and based on monitoring information, maintenance activities, and observations, an intensive inspection, cleaning, and evaluation of the screen system at Beal Lake was planned for FY09; however, scheduling with the maintenance crew pushed the event back to the first week of November 2009 when lake elevations were at a lower level.

Other expenditures in FY09 included continuation of the restoration research component at Beal Lake. Funding for restoration research in FY09 was supported by Adaptive Management Research Projects (G3). An in situ evaluation of this technology's effectiveness was conducted to determine exclusion potential and entrainment rates in a real-world application. These entrainment tests occurred in spring and summer of FY09 at the Imperial Ponds on Imperial NWR.

FY10 Activities: The intensive inspection, cleaning, and evaluation of the screen system at Beal Lake took place in November 2009, and entailed removing the screens, spraying out and inspecting the pipes, working the valves, and cleaning the screens in the maintenance yard where they could be hung, sprayed out, treated with muriatic acid, and rinsed. After cleaning and reinstalling the screens, the fourth pipe, which had been capped with blank flanges, was opened and a new set of screens were installed. Flow through the rock structure is now supplemented by flow through four pairs of screens instead of the previous three. Cleaning in conjunction with the installation of the fourth pair of screens was successful in providing the flow capacity necessary to transfer enough water through the system to allow for an equilibration of hydraulic head on either side of the rock structure during low evaporation months. However, higher evaporation rates occur in the summer months and they have not occurred yet.

Access ports were installed on the three pipes that previously had no opening from which to sample the inside of the pipe. Debris buildup against a downstream structure had caused flow to slow through the inlet canal to Beal Lake; to remedy this, the 24-inch pipes and a culvert box were removed and the canal was cleaned out.

Both screens and the system as a whole were evaluated for continued functionality. A report documenting the monthly cleaning and evaluation of the system is due to Reclamation by the end of the calendar year.

Long-term monitoring of the screen system's hydraulic performance will continue using the installed water level sensor system. This work task also covers the routine maintenance of the screen system and water level sensors, including manual cleaning of the screen system and periodic calibration and maintenance of the sensor system.

Water quality and fisheries monitoring activities will be coordinated with USFWS and are covered under F5. Coordination with resource agencies will continue to determine future operations and maintenance of existing features at Beal Lake.

Proposed FY11 Activities: Cleaning the screens monthly and monitoring the water levels on either side of the rock structure will continue. The budget has been increased to provide for replacement of the water control structure in Beal ditch that was removed in FY10 to allow for future rehabilitation of the rock/screen structure. If directed by adaptive management recommendations, a complete rehabilitation of the rock structure/screen system may be necessary or a new system may be constructed based on an improved design if the current system is deemed inadequate. These major construction activities would not be anticipated until at least FY12, and would require comprehensive designs and appropriate permitting before an estimate could be developed.

Pertinent Reports: *Evaluation of a Cylindrical Wedge-Wire Screen System at Beal Lake, Arizona, 2005,* and *Evaluation of a Cylindrical Wedge-Wire Screen System at Beal Lake, Arizona, 2006 Phase II Testing* are posted on the LCR MSCP Web site.

Work Task E3: ‘Ahakhav Tribal Preserve

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$145,000	$97,370.14	$1,392,665.44	$241,000	$0	$0	$0

Contact: Jed Blake, (702) 293-8165, jblake@usbr.gov

Start Date: FY04

Expected Duration: Closed in FY10

Long-term Goal: Restoration research and habitat creation

Conservation Measures: WIFL1, WRBA2, WYBA3, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, MNSW2, CLMB2, PTBB2

Location: Reach 4, Colorado River Indian Tribes, river miles 173-174, 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 in F1-F4.

Project Description: In September 2004, the LCR MSCP began working at the ‘Ahakhav Tribal Preserve through a research and development agreement. A variety of methods and techniques for the propagation and irrigation of cottonwood-willow and mesquite land cover types were used to create approximately 154 acres of habitat. Prior to habitat development, the site consisted of out-of-production agricultural fields dominated by tumbleweed and sparse saltcedar. All work was done in an effort to evaluate efficient and cost-effective methods for various revegetation projects. Maintenance and management of approximately 154 acres of riparian land cover types created at CRIT 9 since 2003 is ongoing.

Previous Activities: Work began in 2003 by restoring CRIT 9 (154 acres) with native riparian plant species including cottonwood, willow, and mesquite. This involved site preparation (clearing, root-ripping, leveling), soil testing, installation of irrigation infrastructure, and planting. Monitoring of irrigation and maintenance of planted areas has been ongoing throughout this process.

FY09 Accomplishments:

Maintenance/Restoration/Management. At CRIT 9, previously established cottonwood-willow and mesquite land cover types totaling 154 acres were flood irrigated with an average of 9.5 acre-feet/acre of water. General maintenance on CRIT 9 included clearing canals of debris, installing tail ditches, maintaining access roads, installation of canal bridges, installation of signage, repairing ditches and gates, and re-establishing berms between irrigated sections. Irrigation continued at CRIT 10 (58 acres), which was previously planted with a cover crop of alfalfa and Sudangrass.

Discussion of a possible land use agreement between the Colorado River Indian Tribes and the LCR MSCP Program Manager continued. LCR MSCP staff members attended two tribal council meetings during FY09.

Monitoring. Post-development vegetation monitoring was conducted at CRIT 9 in sections 1-4. Canopy closure ranged from 10% to 100% with an average of 74.13%. Average height and DBH for the overstory were 9 m and 17 cm, respectively. Average tree height and DBH for the intermediate and shrub layer category were 6 m and 10 cm, respectively. Land cover types included cottonwood-willow types II-III and honey mesquite III, with an overall site cover type of cottonwood-willow type II.

Anabat bat detectors were deployed quarterly across the site in different habitat types to determine bat activity. All four MSCP species were acoustically detected using the site in FY09, although the Townsend's big-eared bat was only detected once. Capture surveys were conducted once a month from May to September. Western red bats, western yellow bats, and California leaf-nosed bats were captured, and voucher calls were obtained.

Avian species were surveyed using an intensive area search method. There were 158 pairs of birds comprising 20 species that were confirmed as breeding at CRIT 9, including two LCR MSCP covered species, the vermilion flycatcher and the summer tanager.

For the second year, the mature cottonwood-willow and mesquite habitat in CRIT 9 was surveyed on three nights for elf owls. No elf owls responded to taped recordings.

The CRIT 9 site was visited 11 times between June 25 and August 20 to survey for yellow-billed cuckoos. Cuckoos were present from June 25 to July 30. Nesting was not confirmed, but based on behavior and timing of detections, nesting was possible.

FY10 Activities:

Maintenance/Restoration/Management. Maintenance of CRIT 9 continued in FY10 until the end of the research grant on December 31, 2009. Maintenance activities included irrigation infrastructure repair, application of fertilizers, maintenance of fields, installation of more tail ditches, use of a crop consultant to monitor plant health, and installation of additional signage on the site.

Since the site was developed, the fields are no longer level. Initially the site was laser leveled; however, due to the extremely sandy environment and high wind conditions the site has been taking longer to irrigate. The uneven surface causes the flood irrigation to take longer than necessary and is believed to flush vital nutrients from the soil. A thorough GPS survey was conducted to determine existing slope of the field. In-house surveyors will be utilized to guide improvements to the irrigation system.

Reclamation has discussed the potential inclusion of CRIT 9 into the LCR MSCP as a new Conservation Area with the Colorado River Indian Tribes Tribal Council. If the Tribal Council is interested in entering into an agreement with Reclamation to manage CRIT 9 as an LCR MSCP Conservation Area, Reclamation will evaluate their proposal. If the Program Manager recommends this project be included as a new Conservation Area, Reclamation will request concurrence from the Steering Committee. However, at this time, CRIT has not determined if they are agreeable to proposing CRIT 9 as a new LCR MSCP Conservation Area. With the expiration of the existing research grant on December 31, 2009, this work task will be closed in FY10.

Monitoring. Monitoring may continue as part of system-wide monitoring until the site is secured for the program.

Proposed FY11 Activities: The work task was closed in FY10. Post-development monitoring of abiotic and biotic habitat characteristics may continue in CRIT 9.

Pertinent Reports: *'Ahakhav Tribal Preserve: 2009 Annual Report* will be posted to the LCR MSCP Web site.

Work Task E4: Palo Verde Ecological Reserve

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$1,250,000.00	$1,349,593.46	$3,618,294.65	$1,683,000	$1,950,000	$2,174,000	$1,000,000

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 D2, D3, D5, D6, D7, D9, and F1-F6. Various related research projects are being conducted under C5, C7, C24, C27, C28, and C35.

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. 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 avian riparian obligate covered species.

To date, standard farming practices are an efficient and effective way to convert agricultural cropland to habitat. Costs for development and maintenance of the habitat include such farming methods as land leveling, disking, irrigation of crops, repair and maintenance of the irrigation system, and the application of fertilizer and herbicide. Palo

Verde Irrigation District provides water to PVER. The costs associated with irrigation, electricity, and water are proportional to the amount of acreage that has been converted to habitat.

It is desirable 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. Typically, mesquite costs are based on a 1-gallon planted tree.

Agricultural areas have irrigation systems in place that are conducive to 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 FY08, 323 acres of cottonwood-willow and mesquite land cover types have been established in phases 1-4 and are being managed for the LCR MSCP covered species.

FY09 Accomplishments: The *Palo Verde Ecological Reserve Development Plan: Phase 5* document was reviewed and approved by CDFG. According to the design, 100 acres of cottonwood-willow were planted in Phase 4. On the 84 acres in Phase 3, approximately 12 acres of cottonwood-willow land cover type was planted in the spring of 2009, as well as 22 acres of mesquite.

Soil samples were taken by the contract crop consultant in Phase 4 prior to planting. The samples indicated deficiencies of NO3-N (nitrogen), and PO3-P (phosphorus). An application of 10-34-0 was added in an irrigation cycle.

In March 2009, trees and shrubs were planted in Phase 4, checks 1-16, utilizing mass transplanting. Over 188,000 trees and shrubs were planted within a five-day period. The checks were planted according to the design *(Palo Verde Ecological Reserve: Restoration Development Plan Phase 4, 2008)*. The 2008 planting contained the following average percentages of plants and trees: 1% *Atriplex*, 17% cottonwood, 7% *Baccharis*, 36% Goodding's willow, 36% coyote willow, and 0.05% mesquite. The average number was 2,100 plants per acre.

Checks 1-3, Phase 3 were planted with *Atriplex* in 2008; the mid-section of each of these checks was planted with a cover crop until spring of 2009. At that time, 1,800 mesquite trees were planted through the cover crop areas. The 12 acres in checks 9 and 10 were mass transplanted with 20% cottonwood, 10% *Baccharis*, 40% Goodding's willow, and 30% coyote willow.

In July 2009, CDFG proposed a land exchange at PVER involving the land they retained located to the west and north of Phase 5, for the land identified as Phase 8 and the eastern part of Phase 9. This was determined to benefit both parties, resulting in a contiguous

riparian land area. This exchange will affect the phase schedule by increasing the acres developed in Phase 5 and decreasing the acres in Phase 8.

Post-development vegetation monitoring was conducted at phases 2, 3, and 4. Canopy closure ranged from 0 to 100% with an average of 68% in Phase 2 and 33% in Phase 3. Average height and DBH for the intermediate and shrub layer category in Phase 2 were 11 m and 10 cm, respectively; Phase 3 averages were 7 m and 9 cm, respectively. Phase 4 plots (planted in 2009) did not have trees that met the overstory or intermediate shrub layer size requirements, so no data were collected in these categories. Land cover classifications consist of cottonwood-willow types II-V and honey mesquite III-VI. Overall land cover has not yet been determined.

The *Atriplex lentiformis* and alfalfa plot at Phase 3 was surveyed for MacNeill's sootywings; only one sootywing was observed.

Rodent trapping has been conducted and no *Sigmodon* have been captured within PVER to date. The species, however, continues to maintain a population on an accretion bench in the Colorado River just below Phase 4 of PVER.

Anabat bat detectors were deployed quarterly across the site in different habitat types to determine bat activity. All four MSCP species were found using the site in FY09, with western yellow bat and Townsend’s big-eared bat only detected acoustically one time for each species. Capture surveys will be implemented in 2010.

General avian species were surveyed to determine breeding status at PVER, Phase 2 using area search and spot mapping techniques. No LCR MSCP covered species were detected by this method.

Willow flycatchers were surveyed five times in PVER Phase 2 using standard taped playback methods. One willow flycatcher was detected on May 27 and one on June 3. Due to the dates the birds were present, they were considered migrants.

PVER phases 1 and 2 were visited on 20 separate dates to conduct yellow-billed cuckoo surveys. Two nests were found. One nest successfully fledged young, as adults were observed feeding an unknown number of young. The other nest failed, likely due to predation. One returning adult was banded as a nestling at CVCA in 2008.

FY10 Activities: The development of Phase 5 (216 acres) is the focus in FY10. The ground will be prepared for Phase 5 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 in reducing weed infestations in phases 2, 3, and 4, this method will continue to be utilized in Phase 5. 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 200 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 and *Atriplex* will also be hand planted on the remaining 16 acres. The planting will integrate three different percentages of Goodding's willow, 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.

A crop consultant will be contracted for soil analysis, soil moisture, and general health checks. Weeds will be managed with the application of a pre-emergent herbicide, manual removal where possible, and target herbicides. Visual monitoring for destructive insects will continue and, when applicable, pesticides may be used.

Irrigation will continue on the same schedule until data become available that indicate adjustments are needed. The plan and design for Phase 6, development of approximately 220 acres, will be drafted and is expected to establish this phase with cottonwood-willow land cover type. Monitoring activities conducted in 2009 will continue in 2010. Locations of surveys will be adjusted based on the growth and development of the planted phases.

Proposed FY11 Activities: Field preparation and planting of Phase 6 (216 acres) will be conducted to create as much riparian habitat as practical with the intent to target habitat for SWFL, YBCU, and other covered species. Previous phases will be monitored and adaptively managed for the targeted species. The plan and design for development of Phase 7 will be developed and will continue the expansion of riparian habitat. Monitoring activities conducted in 2010 will continue in 2011. Locations of surveys will be adjusted based on the growth and development of the planted phases.

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*, and the *Palo Verde Ecological Reserve Restoration Development Plan: Phase 5*, which described the restoration activities planned for FY10 are posted on the LCR MSCP Web site.

Work Task E5: Cibola Valley Conservation Area

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$1,000,000	$789,905.06	$9,209,864.66	$900,000	$1,100,000	$1,100,000	$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. Insect populations may be investigated as described in C5.

Project Description: In 2007, Reclamation secured 1,309 acres of land serviced by the Cibola Valley Irrigation and Drainage District and established the Cibola Valley Conservation Area (CVCA). The Arizona Game and Fish Department (AGFD) acquired the CVCA in September 2007 through a multi-organizational agreement involving the AGFD, Reclamation, the Mohave County Water Authority, The Conservation Fund, and the Hopi Tribe. Through these agreements, AGFD acquired CVCA fee title and water entitlements and agreed to manage the site.

Cibola Valley Conservation Area is located in southwestern La Paz County, Arizona, about 15 miles south of Blythe, California. The valley encompasses the land inside an engineered bend of the lower Colorado River and a remnant oxbow on the west side of the river (Palo Verde Oxbow). It is currently farmed for cotton and alfalfa. The area is bordered to the south by Cibola NWR and on the east by unimproved land under the jurisdiction of the Bureau of Land Management. The river forms the north and west boundaries, except for the Palo Verde Oxbow, from river miles 98.8 to 104.9.

Reclamation has secured 1,300 acre feet of irrigation water per year for the AGFD and 1,419 acre feet per year of the Hopi Tribe's fourth priority Colorado River water entitlement. In addition, Reclamation already maintains a fourth-priority entitlement of 118.94 ac-ft per year at CVCA. The irrigation water will be used for establishment and maintenance of land cover types throughout the life of the program. Agricultural areas have irrigation systems in place that are conducive for water management of riparian species. Checks, which are small borders placed within a given field, allow for flooding of only a portion of a field. This provides additional flexibility to create and maintain saturated soil areas for covered species.

Previous Activities: Through FY08, 265 acres of cottonwood-willow and honey mesquite land cover types have been established in phases 1-3 and are being managed for LCR MSCP covered species. A Memorandum of Understanding was signed in September 2008 between Reclamation and AGFD that assures availability of land and water resources for the 50-year term of the program. Additionally, 1,419 acre-feet of water was purchased from the Hopi Tribe for the site. Reclamation and AGFD continued joint planning for development and creation of habitat on CVCA.

Ivyleaf morning-glory is present at various levels throughout all of CVCA. Working with our Farm Advisory Board and local contract farmer, many different techniques were used to control or minimize the spread of this invasive non-native species. Through this successful partnership, morning-glory, although still present, is not significantly affecting growth or survivorship of planted native land cover types.

FY09 Accomplishments:

Maintenance/Restoration/Management. Phase 4, consisting of 245 acres, was planted in March 2009 in accordance with the restoration development plan. This planting established approximately 25,000 honey mesquite and 18,000 *Atriplex*. Phase 4 actually consists of two locations; one site (58 acres) is located due 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 mix consisted of quailbush, needle grama, curley mesquite, desert bluebells, and desert Indian wheat. A sprinkler system was rented for four months to provide irrigation water for initial plant germination. This mixture requires less than 4 inches of annual rainfall to survive.

The remaining portion of Phase 4 was planted in furrows approximately 2-feet deep with a 20-foot separation between the rows. This wide furrow spacing saves irrigation water and provides adequate room for a tractor to disk invasive saltcedar and volunteer cotton, which grows between the planted furrows.

Ivyleaf morning-glory was present again in the fields of phases 1 and 2, and to a smaller degree, in Phase 3. The incursion was not as widespread as in the previous year. In an attempt to control the morning-glory, a trial application of Harrell's granular herbicide 75 was aerially applied in field B-2 (5 acres) in Phase 1 and fields 2-5 (6.5 acres) in Phase 2.

The manufacturer recommended two separate applications on each field. The two treatments did not noticeably affect the morning-glory's growth.

Field crews continued to control morning-glory, volunteer cotton, and saltcedar with hand tools. This method of using crews proved to be an effective method of controlling invasive plants as they germinate. The crews remove invasive plants from the fields twice a year, in the spring and in the fall.

An agronomist continued taking soil samples, recommending fertilizer applications, and providing soil moisture monitoring information. The agronomist conducted inspections focusing on general plant health, evidence of disease, over-irrigation, under-irrigation, water drainage, general nutrition, and insect problems. All reports were forwarded to Reclamation with recommendations for treatment.

A document titled, *Cibola Valley Conservation Area Restoration Development Plan: Phase 5*, was drafted that includes the design and planting plan for Phase 5, which would be established in FY10. Approximately 71 acres of honey mesquite will be planted.

Monitoring. Post-development vegetation monitoring was conducted at phases 1, 2, 3, and 4. Canopy closure ranged from 0 to 100% with the average of 87% for Phase 1, 81% for Phase 2, and 69% for Phase 3. Average height and DBH for overstory trees in Phase 1 were 12.18 m and 15.35 cm, and for Phase 3 were 9.46 m and 18.41 cm. Phase 2 and Phase 4 contained trees too small to be classified as overstory. Average height and DBH for the intermediate and shrub layer category in Phase 1 were 10.43 m and 9.56 cm; Phase 2 averages were 6.69 m and 9.16 cm; Phase 3 averages were 6.64 m and 9.09 cm; and Phase 4 (planted in 2009) average was 1.6 m. Land classifications consisted of cottonwood-willow types I-IV, and honey mesquite type VI.

MacNeill's sootywings were monitored every 2-3 weeks during April-September 2009. Sootywing numbers ranged from less than 10 adults to over 100 adults. The deep irrigation furrows at Phase 4 have been very effective in establishing host plants (quailbush) and sootywings. Rodent monitoring was conducted at CVCA during 2009, but to date *Sigmodon* have not been captured.

Anabat bat detectors were deployed quarterly across the site in different habitat types to determine bat activity. The western red bat, western yellow bat, and California leaf-nosed bat were all recorded acoustically, with a large increase in red bat activity in 2009. Capture surveys were conducted once per month from May to September. The western red bat, western yellow bat, and California leaf-nosed bat were all captured, and acoustic voucher calls were obtained.

Avian species were surveyed at phases 1 and 3 using an intensive area search method during 2009. There were 163 pairs of birds comprising 17 species that were breeding, including one LCR MSCP covered species, the Sonoran yellow warbler.

Surveys for southwestern willow flycatchers were conducted five times during 2009. Birds detected before June 15 were considered migrants. One willow flycatcher was detected on May 27 in Phase 1. One willow flycatcher was detected on May 16, one on May 27, and two on June 10 in Phase 3.

As many as five yellow-billed cuckoos were present from June 16 to July 16. Two pairs of cuckoos were confirmed breeding. One nest failed and the other nest, containing two eggs, fledged an unknown number of young.

FY10 Activities: Planting and field preparation of Phase 5 is intended to create approximately 71 acres of honey mesquite land cover, which in coordination with earlier and later planting phases, is designed to create a native vegetation mosaic. Phase 5 consists of eight fields, or checks, arranged in size from 8 to 10 acres, that will be planted in east-west rows.

The ground will be prepared for planting by disking, laser leveling, and creating furrows in preparation for hand planting of 1-gallon potted mesquites (10,000). Smaller *Atriplex* plants (7,500) will also be hand-planted between the mesquite. These plants will be planted in furrows with a plant in-line spacing of 15 feet and a furrow row spacing of 20 feet. This wide furrow spacing saves irrigation water and allows for a tractor to disk invasive saltcedar and volunteer cotton that grow between the planted furrows.

Soil samples will be taken prior to planting to provide nutrient availability information. A contracted crop consultant will be utilized to recommend schedules for water and fertilizer applications. During the growing season, the consultant may sample and analyze plant tissue for nitrogen levels and other nutrients as necessary.

A document titled, *Cibola Valley Conservation Area Restoration Development Plan: Phase 6*, will be drafted, which includes design and planting plan of Phase 6 that would be established in FY11. Approximately 89 acres of honey mesquite and *Atriplex* will be planted.

Monitoring activities conducted in 2009 will continue in 2010. Locations of surveys will be adjusted based on the growth and development of the planted phases.

Proposed FY11 Activities: The planting and field preparation of Phase 6, located east of Phase 5, is designed to create 89 acres of honey mesquite land cover. All the previous phases will be developed, maintained, monitored, and adaptively managed riparian habitat for targeted species. Winter wheat will be planted and is anticipated to benefit the dove population. Habitat, avian, small mammal, and bat monitoring will continue.

A document titled, *Cibola Valley Conservation Area Restoration Development Plan: Phase 7*, will be drafted and will include design and planting plans for Phase 7, which will be established in FY12. Approximately 72 acres of cottonwood and willow riparian habitat will be planted.

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

Pertinent Reports: *Soil-Plant-Water-Nutrient Relationships of Populus fremontii, Salix gooddingii, and Salix exigua During Native Habitat Restoration*, the study plan from the Department of Soil, Water, and Environmental Science, University of Arizona, is available upon request. *Cibola Valley Conservation Area Restoration Development Plan: Overview; Cibola Valley Conservation Area Restoration Development Plan: Phase 1; Cibola Valley Conservation Area Restoration Development Plan: Phase 2*; *Cibola Valley Conservation Area Restoration Development Plan: Phase 3;* and *Cibola Valley Conservation Area Draft Report for Phase 4* are posted on the LCR MSCP Web site. The *Cibola Valley Conservation Area 2009 Annual Report* will be posted when available.

Work Task E8: Seed Feasibility Study

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$210,000	$132,389.11	$859,825.69	$0	$0	$0	$0

Contact: Gregg Garnett, (702) 293-8644, ggarnett@usbr.gov

Start Date: FY05

Expected Duration: Closed in FY09

Long-term Goal: Restoration research

Conservation Measures: WIFL1, WRBA2, WYBA3, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, CLMB2, PTBB2

Location: Reach 4, Cibola NWR, one-half mile east of River Mile 97, Arizona

Purpose: This research project documents the feasibility of establishing native riparian habitat (cottonwood, willow, and other native groundcovers and shrubs) from seed to potentially increase the cost effectiveness and quality of future habitat creation projects.

Connections with Other Work Tasks (past and future): Beginning in FY11, operation and maintenance costs for this work task will be included in Cibola NWR Unit #1 (E24).

Project Description: Through a series of laboratory and field experiments, this study will document the necessary steps involved in using seed to create dense mosaics of native riparian land covers. Steps in the process include seed collection, storage, treatment, planting, germination, and seedling growth and survival. Using seeds in lieu of, or in conjunction with, cuttings may be feasible if it involves less labor, is more cost effective, or preserves the genetic diversity of the riparian habitat created under the LCR MSCP. The amount of nonnative to native vegetation resulting from using seed for restoration will also be an important factor in determining the feasibility of this method. Reclamation has entered into a 50-year land use agreement with the USFWS to conduct restoration research and manage created land covers in Unit #1 at Cibola NWR.

Previous Activities: During 2008, three additional germination trials were completed for frozen Fremont cottonwood, Goodding's willow, and coyote willow seed collected on the LCR during April 2006. Results indicate viability of over 80% for at least 27 months after collection. Vegetation and water content monitoring continued for cottonwood-willow study plots seeded at Cibola National Wildlife Refuge in May 2007. Results for continued monitoring indicate an expansion of Fremont cottonwood crown and canopy

cover as well as saltcedar crown and canopy cover. Monitoring of tagged trees has allowed documentation of superior growth rates of Fremont cottonwood over saltcedar under both irrigation regimes.

Sixteen additional small-scale study plots were implemented at Cibola National Wildlife Refuge to analyze the effectiveness of direct seeding Goodding's willow under reduced competition. Fremont cottonwood seed was not applied, and grass-specific herbicide was applied four times between May and July to control weed competition. Additionally, seeding rates were increased to approximately 140 pure live seed (PLS)/ft^2 (approximately 1400 PLS/m^2). Finally, hydroseeding of un-cleaned seed was compared with broadcast seeding of cleaned seed.

Goodding's willow establishment in the 2008 plots averaged 0.13% for broadcast seed and 0.95% for hydroseed. The relative Goodding's willow establishment compared to the 2007 cottonwood-willow study plots increased approximately 300% and 450% for broadcast and hydroseed methods, respectively. These data indicate that reduced competition increased plant establishment. However, the plant density was still low enough that the ratio of saltcedar to Goodding's willow was approximately 1.5:1.

FY09 Accomplishments: In FY09, an additional set of willow plots were set up to determine whether the best treatments (most successful in terms of establishment, survival, and density) would have repeatable results and were not simply a result of random variability.

The interim results indicate a higher degree of promise than for previous small plot willow trials. Establishment success was high with less establishment of saltcedar. The researchers suggest that a reduction in saltcedar seed source next to the main canal and plots may have contributed to this lower observed saltcedar establishment. Grasses and other weedy species are also abundant in these plots, but don't seem to be out-competing the willows at this stage. Growth rates for the willows in these plots are still lower than what we have observed in other mass-transplanted areas; however, this may be a site-specific (local) effect.

Using seed appears to be feasible in terms of logistics and cost-effectiveness for establishing native riparian trees. However, using seed as a large-scale restoration method for the LCR MSCP still needs to be determined. This determination will be made by using a longer-term assessment of the seed-established trees' survival and competition as it pertains to the establishment of habitat for LCR MSCP cover species. Although these 2009 willow plots are showing more promise than previous willow trials, no additional experimentation will be conducted under this work task. Reclamation will participate in longer-term monitoring and assessment of the experimental plots to make an assessment for the large-scale feasibility of this technique.

Reclamation will continue to participate in monitoring of the small plots to determine whether the positive trend for seed-established natives (in terms of survival and competition versus non-native species) will continue. An assessment will also be made,

after five years of growth, as to whether the seeded plots show promise for habitat creation for LCR MSCP covered species and whether the composition of native versus nonnative species is acceptable for other habitat and fire management aspects. If this longer-term assessment shows promise for large-scale seeding, a demonstration project using the techniques and protocols established by this study may be advertised and funded at a future time. At that time, the E8 work task will be reopened, depending on steering committee input. Maintenance of this site will be covered under conservation area maintenance for Cibola NWR Unit 1 (E24).

Proposed FY10 Activities: No additional seed-feasibility research activities or expenditures will be undertaken associated with this work task for FY10. The work task was closed in FY09.

Proposed FY11 Activities: The work task was closed in FY09.

Pertinent Reports: *Year 1 Research Plan, Feasibility Study using Native Seeds in Restoration, July 17, 2006; Technical Proposal, Feasibility Study using Native Seeds in Restoration, and* the 2008 Annual Report, *Feasibility Study using Native Seeds in Restoration,* are posted on the LCR MSCP Web site.

Work Task E9: Hart Mine Marsh

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$3,125,000	$2,285,834.49	$2,724,171.68	$2,380,000	$500,000	$300,000	$200,000

Contact: Gregg Garnett, (702) 293-8644, ggarnett@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Habitat creation

Conservation Measures: CLRA1, LEBI1, and CRCR2.

Location: Reach 4, Cibola NWR, River Mile 92, Arizona.

Purpose: Create and manage marsh habitat for Yuma clapper rail, least bittern, and Colorado River cotton rat.

Connections with Other Work Tasks (past and future): Vegetation and species monitoring are being addressed under F1-F4.

Project Description: Hart Mine Marsh is a decadent marsh located on Cibola NWR. Currently, drainage water from the refuge's agricultural fields enters Hart Mine Marsh through gated structures in the Arnett Ditch. Previous management practices have not allowed any outflow from the marsh; therefore, the drain water terminates in the marsh to evaporate and stagnate. The result is poor water quality, limited marsh habitat, and saline upland areas, some completely devoid of vegetation or dominated by saltcedar.

Habitat requirements for marsh-covered species include areas of permanent open water and larger areas of adjacent emergent marsh vegetation with water depths ranging from 1 to12 inches. At least 80 acres adjacent to deep areas will be re-graded to provide more suitable marsh areas, adjacent permanent open water, and controllable water levels. This would provide permanent open water adjacent to emergent vegetation. By managing water levels and providing appropriate vegetation, suitable habitat for covered marsh species can be created. Water, diverted by gravity from the Arnett Ditch, would be used to flood-leveled fields and create marsh habitat conditions. Water levels would be managed by a series of small water control structures such as culverts or stop logs.

Previous Activities: Through FY08, NEPA compliance activities, cultural surveys, topographic surveys, and pre-development surveys for marsh birds and riparian obligate

birds were conducted. Engineering designs were finalized, and all regulatory permitting required for construction was completed including NEPA, ESA, sections 401 and 404 of the CWA, and Section 106 of the NHPA.

FY09 Accomplishments: The first phase of construction was completed at Hart Mine Marsh (HMM). This included the clearing of over 100 acres of saltcedar, the installation of new outlet works and control structures (seven in FY09) for the marsh, and the dredging and contouring of cell 2 in the southern portion of the conservation area. Upland vegetation was planted along the perimeter of the newly constructed cell to stabilize the ground and to reduce invasion of weedy species. This included approximately 325,000 saltgrass plugs and approximately 150 honey mesquites trees. Marsh vegetation was not planted in cell 2 due to rapid and abundant natural regeneration of emergent vegetation (primarily cattails). Supplemental planting to enhance species diversity may be warranted at a later date. This will depend on an assessment of amount and locations of future natural regeneration of cattails within cell 2.

Phase I of HMM construction was completed at a savings of over $1,000,000 from the projected FY09 budget. The majority of these savings are attributed to efficient work crews and production rates coupled with more favorable site conditions than were anticipated. The budget for FY10 activities was adjusted according to similar projections for Phase II construction.

FY10 Activities: The second phase of construction will be completed in FY10. This will include the removal of over 200 acres of saltcedar, the dredging of channels and contouring of cell 1, and the installation of additional control structures for marsh water level management. When these cells are complete, native vegetation will be planted as needed according to its particular requirements. Plants and planting services will be obtained through commercial sources. Maintenance of the site, including water level management and nonnative vegetation control, will be accomplished through a combination of resources from the USFWS staff and commercially procured sources.

During FY10, biotic and abiotic monitoring protocols will be established for HMM. These include marsh vegetation monitoring protocols, and water quality parameters and monitoring protocols. Marsh bird surveys will continue based on current established protocols.

Proposed FY11 Activities: The third and final phase of construction at Hart Mine Marsh will be completed in FY11. This will include the construction of two additional fresh water inputs in the constructed marsh cells. Additional water control structures for these inputs will also be installed. Based on feedback from operations in FY10, any additional repair or refinement of the infrastructure will be accomplished during FY11, including any additional road construction and maintenance and any refinement of water control devices such as the addition of stoplog structures or automated water control features. If any additional stabilization or marsh vegetation planting is required, it will be performed in FY10 and FY11. Site maintenance will continue in FY11.

Pertinent Reports: *Hart Mine Marsh, Existing Conditions Report*, and *Comprehensive Conceptual Restoration Plan, Hart Mine Marsh Conservation Area Development Plan* are posted on the LCR MSCP Web site.

Work Task E14: Imperial Ponds Conservation Area

FY09 Estimate	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	ed e
$483,000	$540,515.32	$6,915,377.41	$651,840	$610,000	$525,000	$395,000

Contact: Nathan Lenon, (702) 293-8015, nlenon@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: 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.

Colorado River water is supplied to the ponds and other habitat areas by a pump that uses state-of-the-art fish screening technology developed specifically for the LCR MSCP. 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. This is a key component to successful water quality and fisheries management. When water is released from a pond, it enters a drainage ditch where native wetland and riparian vegetation has been planted.

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. The additional cottonwood-willow forested area, and the waterfowl acreage, will create a vegetation mix that makes this an ideal site for attracting the threatened and endangered species the LCR MSCP is designed to protect. Field leveling and irrigation system installation for the area were completed in FY08; tree planting will not occur until soil salinity levels have been decreased, which is not anticipated until at least FY12.

A 12-acre marsh unit was created at Field 18 in the refuge's southeast corner. 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, it is an ideal site for attracting this species and other species of concern.

FY09 Accomplishments:

Maintenance/Restoration/Management. During FY09, Reclamation executed a three-year interagency agreement with Imperial NWR, which funds the onsite maintenance, utility payments, and water management for the site. This agreement is reviewed and modified annually by both agencies. Additionally, Reclamation executed a fuel contract to supply heavy equipment use onsite, in support of site maintenance and development.

Ponds. Water management was the largest focus area during FY09 at Imperial Ponds. Pond 1 was dewatered (twice), in support of efforts to remove non-native fish, as well as to document drawdown rates, performance of the drainage ditch, and to better predict resource requirements for future dewatering events. During the dewatering, the boat ramp was re-graded and the southeast corner of the pond was resurfaced with large cobble to prevent erosion. Pipe elbows were also installed on pond outflow pipes, to prevent water from backflushing from the drainage ditch and entering ponds, a potential vector for non-native fish contamination.

New staff gages were purchased to be installed throughout the site to monitor and manage water levels. A series of surveyed benchmarks were placed in FY 2009 as reference points for positioning the staff gauges, relative to actual elevations.

Through G3, an evaluation of the wedge-wire screen system on the 6,000 gallon per minute pump supplying the ponds was conducted. The preliminary results showed 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 an action level of 9.0, which was 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 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.

Vegetation management was the second-largest focus area during FY09 at Imperial Ponds. FY09 funding was used to acquire 10,000 bulrushes and 3,000 Baccharis for hummocks and pond shorelines, planting was completed in October 2009 (FY10). These plantings are intended to reduce shoreline erosion, limit encroachment of undesirable non-native vegetation, maintain open areas for wind circulation in the ponds, and improve marsh habitat in the ponds. Reclamation also assisted INWR with vegetation control onsite through application of herbicides and mechanical removal. FY09 funds were also expended to purchase herbicides, personal protective equipment, and gasoline powered brush clearing tools, to be used by vegetation crews at INWR over the next several years.

A preliminary design was completed for a series of spawning beds to be constructed within the ponds, in support of ongoing research efforts regarding habitat use by native fish (C25). Lessons learned from constructing a series of experimental spawning beds will be applied at other backwaters developed in the future.

Fields. Soil mapping and sampling of the future cottonwood-willow field areas was performed 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 FY12. During the spring of 2009, the fields were fertilized with a high nitrogen fertilizer (to increase nutrients) and humic acid to help mobilize salts and facilitate salt flushing. The previous ryegrass cover crop was rotated to a salt-tolerant grass cover crop, to continue amending and managing the soil.

Marsh. During FY 2009, Reclamation continued to work closely with INWR to adaptively manage water levels in Field 18, in response to field observations and recommendations by USGS researchers. A small portion of the field typically remains above the high water level, and cannot be submerged as effectively as the deeper marsh areas. In response to this need, design work was completed for a new water control structure, which will allow for expansion of the marsh area in Field 18, as well as more precise adjustments in water level.

Monitoring. Pre-restoration bird monitoring was conducted in the fields to be planted with riparian habitat, and post-restoration bird monitoring was conducted in the adjacent

nursery site and the planted cottonwood-willow habitat. The following LCR MSCP covered species were detected: Gila woodpecker, summer tanager, willow flycatcher (migratory only), and yellow-billed cuckoo.

Marsh bird surveys were conducted in Field 18 and in the created ponds through the breeding period. In Pond 5, one clapper rail was detected. In Field 18, one black rail, up to three clapper rails, and one least bittern were detected.

Vegetation monitoring was conducted for both the ponds and Field 18. In Field 18, California bulrush is the most dominant plant species, but common threesquare, southern cattail, and river/alkali bulrush also occur. In the ponds, some *Phragmites* occurs along the pond margins in thin strips and the hummocks are covered in bulrush and *Phragmites*.

Anabat acoustic surveys were conducted at the Imperial Ponds Conservation Area for bat species. Eight western red bats and six western yellow bats were detected.

Water quality was monitored to ensure that parameters measured below thresholds set by the Imperial Ponds fisheries coordination team, and to direct pumping operations if thresholds were exceeded. Dissolved oxygen, temperature, conductivity, and total dissolved solids remained within the set thresholds. Mean pH exceeded the set threshold (< 9). Well water was added, which has a consistently lower pH than surface water, to effectively lower the pH.

Population and habitat monitoring were conducted in ponds 1, 2, 3, 4, and 6. Population estimates and post-stocking estimates were calculated. Pond 1 was renovated in 2009; prior to renovation the RASU population declined to less than 10%. In pond 4, the RASU population is at 44.5% of what was stocked. Ponds 2 and 3 were stocked with BONY; pond 2 has less than 1% survival and there was no survival in pond 3. Pond 2 was also stocked with RASU and has 84.7% survival. Additionally, pond 6 was stocked with RASU and has 65.7% survival. RASU habitat use in ponds 2, 4, and 6 was not consistent among ponds.

Autumn sampling was conducted in ponds 2, 3, 4, and 6 using hoop nets, box traps, minnow traps, and trammel nets. There were 0 BONY captured, and a total of 45 RASU captured: 17 from pond 2, 18 from pond 4, and 10 from pond 6.

Larval collections were conducted during the spawning season; three larvae were collected and sent for genetic analysis, but none were identified as BONY or RASU larvae.

FY10 Activities: Funds will be provided to the USFWS to continue onsite maintenance, make utility payments, and provide water management for the site. E14 will also be used to support the dewatering, evaluations, and maintenance of one pond.

Several infrastructure maintenance tasks are being conducted in FY10. Cracking in the concrete of the new irrigation canal was sealed. Additionally, gravel road base will be

stockpiled for surfacing and maintaining roads at the site. Surfacing roads near the irrigation canal would be expected to reduce maintenance costs at the canal because of reduced sediment and dust coming off of the roads, as well as reducing the frequency that road grading would need to occur.

Additional non-native fish entrainment studies to resolve outstanding needs to filter Colorado River surface water to a slot size capable of excluding all non-native fish eggs and larvae are being discussed. The expanded research will be performed at Imperial Ponds. This research is intended to result in a set of revised slot size criteria for filtering water through a primary system (wedge wire screen), as well as development of secondary screening systems (sand filter or other technique). The study would also include testing of a secondary filtration system, to determine the effectiveness of such a configuration. If the recommended slot size criteria can be met, then Reclamation would use this information to determine what site improvements to make at Imperial Ponds (or potentially Beal Lake also) to meet the needs of the program.

Placement of a series of six spawning beds in pond 1 in support of ongoing native fish habitat use research is anticipated. The design of these spawning beds is intended to evaluate the use of geotextiles (as a vegetation barrier), a prototype gradation of gravels and rock, and site fidelity of razorback suckers to a particular spawning location. A new water control structure will be installed in Field 18 as a part of the spawning beds contract, to expand marsh area and provide ability for more precision in water levels.

A data telemetry system will be designed to manage water levels and water quality. The staff gages purchased during FY09 will be surveyed in and installed in the ponds and Field 18 to assist with more accurate water measurement and applications. The monitoring instrumentation will be purchased in FY10 and installed to begin monitoring. During FY11, this instrumentation will be linked together into a network.

During FY10, clearing, preparing, planting, irrigating, and monitoring of shoreline plantings along selected areas of the pond shorelines with native grasses, Baccharis, mesquite, and coyote willows will continue. The functions these plantings are intended to provide are to reduce shoreline erosion, limit encroachment of undesirable non-native vegetation, maintain open areas for wind circulation in the ponds, and improve marsh habitat in the ponds.

FY11 Activities: Funds will be provided to the USFWS to continue onsite maintenance of the site, make utility payments, and provide water management for the site. E14 will also be used to support the dewatering, evaluations, and maintenance of one pond. Vegetation management is anticipated to occur during FY11 to keep the pond shorelines clear of excessive growth.

During FY11, assuming adequate soil conditions, cottonwoods and willows will be acquired to plant on approximately 34 acres; planting is expected to be performed during FY12. Fertilizing of fields will continue, as needed. A data telemetry system will be

completed to provide remote water level and water quality monitoring at all of the ponds, marsh units, and fields under management by the LCR MSCP.

Pertinent Reports: *Imperial Ponds Conservation Area 2009 Annual Report* will be posted to the LCR MSCP Web site.

Work Task E15: Backwater Site Selection

FY09 Approved Estimate	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$209,000	$161,470.80	$1,282,267.81	$286,750	$20,000	$20,000	$20,000

Contact: Nathan Lenon, (702) 293-8015, nlenon@usbr.gov

Start Date: FY06

Expected Duration: FY14

Long-term Goal: Habitat creation

Conservation Measures: BONY2, RASU2, and FLSU1

Location: Reaches 3-6; California, and Nevada, River Mile 22-276, Arizona, California, and Nevada

Purpose: The backwater site selection process is used to evaluate and prioritize potential sites for backwater habitat creation for razorback sucker, bonytail, and flannelmouth sucker.

Connections with Other Work Tasks (past and future): E16 is used with this work task to identify projects other than existing backwaters for habitat creation.

Project Description: Backwater site selection consists of a five-step process to evaluate existing backwaters along the Colorado River within the LCR MSCP planning area, from reaches 3 to 6. This ultimately results in the conceptual-level planning efforts for a select number of sites, which would become available for the Program Manager to select for inclusion into the program. New backwaters, which may be constructed separate from the existing river channel (and its associated backwaters), are excluded from this effort, and would follow the general site-selection process (E16). Backwaters may be disconnected or connected with the main channel of the Lower Colorado River. Backwaters that are disconnected from the LCR channel are of considerably higher value to bonytail and razorback sucker than connected backwaters in the LCR, and are the preferred type of backwater to achieve LCR MSCP conservation goals for these species.

Because some 1,000 backwaters currently exist within LCR MSCP reaches 3-6, the backwater site selection effort was divided into two phases: reaches 5-6 represent the first phase, and reaches 3-4 will represent the second.

Previous Activities: Backwater Site Selection starts with Step 1, an inventory and review of existing GIS data, aerial videos, and photographs to quantify the number, size,

and location of currently existing backwaters, and to identify land ownership at a broad level. Reclamation personnel work with land managers and resource agencies to identify land use issues, and other regulatory constraints, which is used to generate a list of candidate sites (approximately 25) for further evaluation. Helicopter reconnaissance flights are conducted during winter low-flow periods to confirm the presence of water year-around at these candidate sites, prior to conducting any site visits.

Steps 2 and 3 entail conducting brief (1-2) day visits at each of the (25) candidate sites, and a biological rating effort. Biological and physical data are collected and entered into a biological suitability model, established specifically for this effort. The model generates a biological suitability rating, such as poor, moderate, good, or excellent. This rating provides decision makers with a basic scientific understanding of the potential of each site, in their existing conditions, to provide habitat for LCR MSCP covered fish species. Once the biological ratings are established, Reclamation solicits input from cooperating land managers, resource agencies, and the general public, as sites are selected and prioritized for further evaluation and planning. Approximately four to five sites are chosen for further evaluation from the (25) candidate sites evaluated in steps 2-3.

Step 4 of the process includes conducting quarterly sampling to construct a one-year environmental baseline for each of the four to five candidate backwater sites that proceed to this point. While this environmental baseline is being constructed, Reclamation works with the landowner (and appropriate project stakeholders) to develop a conceptual habitat creation plan and preliminary cost estimates for project implementation. At the conclusion of Step 4, sites may be selected by the Program Manager for implementation into the program Step 5. Site selection is considered to be final once an executed land use agreement is in place between Reclamation and the appropriate land manager.

FY09 Accomplishments: Evaluation of Step 4 for two existing backwaters in reaches 5 and 6, Headquarters Lake and Secret Lake, was completed. Further evaluations were suspended, to provide Reclamation an opportunity to formulate a backwater strategy for addressing research needs and acreage goals related to backwater development.

Comments from the USFWS, CAFGD, and AZGFD to help guide selection of additional sites to be reviewed under Step 4 of the process were requested and reviewed. In January of 2009, the LCR MSCP hosted a public meeting in Yuma, Arizona, with participation by AZGFD, USFWS, CAFD, the Arizona Department of Water Resources, and Reclamation. The purpose of the meeting was to provide a program overview and presentations specific to backwater site selection, and to solicit public comment to be used to guide future backwater site-selection efforts. Concerns were raised over potential closures of existing backwaters presently used for recreation, as well as how isolated backwaters would be managed to remove non-native fish species.

In response to technical challenges associated with creating and maintaining backwaters free from non-native species, as well as public comments associated with current isolated LCR MSCP backwaters, the decision has been made to postpone further conceptual planning for backwater habitat creation to provide additional time to perform further

research on screening requirements for non-native fish, revising backwater habitat design criteria, and evaluating alternative water supply and filtration methods. A five-year backwater strategy is currently being drafted to address how the program will address backwater-related research and development issues.

FY10 Activities: A workshop was held in January 2010, focusing on habitat goals by reach and state. Although backwaters were not specifically discussed, the program commitments and focus of future backwaters will reflect the intent to focus on backwaters within the state of California. The step 1 inventory report for backwaters in reaches 3 and 4 will be completed and the final report posted to the LCR MSCP Web site. Following the completion of this report, further backwater site selection efforts will be suspended, with future work following the direction of the new backwater strategy.

The following activities will take place in support of the backwater strategy, but are funded through Imperial Ponds Conservation Area (E14):

1. Additional non-native fish entrainment studies to resolve outstanding needs to filter Colorado River surface water to a slot size capable of excluding all non-native fish eggs and larvae will be performed. The expanded research will be performed at Imperial Ponds. This research is intended to result in a set of revised slot size criteria for filtering water through a primary system (wedge wire screen), as well as development of secondary screening systems (sand filter or other technique). The study would also include testing of a secondary filtration system, to determine the effectiveness of such a configuration. If the recommended slot size criteria can be met, this information would be used to determine what site improvements to make at Imperial Ponds (or potentially Beal Lake also) to meet the needs of the program.

2. A series of six spawning beds is anticipated to be installed at Imperial Ponds, in support of ongoing native fish habitat use research. The design of these spawning beds is intended to evaluate the use of geotextiles (as a vegetation barrier), a prototype gradation of gravels and rock, and site fidelity of razorback suckers to a particular spawning location. A new water control structure will be installed in Field 18, as a part of the spawning beds effort, to expand marsh area and provide ability for more precision in water levels.

FY11 Activities: Minimal activities are projected until the five-year backwater strategy is completed. At that time, backwater inventory and selection is anticipated to resume at increased funding levels and focus on backwaters within the state of California.

Pertinent Reports: *Backwater Inventory: Reaches 5 & 6, Steps 2-3: Screening and Evaluation (March 2008);* and *Backwater Site Selection for Reaches 5 & 6, Backwater Site Assessments* are posted to the LCR MSCP Web site.

Work Task E16: Conservation Area Site Selection

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$200,000	$203,978.83	$835,000.17	$360,000	$375,000	$375,000	$375,000

Contact: Jed Blake, (702) 293-8165, jblake@usbr.gov

Start Date: FY05

Expected Duration: FY30

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

Conservation Measures: CLRA1, WIFL1, BONY2, RASU2, WRBA2, WYBA2 CRCR2, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, FLSU1, MNSW2, CLMB2, PTBB2

Location: Reaches 1-7, Arizona, California, and Nevada

Purpose: Finalize and implement the *Draft Guidelines for the Screening and Evaluation of Potential Conservation Areas,* which provides Reclamation with a consistent and transparent method for requesting, screening, evaluating, and recommending the suitability of lands that are made available to the program for use as conservation areas.

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.

FY09 Accomplishments: FY09 accomplishments focused on securing properties for both the desert tortoise and flat-tailed horned lizard (FTHL). Three federal appraisals were conducted to establish fair market value for privately held lands occupied by desert tortoises within the Chuckwalla Bench ACEC. The appraisals were conducted with the permission of the landowners who had previously expressed interest in selling their parcels. In total, 260 acres of land were appraised. Desert Tortoise (E29) has been established as a new start in FY10 and will track future accomplishments.

Both the Anza-Borrego Desert State Park and Dos Palmas Preserve were identified as having the potential to fulfill the conservation measure for the FTHL. The Dos Palmas Preserve has privately held lands occupied by FTHL; however, it was unknown if FTHL were present on privately held lands within the Anza-Borrego Desert State Park.

A FTHL survey was conducted at the Anza-Borrego Desert State Park located in Borrego Springs, California. The state park was identified because the Park's non-profit foundation maintains many large tracts of land available for acquisition and permanent protection. Trained FTHL monitors from the BOR, BLM, and California Parks participated in a three-day presence/absence survey. The survey showed an inconclusive presence of FTHLs. In light of the survey, the recommendation was made to focus efforts within the Dos Palmas Preserve.

FY10 Activities: FY10 activities are focused on securing properties to satisfy the FTHL conservation measure, development of draft habitat goals by reach and state, and evaluation of backwaters created from existing dry ground.

With the passing by the Steering Committee of Program Decision Document 10-001: Land Approval in October 2009, Reclamation is directed to evaluate unprotected properties within the Salt Creek ACEC of the Dos Palmas Preserve for inclusion into the program for the protection of FTHL. Secured properties would be donated to the BLM and managed as FTHL habitat. All FTHL acquisition costs prior to FY11 will be captured under this work task. Costs include preliminary site visits for lands and realty personnel, discussions with the BLM, working with landowners, and costs of appraisals. Beginning in FY11, Flat-tailed Horned Lizard (E30) will track expenditures to secure properties and turn over management to the BLM

In January 2010 the LCR MSCP held a technical two-day workshop in Boulder City, Nevada to review the draft land cover type creation goals by reach and state presented at the October 2009 Steering Committee meeting in Laughlin. All LCR MSCP stakeholders were invited to attend and participate in the meeting, which will help refine the creation

goals. As a result of the workshop, working with our partners the LCR MSCP will be actively talking with potential landowners to secure additional lands, primarily in California, to meet the goals of the program.

At least one backwater, which would be created on existing ground at existing or potential conservation areas, may be identified and evaluated in California during this interim period. This effort is being initiated to bring a backwater, created from dry ground, to parity with existing backwaters identified under E15.

Proposed FY11 Activities: FY11 activities will focus on the identification and evaluation of potential conservation areas, primarily in California. Specific activities include:

1. Completion of the site-selection process for sites identified under the 2008 RFP. Steps 2-6 of the *Draft Final Guidelines for the Screening and Evaluation of Potential Conservation Areas* will be conducted if the sites meet the goals identified in the workshop held in FY10.

2. As a follow-up to the workshop to define the draft habitat goals by reach and state, it is anticipated that landowners will be contacted to define their willingness to participate in the LCR MSCP and identify specific areas for evaluation. Areas acceptable to both the landowner and the LCR MSCP would be evaluated using the site-selection guidelines.

Pertinent Reports: *Draft Guidelines for the Screening and Evaluation of Potential Conservation Areas*, and *October 2008 Trip Reports* are posted on the LCR MSCP Web site.

Work Task E17: Topock Marsh Pumping

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate*	FY11 Proposed Estimate	FY12 Proposed Estimate**	FY13 Proposed Estimate
$5,000	$7,711.94	$24,076.60	$800,000	$270,000	$2,570,000	$70,000

*The FY10 approved budget was revised with the concurrence of the Steering Committee in October of 2009.
**The FY12 budget was revised with the concurrence of the Steering Committee in April of 2010.

Contact: Ashlee Rudolph, (702) 293-8178, arudolph@usbr.gov

Start Date: FY06

Expected Duration: FY55

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): N/A

Project Description: Topock Marsh has been identified as an important area for LCR MSCP covered species such as Yuma clapper rail and the southwestern willow flycatcher. At times, flow-related activities could lower river elevations to levels that will disrupt existing gravity diversions of water from the river to the marsh. Construction of a new control structure that diverts water through both gravitational and pumped means ensures the delivery of water to the marsh even when river elevations are low. It is anticipated that the gravity diversion of river water, paired with supplemental pumping to maintain the water surface elevation of the marsh, would avoid negative effects on the groundwater elevation.

Previous Activities: The *Final Havasu National Wildlife Refuge Water Management Plan* has been drafted by the USFWS and is posted on the LCR MSCP Web site.

FY09 Activities: A review of alternatives and preliminary costs for management of Havasu refuge occurred in late FY09, as well as a discussion of water accounting issues between USFWS, Arizona Department of Water Resources, and Reclamation, who all

supported the ongoing technical reviews, discussion of water accounting issues, and determining the feasibility of implementation.

The USFWS secured funding to begin implementation of the initial phases of the Final Havasu National Wildlife Refuge Water Management Plan. Options for the integration of USFWS funds and LCR MSCP funds (specifically targeted to fulfill AMM2) began. A decision was reached that MSCP would provide funds to construct a dual-purpose gravity flow and pumping control structure. The technical workgroup of the Steering Committee was briefed on the options to satisfy portions of AMM2. The culmination of these presentations was passing of resolution 10-003 by the Steering Committee in October of 2009 to increase the budget for this work task and proceed with implementation of Phase 1 of the Havasu Water Management Plan, which would satisfy the construction portion of AMM2.

Proposed FY10 Activities: Interagency Acquisitions between the USFWS and Reclamation are being composed and will transfer funds from the LCR MSCP to the USFWS for the construction of a new water control structure at the western terminus of the Fire Break Canal. In return for funding construction of the new control structure, correspondence will be issued to Reclamation by USFWS releasing the LCR MSCP from any further construction obligations under AMM2. These funds will be joined with USFWS ARRA dollars to complete the initial phases of the Topock Marsh Water Infrastructure Improvement Project. The transfer of $1,000,000 to the USFWS has been completed and fulfills the construction obligation. Once completed, USFWS will have the ability to more efficiently and effectively transfer water into the marsh even under low flow conditions.

Upon transfer of $2,500,000, expected in FY12 depending on available funding, the LCR MSCP will have satisfied its long-term operation and maintenance requirements of AMM2 and the work task would be closed. Long-term maintenance of the entire water management system will be the responsibility of the USFWS and the LCR MSCP would be permanently relieved from all maintenance responsibilities.

Proposed FY11 Activities: Funding continues to track the progress of implementation of the initial phases of the Havasu Water Management Plan.

Pertinent Reports: *Final Havasu National Wildlife Refuge Water Management Plan* is posted on the LCR MSCP Web site.

Work Task E18: Law Enforcement and Fire Suppression

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$200,000	$205,056.92	$232,651.60	$250,000	$250,000	$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, and other agencies will conduct law enforcement and fire fighting activities on the river. The LCR MSCP will provide funding to agencies to cover additional LCR MSCP lands. Law enforcement and fire suppression strategies are being developed at the program level and for each conservation area.

Previous Activities: Discussions were held with various law and fire agencies to allow for the preparation and implementation of both program-wide and site-specific law enforcement and fire suppression strategies.

FY09 Accomplishments: A contract for the development of both programmatic level and conservation area-specific Fire Management and Law Enforcement Strategies was awarded and completed.

The programmatic level fire management and law enforcement strategy is contained in the *Lower Colorado River Multi-Species Conservation Program Fire Management & Law Enforcement Strategy*. This document was drafted to help initiate and identify

critical elements to conservation measure CMM1, which calls for reducing the risk of loss of created habitat to wildfire.

Consultants who were retired and active federal fire management officers toured the LCR MSCP Conservation Areas for a better understanding of the sites. The contract required that they develop a Lower Colorado Region-wide strategy identifying the following elements: effects of fire on the LCR MSCP land cover types, law enforcement agencies, authorities and jurisdictions, effects of fire on endangered species, wildland fire management standards and components, risk analysis, pre-suppression, suppression activities, Burned Area Emergency Rehabilitation (BAER) and fuels management tactics, and proactive management recommendations.

Conservation-area specific Fire Management and Law Enforcement plans were drafted for the following seven conservation areas: Big Bend, Beal Lake, Ahakhav Tribal Preserve, Palo Verde Ecological Reserve, Cibola Valley Conservation Area, Cibola Unit #1, and Imperial Ponds.

As new conservation areas are developed, a site-specific strategy will be drafted. Information contained in the strategies includes location, reach, ownership, local law enforcement responsible and contact information, local fire agencies and contact information, applicable jurisdictions and authorities, existing habitat and wildland fire risk, fire management, fire fighter safety and public health, fuels management, prevention, outreach, and proactive management recommendations.

FY10 Activities: Federal agreements will be drafted and awarded to partner agencies for the help and support of conservation area fire management. The BLM-Lake Havasu Fire will have fire management responsibility on state-owned conservation areas. The USFWS Imperial Refuge Fire office will maintain conservation areas on federal refuges, and the BIA will maintain conservation areas located on Tribal Reservations.

Contracts may be administered to help reduce fuel loads on the conservation areas. Chemical treatments, manual and mechanical removal, and chipping are all appropriate fuel reduction methods. The BLM and USFWS will help advise on the implementation of new fire breaks, infrastructure upgrades, and associated fire management actions.

Proposed FY11 Activities: It is envisioned that federal grants awarded to wildland fire agencies in FY10 will be renewed in FY11. New conservation areas may be added and funding levels adjusted per law and fire work load. Fuel load reduction work is also expected to be carried out as a yearly action. As deemed necessary by the landowner's fire management office, proactive measures will be implemented at the conservation areas.

Pertinent Reports: *Lower Colorado River Multi-Species Conservation Program Fire Management & Law Enforcement Strategy 2009,* and *Lower Colorado River Multi-Species Conservation Area-Specific Fire Management and Law Enforcement Strategy* 2009 are posted to the LCR MSCP Web site.

Work Task E21: Planet Ranch, Bill Williams River

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$50,000	$83,869.06	$103,066.68	$100,000	$8,900,000	$1,500,000	$750,000

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 is being reopened in FY09.

Project Description: Planet Ranch (currently owned by the City of Scottsdale), encompasses approximately 8,400 acres, of which approximately 2,400 acres had previously been farmed for alfalfa. In 2008, the LCR MSCP Steering Committee approved a land and water resolution, which authorizes Reclamation to enter into negotiations to secure approximately 3,418 acres of land and 4,668 acre-feet of water per year. The sum of $8,300,000 to secure this land and water was determined through the federal appraisal process. Negotiations are also underway to allow the Bureau of Land Management to secure the remaining acreage, which has no water entitlement from the Bill Williams River. Once finalized, the terms and conditions to secure the land and water resources will be brought back to the Steering Committee.

An estimated 550 acres of primarily cottonwood-willow land cover type is anticipated to be developed on Planet Ranch. In addition, another 396 acres of cottonwood-willow land

cover type on the Bill Williams River National Wildlife Refuge is afforded protection by securing the Planet Ranch property.

Previous Activities: Reclamation evaluated Planet Ranch and developed a conceptual design, assuming the entire ranch and water entitlement were secured for the program. This information is posted on the LCR MSCP Web site as *Planet Ranch: Potential Restoration Site, Preliminary Site Analysis and Conceptual Design*. A federal appraisal was conducted in FY08 and established the fair market value of the land and water resources.

FY09 Accomplishments: Negotiations to secure the land and water resources for the project continued. A lease with Freeport MacMoran was drafted, which included the donation of the land and water resources to the Arizona Game and Fish Commission for on-site activities, and included discussing the transition of property ownership from the City of Scottsdale to the Arizona Game and Fish Commission. A boundary record of survey, consistent with the standards of the Arizona Boundary Survey Minimum Standards, was conducted on the 3,418 acres of land that comprise the lease agreement. Survey content and placement of on-site monumentation defined the proposed LCR MSCP lease boundary. The survey will also result in the legal description of the parcel and will be ready for recording in FY10.

FY10 Activities: After the October 2009 Steering Committee meeting, members of the committee were given a tour of the Planet Ranch property. The tour included presentations on the area's geology, the relationship of Planet Ranch and Bill Williams River National Wildlife Refuge, and conceptual plans for habitat restoration and potential downstream cottonwood-willow credit.

Regulatory compliance activities required under the National Environmental Policy Act, the Endangered Species Act, and the National Historic Preservation Act are anticipated. Those activities are expected to include an Environmental Assessment with a public comment period, Native American consultation, and a class I cultural survey. In addition, state regulatory compliance from the Arizona Department of Environmental Quality ADEQ is being coordinated by the City of Scottsdale.

A transition plan will be drafted to address the need for on-site staff and appurtenances such as vehicles and farming equipment. Given the property's remote location, the city of Scottsdale currently employs a caretaker, living year-round on the property, for maintenance and security purposes. Finalization of the draft land use agreements with Arizona Game and Fish Department as well as the Bill Williams River National Wildlife Refuge is anticipated in FY10. The land use agreements will address the roles and commitments of all parties. Additional documents, to secure water resources, are also anticipated during this fiscal year. Issues and high priority items identified in the transition plan would be addressed in anticipation of the securing and transition of property ownership in FY11.

Proposed FY11 Activities: A Land and Water Resolution is anticipated to be presented to the Steering Committee at the October 2010 meeting. The resolution would include the terms and conditions of the escrow transactions as well as the responsibility of all parties involved. Assuming the property and its resources have been secured, the AGFD will provide on-site staffing. Activities to be conducted include maintenance of existing roads and river crossings, evaluation and repair of existing irrigation infrastructure, repair and maintenance of resident housing, procurement and deployment of vehicles and equipment necessary to maintain the ranch, and continued monitoring and research being conducted under other work tasks.

Pertinent Reports: *Planet Ranch: Potential Restoration Site, Preliminary Site Analysis and Conceptual Design* is posted to the LCR MSCP Web site.

Work Task E24: Cibola NWR Unit #1

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$1,072,000	$689,711.29	$1,821,090.37	$600,000	$636,000.00	$1,700,000	$1,500,000

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 (E24) 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.

FY09 Accomplishments:

Maintenance/Restoration/Management. Regular water delivery, invasive plant control, cover crop establishment, and site maintenance continued through FY09 in the Cibola NWR Unit #1 Conservation Area. Additional major expenditures associated with this work task in FY09 included the clearing of approximately 158 acres and the installation of irrigation turnouts in the North 160 in preparation for leveling and cover crop establishment in FY10. During FY09, over 200,000 trees were mass-transplanted planted in the Crane Roost, resulting in an additional 154 acres of land managed for LCR MSCP covered species at the Cibola NWR Unit #1 Conservation Area.

Monitoring. Soil samples were taken at the Crane Roost area as well as the Nature Trail. Fertilizer was added as necessary. Post-development vegetation monitoring was conducted at Nature Trail and the mass transplanting site. Canopy closure ranged from 0 to 100% with an average of 75%. Average height and DBH for the overstory were 10.4 m and 25.2 cm, respectively. Average height and DBH for the intermediate and shrub layer

were 8.22 m and 9.99 cm, respectively. Land cover type classification includes cottonwood-willow types I-III, and honey mesquite type III.

Small mammal trapping was conducted at the Nature Trail for a habitat characteristic study that was initiated in 2009. Cotton rats are still found in relatively high numbers within the mesquite area due to the dense Johnsongrass areas.

Anabat bat detectors were deployed quarterly across the site in different habitat types to determine bat activity. The western red bat, western yellow bat, California leaf-nosed bat, and Townsend's big-eared bat were all detected in 2009, although in low numbers. Capture surveys were conducted once per month from May to September. The California leaf-nosed bat was the only LCR MSCP species captured.

General avian species were surveyed to determine breeding status at the Nature Trail and Mass Transplanting areas using area search and spot mapping techniques. The Sonoran yellow warbler was the only LCR MSCP covered avian species found breeding within the conservation area.

Willow flycatchers were surveyed five times at the Nature Trail using standard taped playback methods. One willow flycatcher was detected on May 16, two on May 27, and one on June 10. Due to the dates the birds were present, they were considered migrants.

The Nature Trail was visited 17 times between June 17 and August 20 to survey for yellow-billed cuckoos. As many as two cuckoos were detected during these visits. Breeding was not confirmed.

FY10 Activities: Ongoing infrastructure improvements, including additional drain construction and repair and road-building, will also occur during this fiscal year. This may also include the addition of irrigation infrastructure upgrades to improve water delivery to fields within the conservation area.

Based on preliminary observations, tree establishment in the Crane Roost appears to be variable in some locations, suggesting areas of heavy and persistently saline soils. In most cases, these are small areas and this effect will likely result in providing a more diverse mosaic across the Crane Roost Fields; however, in a few areas these variable soil conditions are more pronounced and have resulted in reduced establishment of native trees and dominance of weedy species. Depending on results of the next growing season, these areas may be cleared and replanted with appropriate native vegetation. To minimize similar situations in future planting phases at the Cibola NWR Unit #1 Conservation Area, cover crops will be maintained for longer periods to better condition soils. In addition, less salt-tolerant cover crops have been established in these future phases in order to indicate potential soil problem areas.

An additional season of soil conditioning is projected for fields in the next phase of development (Hippy Fire). No tree purchases will be made and no riparian tree planting will occur on the Cibola NWR Unit #1 Conservation Area for FY10.

Pre- and post-development monitoring will continue at Cibola NWR Unit #1 Conservation Area. Habitat, avian, small mammal, and bat monitoring will continue.

Proposed FY11 Activities: The decision has been made to delay the purchase of trees for 100 acres of fields available in the Hippy Fire Area until FY12. These riparian trees would then be planted in FY13. The reduction in effort is reflected in the reduced budget in FY11.

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.

Pertinent Reports: *Cibola NWR Unit #1 Conservation Area Annual Report, 2009* will be posted to the LCR MSCP Web site.

Work Task E25: Big Bend Conservation Area

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$80,000	$137,722.25	$137,722.25	$500,000	$500,000	$80,000	$80,000

Contact: Nicole Pageler, (702) 293-8119, npageler@usbr.gov

Start Date: FY09

Expected Duration: FY55

Long-term Goal: Habitat protection

Conservation Measures: BONY2, RASU2, and FLSU1

Location: Reach 3, Nevada, River Mile 266.5

Purpose: Protection of an existing backwater from development, which would result in 15 acres of backwater credit.

Connections with Other Work Tasks (past and future): This project was identified under Conservation Area Site Selection (E16) and documented in the *Screening and Evaluation of Potential Conservation Areas: November 2006 Trip Reports.* Marsh bird surveys are conducted under D1, while fish surveys are conducted under multiple work tasks in sections C, D, and F.

Project Description: The Boy Scout Camp purchased by the SNWA, combined with the adjacent backwater managed by the State of Nevada, has collectively been identified as the Big Bend Conservation Area. The conservation area includes approximately 15 acres of backwater within the Nevada portion of the Colorado River that will be protected, and approximately 15 acres of upland area adjacent to the backwater. The dry upland area is planned to be enhanced for education and outreach purposes by SNWA at minimal cost to the program and is being completed in concert with protection of the backwater. The properties are adjacent to and buffered by Big Bend State Park, which 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

makes protection of the existing backwater a priority for the LCR MSCP (see Conservation Measure FLSU1).

The Colorado River and Reach 3 in particular are experiencing extensive urban development. The Big Bend Conservation Area, formally known as the Boy Scout Camp, maintains access to the river via the adjacent backwater and would make the area a likely candidate for development. Securing the property for the LCR MSCP ensures the commitment of adjacent landowners, and controls future development in the surrounding areas. Long-term security of the property would also provide protection to the backwater and allow for future restoration activities.

A long-term lease with the option to renew has been signed to reimburse SNWA for the acquisition cost of the 15 acres of upland. The value was established by a federal appraisal, which set the appraisal price and compensation at $872,000. The compensation will be split equally over two fiscal years, beginning in FY10 as an in-kind contribution. Reimbursement was approved by the Steering Committee in October of 2008.

A land use agreement between Reclamation, NDOW, SNWA, and the Nevada Division of State Parks has been drafted. The land use agreement documents the roles and responsibility of each party pertaining to continual management of the Big Bend Conservation Area.

Previous Activities: N/A

FY09 Accomplishments:

Maintenance/Restoration/Management. A land resolution was presented approved by the Steering Committee in October 2008. The program intends to secure the land resources through a long-term lease agreement with SNWA. A land use agreement between Reclamation, NDOW, SNWA, and the Nevada Division of State Parks was finalized and the signature process was initiated. The land use agreement documents the roles and responsibility of each party pertaining to continual management of the Big Bend Conservation Area.

SNWA assumed the responsibility of restoring the upland portion of Conservation Area at minimal cost to the program. Reclamation reviewed and concurred with the site improvement plans to ensure compatibility with LCR MSCP. Saltcedar was removed from the upland site and roughly 800 mesquite trees were planted. The LCR MSCP provided the mesquite trees, development of the existing groundwater well, and procurement of a portion of the irrigation system in support of SNWA's upland restoration action, which is being accomplished as an outreach project. Administrative costs associated with NEPA compliance and contracting were also expended in FY09. These actions contributed to the higher than anticipated costs.

A Restoration Development and Monitoring Plan was drafted by Reclamation and posted to the LCR MSCP Web site for the backwater portion of the Conservation Area. The plan

documents the operations, maintenance, and monitoring activities associated with the backwater.

Monitoring: Marsh bird surveys were conducted during March, April, and May, utilizing the National Marsh Bird Monitoring Protocol. No LCR MSCP covered species were detected.

FY10 Activities: The SNWA will be reimbursed for approximately one half of the funding used to secure the Boy Scout Camp property. The balance will be reimbursed in FY11. 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. The land use agreement and lease to secure and manage the property for the life of the program have been signed by all parties.

The Nevada Division of State Parks has been identified to provide on-site personnel in support of care and maintenance of the property. Site personnel will be utilized for regulation enforcement, on-site management, site security, and point of contact in the event of a wildland fire. A Cooperative Agreement will be submitted between the Nevada Division of State Parks and Reclamation for this purpose.

NDOW has coordinated with the Nevada Wildlife Commission for the installation of two buoys at the entrance of the backwater and the installation has been approved. The buoys will restrict access to the backwater to only wakeless speed in order to decrease disturbance to wildlife. Marsh bird surveys will be conducted in March, April, and May at previous established points.

Proposed FY11 Activities: The SNWA will be reimbursed the remaining balance, approximately one half of the funding, used to secure the Boy Scout Camp property. The LCR MSCP will continue to support SNWA's effort to establish native plants on the upland property and ensure compatibility with the goals of backwater protection.

Installation of the buoys is anticipated for this year; the buoys will be installed during the winter when low water conditions are present. Marsh bird surveys will be conducted in March, April, and May at previous established points.

Pertinent Reports: *Big Bend Conservation Area Restoration Development and Monitoring Plan*, and the *Site Improvement Plan* are posted on the LCR MSCP Web site.

Work Task E27: Laguna Division Conservation Area

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate*	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$750,000	$1,375,000.00	$5,000,000	$12,000,000

*FY10 Approved Estimate revised at the October 2009 Steering Committee meeting.

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 and Quechan Tribal Lands, River Mile 43-49, California and Arizona.

Purpose: Create and manage a mosaic of native land cover types for LCR MSCP covered species.

Connections with Other Work Tasks (past and future): This is a new start for the LCR MSCP in FY10.

Project Description: The Laguna Division has been identified as having potential for large-scale riparian and marsh restoration and enhancement (approximately 1,000 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. Currently, there are three river operational requirements and constraints: water delivery, sediment removal, and power generation.

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 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 Mittry Lake inlet canal or Gila Sluiceway. Open water areas could be created in the form of linear excavations aligned with historic river meanders that are 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 either by flooding or drip irrigation.

To support the concept described above, inlet modifications to the point of diversion at the Gila desilting basin would be made to allow for up to 100 cfs capacity. This diversion ditch/pipe systems would be engineered to allow for maximum management flexibility including diverting the entire flow to Mittry Lake, the Laguna Division Conservation Area, or the old river channel.

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, and cost effectiveness will ultimately determine the project's implementation.

FY09 Accomplishments: The project is a new initiative for the LCR MSCP in FY10. Prior to entering the program, three alternative designs for the Laguna Division were prepared by Natural Channel Design with input from the Laguna Division Planning Group using non-LCR MSCP funds.

FY10 Activities: A design was presented, and the work task was approved as a new start project by the LCR MSCP Steering Committee in October 2009. With the passing of resolution 10-002, the Steering Committee has concurred with the restoration design and directed work to continue on planned restoration activities.

Further analysis/design refinement will occur between the Laguna Planning team, local stakeholders, state and federal agencies, and Reclamation. Compliance activities will be initiated for the overall restoration plan in support of the creation of riparian and marsh land cover types. Such activities consist of National Environmental Policy Act (NEPA) compliance, wetlands delineation, cultural survey, and the Section 404 permit. Land use

agreements, establishing rights-of-way, river operational requirements, and operations/maintenance requirements will be created.

Monitoring will commence to create a baseline of wildlife presence prior to construction and as a prerequisite for compliance requirements. Aggregate Base Course (ABC) rock will be stockpiled throughout the project boundary for use for road/firebreak construction.

Reclamation will conduct coordination meetings with the BLM in anticipation of conducting a 2,000 acre controlled burn to clear existing non-native tamarisk from the site. The assistance will generally be in the form of providing a burn plan along with equipment, materials, and personnel to conduct burn efforts on the site. The burn is scheduled for early FY12.

Proposed FY11 Activities: Continued analysis/design refinement will occur between the Laguna Planning team, local stakeholders, state and federal agencies, and Reclamation. The BLM will finalize the burn plan and burn preparations will occur with Reclamation assistance.

Solicitations for the procurement of the delivery pipe, water control structures, and a planting contractor to plant the native vegetation and provide maintenance of the site are anticipated.

A presentation to the Steering Committee is anticipated in October of 2010.

Pertinent Reports: *Laguna Division Conservation Area Task 4: Final/Preferred Habitat Restoration Concept* is available upon request.

Work Task E28: Yuma East Wetlands

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$250,000	$250,000	$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 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-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 will be presented to the Steering Committee with the FY11 Work Plan at the April 2010 meeting.

In 2000, the City of Yuma and the Quechan Tribe collaborated to analyze the potential of restoring the local wetlands along the Colorado River by removing non-native plant species, trash dumps, and make-shift homeless camps. Wildlife and wetlands delineations were conducted prior to clearing.

YEW is developing into an integrated mosaic of land cover types, including cottonwood-willow, honey mesquite, and marsh. The project is located in Yuma, Arizona, on City of Yuma, Quechan Tribal, and Arizona Game and Fish Commission lands. Existing habitat created by past revegetation efforts has resulted in land cover types used by LCR MSCP covered species. In partnership with the Yuma Crossing National Heritage Area (YCNHA), the lead agency establishing the wetlands, the LCR MSCP will maintain

existing habitat and support adaptive management activities to improve site conditions which will benefit the LCR MSCP covered species.

Approximately 350 acres have been restored to create a mosaic of marsh, mesquite, and cottonwood-willow. YEW has adopted wildlife monitoring standards consistent with the LCR MSCP and has observed numerous LCR MSCP covered species on-site. LCR MSCP covered species and land cover type data sharing between the Heritage Area and Reclamation biologists is ongoing.

Previous Activities: Since 2000, Reclamation has participated in the development of the Yuma East Wetlands outside the LCR MSCP process. Past activities included attendance at workshops and planning meetings, use of heavy equipment, an irrigation system inventory analysis, and adoption of LCR MSCP species monitoring protocols that are being used on the site.

FY08 Accomplishments: This is a new start in FY10.

FY09 Activities: This is a new start in FY10.

FY10 Activities: Maintenance and management activities to be administered by the YCNHA will allow for onsite project management, coordination and funding of labor crews, rental equipment for invasive plant removal, maintenance of water control structures for the marsh, maintenance of pumps and purchase of fuel for drip and flood irrigation systems, irrigating services, herbicide and fertilizer purchase and application, and replanting as necessary.

A report summarizing the results of wildlife and vegetation monitoring, evaluation of habitat potential, recommendations for existing land cover modifications or management approach, and potential credit toward species-specific conservation measures was presented to the Steering Committee in April 2010. Additional information on the language used in the Land Use Agreement was requested.

Reclamation staff will attend planning meetings, habitat and species monitoring activities, and maintenance activity meetings. Additionally, LCR MSCP staff will attend and contribute to the annual bi-national revegetation workshops held in the Yuma area, with a focus on the YEW.

Proposed FY11 Activities: Specific language used in the drafting of Land Use Agreements and the recommendation from the LCR MSCP Program Manager to include YEW into the program is anticipated to be presented to the Steering Committee in October of 2010.

Maintenance and management activities will continue. On-site maintenance activities, such as invasive species removal, irrigation infrastructure upkeep, fertilizer application, equipment upkeep, and replanting when necessary will continue. Based on the data collected from the vegetation and species biologists, management actions will be

implemented. Such actions may include altered irrigation frequency and quantity, planting of additional land cover types promoting species usage, and continued soil and water analysis.

Pertinent Reports: N/A

Work Task E29: Desert Tortoise

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$195,000	$50,000	$50,000	$0

Contact: Jed Blake, (702) 293-8165, jblake@usbr.gov

Start Date: FY10

Expected Duration: FY12

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 and transfer to the Bureau of Land Management, 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. It is anticipated that private parcels acquired by the LCR MSCP will be transferred to the BLM after purchase.

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, individual landowners within the ACEC were identified using county records and tax assessor information. Twelve individual landowners with a combined 1,400 acres located within five section acres were identified. Private parcels for potential acquisition range in size from 40 acres to 120 acres.

FY09 Accomplishments: Funding for coordination meetings and administrative costs were previously charged to E16. This is a new start in FY10.

FY10 Activities: At the October 2008 Steering Committee meeting, motion 09-003, Desert Tortoise Land Approval, was approved, which directed Reclamation to evaluate private in-holdings with the Chuckwalla Bench ACEC. Private in-holding landowners have been contacted by the LCR MSCP and the Conservancy. With the landowners' permission, a federal appraisal was conducted to establish fair market value.

Three federal appraisals were conducted in FY09 through the Federal Appraisal Service Directorate based in Sacramento, California. Three parcels were appraised totaling 260 acres. Fair market value was determined to be $450-$550 per acre, depending on how close the property was to a BLM designated access route.

Offer letters describing the LCR MSCP's approach to acquisition with accompanying financial value have been mailed to landowners. The LCR MSCP has received written commitments to sell from all landowners and is moving forward with due diligence and escrow.

Proposed FY11 Activities: If landowners do not accept the LCR MSCP's offer, a second round of appraisals with different landowners will be initiated. Appraisal and offers will be coordinated until the goal of 230 acres acquired and transferred to the BLM is completed.

Pertinent Reports: N/A

Work Task E30: Flat-tailed Horned Lizard

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$0	$195,000	$50,000	$50,000

Contact: Jed Blake, (702) 293-8165, jblake@usbr.gov

Start Date: FY11

Expected Duration: FY2013

Long-term Goal: Acquisition and protection of unprotected occupied habitat

Conservation Measures: FTHL1

Location: The Dos Palmas Conservation Area, within the Salt Creek Area of Critical Environmental Concern (ACEC), is located on the northeastern side of the Salton Sea in Riverside County, California.

Purpose: Acquire and transfer to the Bureau of Land Management, 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): Dos Palmas Conservation Area 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 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.

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 Dos Palmas Conservation Area. Funding for coordination meetings and administrative costs were previously charged to Conservation Area Site Selection (E16).

With the help of the Conservancy, individual landowners within the ACEC were identified using county records and tax assessor information.

FY09 Accomplishments: This is a new start in FY11.

FY10 Activities: At the October 2009 Steering Committee meeting, Program Decision Document 10-001: Land Approval was passed, which directed Reclamation to evaluate unprotected properties within the Salt Creek ACEC for inclusion into the program for the protection of flat-tailed horned lizards. Private in-holding landowners have been contacted by the LCR MSCP and the Conservancy. With the landowners' permission, a federal appraisal will be conducted to establish fair market value. Funding for coordination meetings and administrative costs were previously charged to E16. This is a new start in FY11.

Proposed FY11 Activities: Acquisition is scheduled to commence in FY11. Acquisition will continue until the target of 230 acres of flat-tailed horned lizard habitat is acquired and transferred to the BLM.

Pertinent Reports: N/A

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WORK TASKS SECTION F

POST-DEVELOPMENT MONITORING

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Work Task F1: Habitat Monitoring

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$350,000	$360,842.17	$1,328,143.26	$350,000	$350,000	$425,000	$425,000

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

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Post-development monitoring

Conservation Measures: MRM2 (CLRA, WIFL, WRBA, WYBA, CRCR, YHCR, LEBI, BLRA, YBCU, ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, SUTA, MNSW)

Location: Beal Lake, Havasu NWR, Arizona; ‘Ahakhav Tribal Preserve, Arizona; PVER, California; CVCA, Arizona; Cibola Unit #1, Cibola NWR, Cibola, Arizona; Imperial Ponds, Imperial NWR, Arizona.

Purpose: Monitor habitat creation to determine whether necessary habitat components have been provided to qualify as habitat as described in the LCR MSCP. Monitor the biotic components (vegetation) and abiotic components (e.g., ambient temperature, relative humidity, rainfall, soil moisture) to provide data to incorporate into future habitat creation efforts.

Connections with Other Work Tasks (past and future): Post-development habitat monitoring is being conducted at habitat creation sites detailed in Section E.

Project Description: Habitat creation projects will be monitored for successional changes over time to determine whether habitat acreage goals are met. To evaluate habitat, a monitoring plan will be written prior to project implementation, and pre-development monitoring may occur (if necessary) to document baseline conditions to evaluate change in site conditions. Post-development monitoring will occur through the LCR MSCP time period, and the data will be used to manage the habitat creation sites and to plan future projects through the adaptive management process. Monitoring successional changes will occur on a periodic basis over time, with the interval dependent on the age of each stand.

Previous Activities: Habitat restoration demonstration sites were monitored using established protocols, including Beal Lake, Cibola Nature Trail, and Pratt Restoration. Survival and growth rates were recorded at each site. Survival and growth rates were

dependent on a number of factors, including planting technique. Results were summarized and evaluated for each demonstration site. Additional monitoring plans were written for habitat creation projects including CVCA, PVER, Imperial Ponds, Beal Lake, and ‘Ahakhav Tribal Preserve. A post-development vegetation monitoring pilot study was conducted at Beal Lake, Cibola Nature Trail, CVCA, and PVER in 2007 and 2008.

FY09 Accomplishments: Modifications were made to the pilot year study and a final protocol was developed and implemented in 2008 at Beal Lake, ‘Ahakhav Tribal Preserve, Cibola NWR Unit #1, CVCA, and PVER. Data were recorded at 117 established plots including tree/shrub height and DBH, ground cover, percent canopy closure, and foliage height diversity. The plots were randomly stratified by habitat type including cottonwood, willow, cottonwood-willow mix, and mesquite. Data were compiled by habitat type and by site. Project summaries were prepared and posted on the LCR MSCP Web site.

FY10 Activities: Post-development monitoring continued at existing restoration sites, including Beal Lake, Cibola Nature Trail, Imperial Ponds, CVCA, ‘Ahakhav, and PVER. A total of 167 vegetation plots were monitored in the fall of 2009 (beginning in FY10) including 50 additional plots located in newly developed phases at PVER, CVCA, and Cibola Unit #1.

Proposed FY11 Activities: Monitoring protocols will be implemented based on evaluation of existing experimental design and project data. The monitoring protocols will be implemented at the existing restoration sites, including Beal Lake, Cibola Nature Trail, Imperial Ponds, CVCA, ‘Ahakhav, and PVER.

Pertinent Reports: The monitoring plans for the 2008-2009 seasons are included in the restoration development plans and are available for CVCA, PVER, Beal Lake, Cibola Unit #1, and ‘Ahakhav Tribal Preserve. Annual reports for 2009 for Beal Lake, ‘Ahakhav Tribal Preserve, Cibola Unit #1, CVCA, and PVER will be posted on the LCR MSCP Web site.

Work Task F2: Avian Use of Habitat Conservation Areas

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$150,000	$143,556.56	$550,165.78	$170,000	$170,000	$180,000	$180,000

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

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Conduct pre- and post-development monitoring for avian species.

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

Location: Beal Lake Havasu NWR, Arizona; ‘Ahakhav Tribal Preserve, Arizona; PVER, California; CVCA, Cibola Unit #1, Cibola NWR, Cibola, Arizona.

Purpose: Monitor avifauna use of habitat conservation areas to provide data for the adaptive management process and develop management guidelines for created habitat conservation areas.

Connections with Other Work Tasks (past and future): Post-development avian monitoring will be conducted at habitat conservation areas listed in section E. In addition, information obtained from this work task may be used to provide data to avian system monitoring by using the same protocols established in the system monitoring program (D1, D2, D5, D6, and D7).

Project Description: Creation of riparian habitat will benefit nine LCR MSCP covered avian neo-tropical migratory species. Conservation areas will be monitored for bird activity, using a variety of techniques including area searches and species-specific survey protocols. Data gathered will be used to guide the design of future riparian habitat conservation areas to provide covered species habitat.

Previous Activities: During 2007 and 2008, avian post-development monitoring for avian covered species occurred at five habitat conservation areas: Cibola Unit #1, ‘Ahakhav Tribal Preserve, PVER, Beal Lake, and CVCA. Avian pre-development monitoring was conducted at three habitat conservation areas: CVCA, Cibola Unit #1, and PVER. Avian use was summarized and evaluated for each conservation area and compared between conservation areas. Pre- and post-development monitoring for avian covered species has been conducted at habitat conservation areas since 2005.

FY09 Accomplishments: Avian post-development monitoring was conducted at existing habitat conservation areas, including Beal Lake, Cibola Unit #1, CVCA, PVER, and the ‘Ahakhav Tribal Preserve in 2009. The following portions of the habitat conservation areas were surveyed: 1) entire area of Beal Lake, 2) the Nature Trail and Mass Planting of Cibola Unit #1, 3) phases 1 and 3 of CVCA, 4) Phase 2 of PVER, and 5) CRIT 9 of ‘Ahakhav Tribal Preserve.

Avian post-development monitoring was conducted utilizing the intensive area search methodology. The methodology followed the same protocol developed as part of avian system-wide monitoring under D6. Each area or phase surveyed was divided into area search plots. Each area search plot was surveyed eight times during the breeding season. A complete census of breeding birds was obtained for each area search plot.

Area search surveys conducted at Beal Lake detected 97 pairs of breeding birds. This included 7 pairs of Sonoran yellow warblers, 10 pairs of Arizona Bell’s vireos, and 1 summer tanager pair, all LCR MSCP covered species. Surveys conducted at CRIT 9 ‘Ahakhav Tribal Preserve detected 158 pairs of breeding birds. This included 1 summer tanager pair and 3 pairs of vermilion flycatchers, both LCR MSCP species.

Surveys conducted at the Nature Trail and Mass Planting of Cibola Unit #1 detected 112 pairs of breeding birds. This included 2 pairs of Sonoran yellow warblers, an LCR MSCP covered species. Surveys conducted at Phase 1 and Phase 3 of CVCA detected 163 pairs of breeding birds. This included 4 pairs of Sonoran yellow warblers, an LCR MSCP covered species. Surveys conducted at Phase 2 of PVER detected 24 pairs of breeding birds. Data from general bird surveys in pre-development agricultural areas and areas in their first year of growth conducted in previous years were assessed to determine whether enough data have been gathered to create habitat suitability models for these areas.

FY10 Activities: Avian post-development monitoring will be conducted at existing habitat conservation areas, including Beal Lake, Cibola Unit #1, CVCA, PVER, and ‘Ahakhav Tribal Preserve. The following portions of the habitat conservation areas will be surveyed: 1) entire area of Beal Lake, 2) the Nature Trail and Mass Planting of Cibola Unit #1, 3) phases 1, 2, and 3 of CVCA, 4) phases 2 and 3 of PVER, and 5) CRIT 9 of ‘Ahakhav Tribal Preserve.

The intensive area search method will be utilized following the same protocol developed as part of the avian system-wide monitoring under D6. Each area or phase surveyed will be divided into area search plots. Each intensive area search plot will be surveyed eight times during the breeding season. This will yield a complete census of breeding pairs at each area search plot.

Proposed FY11 Activities: Avian post-development monitoring will be conducted at existing habitat conservation areas, including Beal Lake, Cibola Unit #1, CVCA, PVER, and ‘Ahakhav Tribal Preserve.

Pertinent Reports: The following reports are posted on the LCR MSCP Web site: 1) *Annual Report and System Monitoring for Riparian Obligate Avian Species (Work Task D6) and Avian Use of Restoration Sites (Work Task F2) 2008;* and 2) *Annual Report and System Monitoring for Riparian Obligate Avian Species (Work Task D6) and Avian Use of Restoration Sites (Work Task F2)2009.*

Work Task F3: Small Mammal Colonization of Restoration Sites

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$55,000	$55,782.13	$156,690.61	$55,000	$60,000	$65,000	$65,000

Contact: Sean Neiswenter, (702) 293-8221, sneiswenter@usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Conduct pre- and post-development monitoring for small mammal species.

Conservation Measures: YHCR1, CRCR1, DPMO1, MRM2 (DPMO, CRCR, YHCR)

Location: Beal Lake, Havasu NWR; PVER, California; CVCA, Cibola Nature Trail, Hart Mine Marsh.

Purpose: Monitor small mammal populations within habitat creation sites. Data will be used in the adaptive management process to guide the design of future habitat creation projects targeting covered small mammal species.

Connections with Other Work Tasks (past and future): Post-development small mammal monitoring will be conducted at habitat creation sites listed in Section E. In addition, information obtained from this work task, in conjunction with C27, will be used to define habitat requirements for future habitat creation projects. Data from C27 research will aide in design of population monitoring protocol.

Project Description: Reclamation will conduct presence/absence surveys 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.

Previous Activities: In previous years, small mammal surveys have been conducted at the Cibola Nature Trail site and at the Pratt Agricultural site. Several animals from the genus *Sigmodon* have been captured at each site. At the Pratt Agricultural site, *Sigmodon* spp. were captured in dense *Baccharis* spp., and at the Cibola Nature Trail site, they were captured in dense Johnsongrass. No S*igmodon* spp. have been captured at Pratt Agricultural since 2005. Presence/absence live trapping surveys were conducted at

several habitat creation sites during FY06, but only one *Sigmodon* spp. was captured at the Beal Lake Riparian Restoration site.

FY09 Accomplishments: *Sigmodon* have been detected at seven areas along the LCR that are either restoration sites or very near restoration efforts (see C27). Cibola Nature Trail and Palo Verde Ecological Reserve site have relatively large populations of Colorado River cotton rats and a smaller population has been identified near Beal. Yuma hispid cotton rats were documented near Pratt, Mittry Lake, and in the Imperial Valley.

FY10 Activities: Presence/absence live trapping surveys will continue as part of the post-development monitoring efforts at LCR MSCP habitat creation sites. At the Cibola Nature Trail site and Palo Verde Ecological Restoration site we will conduct trapping in arrays designed to quantify habitat characteristics and establish a monitoring protocol (C27).

Proposed FY11 Activities: Post-development monitoring activities for small mammals will continue at habitat creation sites and once presence is detected, the population monitoring protocol will begin.

Pertinent Reports: A summary of mammal trapping results at LCR MSCP restoration sites in 2009 will be posted on the LCR MSCP Web site. The population monitoring protocol is available upon request.

Work Task F4: Post-Development Monitoring of Covered Bat Species

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$90,000	$92,697.58	$255,740.71	$110,000	$110,000	$110,000	$110,000

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

Start Date: FY07

Expected Duration: FY55

Long-term Goal: Pre- and post-development monitoring of covered bat species.

Conservation Measures: MRM1, MRM2 (WRBA, WYBA, CLNB, PTBB), WRBA1, WYBA1

Location: Beal Lake, Havasu NWR; ‘Ahakhav Tribal Preserve, CRIT; PVER, California; CVCA, Cibola NWR Unit 1, Cibola, Arizona; Imperial Ponds, Imperial NWR, Arizona; Laguna Conservation Area, Arizona.

Purpose: 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 new study design developed in 2008. Information obtained through this work task, in conjunction with D9, will help determine the distribution of these species.

Connections with Other Work Tasks (past and future): Post-development bat monitoring will be conducted at habitat creation sites listed in Section E. In addition, information obtained from this work task may be used to provide data to D9.

Project Description: Post-development monitoring will utilize a study design developed in 2008 that will compare bat activity between five habitat types (agricultural fields, saltcedar stands, mesquite created habitat, sapling cottonwood-willow created habitat, and intermediate cottonwood-willow created habitat). Acoustic monitoring will be conducted at habitat creation sites, including ‘Ahakhav, CVCA, PVER, Cibola NWR Unit #1, Beal Lake, and Imperial Ponds. These surveys will utilize either active or stationary Anabat systems to record bat echolocation calls for presence/absence surveys. A capture program will also be used in at least four of 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: All sites were monitored in FY07 using both acoustic and capture techniques.

FY09 Accomplishments: Quarterly post-development bat monitoring was conducted utilizing Anabat bat detectors in seven LCR MSCP habitat creation areas, including Beal Lake Habitat Restoration, ‘Ahakhav Tribal Preserve, Palo Verde Ecological Reserve, Cibola Valley Wildlife and Conservation Area, Cibola NWR Unit #1 Conservation Area, Pratt Restoration, and the Imperial Ponds Conservation Area. The principal goal of this monitoring is to assess seasonal use of the restoration sites by the two covered bat species (western red bat and western yellow bat), and the two evaluation species (pale Townsend’s big-eared bat and California leaf-nosed bat).

The new study design that was established in 2008 was continued successfully in 2009. Monitoring was conducted in October 2008, and in January, April, and July 2009. A total of 3,611 minutes of bat activity were recorded at the Beal Restoration site, and all four LCR MSCP species were recorded. A total of 11,823 minutes of bat activity were recorded at the ‘Ahakhav Tribal Preserve, and all four LCR MSCP species were recorded. A total of 2,265 minutes of bat activity were recorded at PVER, and all four LCR MSCP species were recorded in low numbers. A total of 1,866 minutes of bat activity were recorded at CVCA, and three of the four LCR MSCP species (western red bat, western yellow bat, and California leaf-nosed bat) were recorded. A total of 5,726 minutes of bat activity were recorded at Cibola NWR, and all four LCR MSCP species were recorded. A total of 4,223 minutes of bat activity was recorded at Imperial NWR, and three of the four LCR MSCP species (western red bat, western yellow bat, and California leaf-nosed bat) were recorded. A total of 1,268 minutes of bat activity were recorded at Pratt, and yellow bat activity and California leaf-nosed bat activity were recorded.

The Beal permanent acoustic station has continued operating with minimal problems. A second permanent bat acoustic station was established at ’Ahakhav Tribal Preserve in April using a new bat detector that collects acoustic data using full spectrum .wav files. These data will be analyzed using Sonobat software that will be automated in the future.

A bat capture program utilizing mist nets and harp traps was conducted between February and September. Four habitat creation areas were sampled, including ‘Ahakhav Tribal Preserve, CVCA, Cibola NWR Unit #1, and Pratt. A total of 526 individual bats from 12 species were captured among the four sites. Three LCR MSCP target species (western red bat, western yellow bat, and California leaf-nosed bat) were captured. The western red bat was first captured at ‘Ahakhav in February to confirm the species’ presence from acoustic data taken in February. Additional red bats were captured at ‘Ahakhav and CVCA in late summer. Yellow bats were captured at ‘Ahakhav, CVCA, and Pratt. California leaf-nosed bats were captured at all four sites. The Arizona myotis (*Myotis*

occultus) was also captured at ‘Ahakhav and was confirmed using genetic sampling. This is the first record of the Arizona myotis since 1945 along the LCR, where this species was presumed extirpated.

FY10 Activities: Acoustic surveys will continue at all sites sampled in 2009. Pre-development acoustic surveys will begin at the Laguna Conservation Area. Capture surveys will continue at ‘Ahakhav, CVCA, and Cibola Unit #1. The Pratt site will be replaced by PVER due to the success at the similar CVCA. The two permanent stations will continue to collect data and the new Sonobat software will be purchased.

Proposed FY11 Activities: Once FY10 acoustic data is analyzed, it will be determined whether enough data has been collected to infer habitat preferences for covered species. If so, the acoustic surveys may focus more on permanent acoustic stations at each site rather than quarterly short-term monitoring. Capture surveys will continue and will also be used to capture red and yellow bats for the upcoming telemetry project (C35) and to better determine seasonal use of habitat creation areas on a finer scale.

Pertinent Reports: *Post-Development Bat Monitoring of Habitat Creation Areas along the Lower Colorado River – 2009 Acoustic Surveys* will be posted on the LCR MSCP Web site. *Post-Development Bat Monitoring of Habitat Creation Areas along the Lower Colorado River – 2009 Capture Surveys* will be posted on the LCR MSCP Web site.

Work Task F5: Post-Development Monitoring of Fish Restoration Sites

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$150,000	$175,494.19	$354,981.07	$150,000	$175,000	$200,000	$200,000

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

Start Date: FY07

Expected Duration: FY55

Long-term Goal: Post-development monitoring

Conservation Measures: RASU6 and BONY5

Location: Reaches 3-6, backwater habitats developed and stocked with RASU and BONY, Nevada, Arizona, and California.

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.

Project Description: This work will monitor the fish and fish habitat at restoration sites. It is anticipated that fish restoration sites will play various roles for conservation of target fish species throughout the term of the LCR MSCP. Some habitats will be able to develop self-sustaining populations, others may become overpopulated requiring harvest or thinning, and some will require continuous population augmentation. Most isolated fish habitats will require some stock rotation to maintain genetic diversity through time. Basic surveys of the fish population and the physical and chemical habitat developed or restored will be required. Fish monitoring will include trapping (hoop, fyke, and minnow traps), trammel netting, electro-fishing, larvae light trapping, and ocular surveys (including scuba and snorkeling where necessary and practical). Water quality assessment will require annual measurements of temperature, oxygen, pH, and conductivity (salinity), as well as periodic monitoring of chemical makeup, including electro-ions and selenium.

Previous Activities: Since 2006, Beal Lake has been renovated and stocked with more than 6,000 RASU and 2,000 BONY; a limited portion of each of these stockings were marked with PIT tags. Non-natives were identified shortly after the renovation efforts.

Annual surveys have contacted subsets of each of these stockings. Remote sensing techniques have proved valuable in contacting PIT-tagged fish. Netting and electro-fishing have also been attempted with limited success. Water quality has been monitored routinely and all parameters have remained at sufficient levels for native fish.

Since the completion of Imperial Ponds, in excess of 1,600 BONY and 800 RASU have been stocked. Monitoring of this site is being accomplished under C25. Water quality parameters at this site have remained within the assumed thresholds for native fish with the exception of pH, which has spiked above 9, but with no apparent harm to the fish. For more information on Imperial Ponds see C25.

FY09 Accomplishments: Beal Lake fall sampling contacted 16 RASU and 1 BONY using remote sensing; two of these fish were also contacted using conventional gear (nets and electro-fishing) and all of the fish appeared in good health and growing. Closer order water sampling and remote sensing collection trips were accomplished through the summer at Beal Lake. Dissolved oxygen dropped below 3 mg/L on several occasions, which may have impacted fish survival. Remote sensing was unable to contact any fish during these trips. Multiple large impoundment nets were purchased. These nets allow for extended soak times with minimal stress on captured fish.

FY10 Activities: In 2010 we will restock native fish with a greater portion of them being PIT tagged. These stockings will be monitored at closer intervals using remote sensing to help detect changes in the population. Impoundment nets will be deployed to assess their ability to contact native fish, as well as assist in removing non-natives.

Current water management at Beal Lake is highly dependent on the management of Topock Marsh and this may have a detrimental impact on fish survival in Beal. Water quality loggers will be purchased and deployed throughout the year to record and potentially identify problems with water managent. Infrastructure improvements to the water management at Beal Lake will be developed based on our findings.

Proposed FY11 Activities: The activities from FY10 will continue into this year. Fish work or infrastructure improvements will be based on our findings from FY10 activities. Searches for larval fish and other signs of reproduction and recruitment will be conducted in all developed habitats. Food resource assessments will be conducted and results compared with data from C34.

Pertinent Reports: Annual reports will be written and posted on the LCR MSCP Web site.

Work Task F6: Monitoring MacNeill's Sootywing in Habitat Creation Sites

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$10,000	$17,076.49	$17,076.49	$50,000	$70,000	$70,000	$70,000

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

Start Date: FY09

Expected Duration: FY55

Long-term Goal: Post-development monitoring for MacNeill's sootywing.

Conservation Measures: MNSW2

Location: Habitat-creation sites, initially Palo Verde Ecological Restoration Site and Cibola Valley Wildlife Conservation Area.

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 are being determined in Survey and Habitat Characterization for MacNeill's Sootywing (C7). Work task F6 will be phased in when C7 is completed during FY09-10.

Project Description: Preliminary results obtained from work accomplished under work task C7 have determined that sootywings require host plants (*Atriplex lentiformis*) that are larger than 1.6 m in height, greater than 64% in plant water content, and greater than 3.2% in leaf nitrogen content. Sootywings also require plants other than *A. lentiformis* for nectar (e.g., *Heliotropium curassavicum* [Boraginaceae] and *Sesuvium verrucosum* [Aizoaceae]). These attributes will need to be monitored in created habitat. Monitoring host-plant water content is especially critical, as it will be driven by the timing and amounts of irrigation. Utilization of new habitat by sootywings also will need to be surveyed. This work task will need to allow for additional determinations (i.e., adaptive management) of habitat needs if created habitat fails to become colonized.

Previous Activities: None. This is a new start for FY09.

FY09 Activities: In spring 2009, we began monitoring populations of sootywings at one restoration plot at CVCA and at one restoration plot at PVER. Rapid growth of vegetation planted during March 2009 required monitoring three additional plots at

CVCA and one additional plot at PVER beginning in summer. Restoration plots were monitored every two to three weeks during April-September. At CVCA, sootywings were well established at one 58-acre plot, weakly established at two plots, and absent at one plot. Sootywings were near absent or absent at both plots at PVER.

FY10 Activities: The following seven restoration plots, totaling 197 acres, will be monitored for sootywings every two to three weeks during late April to late September:

CVCA Plots	Acreage	PVER Plots	Acreage
Phase 2	8	Phase 5	18
Phase 4 (west)	58	Phase 3	6
Phase 4 (east)	90	Phase 4	11
Phase 3	6		

Proposed FY11 Activities: The plots listed above will continue to be monitored. Additional plots will be monitored as they are planted during FY10-11. Activities during this fiscal year also will begin examining causes of different sootywing abundances among restorations sites. Potential causes include: 1) host-plant size and water content, 2) 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.

Pertinent Reports: The 2009 Annual Report for Monitoring MacNeill's Sootywing in Habitat Creation Sites will be posted to the LCR MSCP web site.

Pratt, G. F., and W. D. Wiesenborn. 2009. MacNeill’s sootywing (*Hesperopsis gracielae*) (Lepidoptera: Hesperiidae) behaviors observed along transects. Proceedings of the Entomological Society of Washington 111:698-707.

Work Task F7: Post-Development Monitoring of Marsh Birds

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$0	$0	$0	$0	$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 suitable habitat for use by California black rails, Yuma clapper rails, and western least bitterns.

Conservation Measures: MRM1 AND MRM2 (CLRA, BLRA, LEBI), LEBI1, BLRA1, CLRA1

Location: Presence/absence surveys will be conducted at newly developed marsh habitat sites.

Purpose: Monitor the use of created marsh habitat by covered marsh bird species.

Connections with Other Work Tasks (past and future): Hart Mine Marsh, Big Bend, and portions of Imperial NWR have been surveyed for marsh birds prior to development. System-wide marsh bird surveys have been conducted by Reclamation on existing marsh habitat since 1996. Previous surveys, both system-wide and those associated with pre-development, were conducted under D1.

Project Description: Surveys for Yuma clapper rail in existing habitat have been conducted in Topock Gorge by Reclamation since 1996. 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.

All Reclamation personnel involved with post-development marsh bird surveys have attended and successfully completed the Marsh Bird Training Workshop and Reclamation possesses all permits required for these surveys.

Previous Activities: None, this is a new start in 2011.

FY09 Accomplishment: None, this is a new start in 2011.

FY10 Activities: None, this is a new start in 2011.

Proposed FY11 Activities: Marsh bird surveys will be conducted on conservation areas once the marsh vegetation has developed in sufficient acreage, vegetation type, and suitability. These sites will include Hart Mine Marsh (Cibola NWR), Field 16 and the Imperial Ponds (Imperial NWR), Big Bend Conservation Area, and the Laguna Division Conservation Area.

Pertinent Reports: Results of surveys will be reported in the annual reports for each associated restoration site.

WORK TASKS SECTION G

ADAPTIVE MANAGEMENT PROGRAM

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Work Task G1: Data Management

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$450,000	$337,661.19	$959,469.78	$650,000	$700,000	$950,000	$950,000

Contact: Jeremy Dandron, (702) 293-8378, jdandron@usbr.gov

Start Date: FY07

Expected Duration: FY55

Long-term Goal: Data management will be an ongoing task for species research, system monitoring, habitat creation, post-development monitoring, and habitat maintenance programs.

Conservation Measures: All

Location: System-wide

Purpose: Develop and maintain an accessible, multi-disciplinary, spatially referenced, relational database to consolidate, organize, document, store, and distribute scientific information related to the LCR MSCP.

Connections with Other Work Tasks (past and future): Database management is integral in the successful completion of work tasks undertaken for Fish Augmentation (Section B), Species Research (Section C), System Monitoring (Section D), Habitat Creation (Section E), Post-Development Monitoring (Section F), Adaptive Management (Section G), and Habitat Maintenance (Section H).

Project Description: To fully implement the LCR MSCP, a database management system is being developed to manage data collected through the species research, system monitoring, habitat creation, post-development monitoring, adaptive management, and habitat maintenance programs. Database design, initial implementation, and maintenance are funded through this work task.

Previous Activities: All RASU and BONY tagging and stocking data have been included in the Lower Colorado River Native Fishes database maintained by ASU in Tempe, Arizona. Arizona State University received a federal grant in FY04 to continue this work for four years. Reclamation accounted for these funds in its request for financial credit. The LCR MSCP Database Management Framework Requirements Analysis was completed in FY06, and outlined several options for implementing an accessible, multi-disciplinary, spatially referenced, relational database to consolidate,

organize, document, store, and distribute scientific information related to the LCR MSCP. This analysis will be used to develop the implementation strategy for the LCR MSCP database management system.

FY09 Accomplishments: New Internet Web page templates were completed under MSCP visual identity guidelines; these Web pages will increase functionality for public and partner access. A support agreement was established with the Reclamation Geospatial Information Systems group to support geospatial software and hardware. Hardware was purchased and software was installed for geospatial data and imagery. The Reclamation information technology office approved the design of the MSCP centralized Database Management System (DBMS) architecture. The internal intranet/document/calendar management system has been tailored to fit the future needs of the LCR MSCP.

FY10 Activities: Database design and implementation of a centralized DBMS will continue in an annually phased approach for all project and species databases. Onsite database and software development for centralized database modules will begin. Additional hardware will be purchased to increase data storage for the implementation of the centralized database. The design and development of a geo-document Web map interface will begin. The geo-document interface will allow SharePoint users to view documents from a geospatial Web map. The intranet/document/calendar management system will be maintained and modified, tailoring it to the future needs of the LCR MSCP. The new Internet Web site and Web map interface will be implemented, maintained, and updated to increase functionality and usability for public and partner access. Updated geospatial imagery will be acquired and implemented for Internet and intranet use. The development of remote data collection from field data loggers will begin. The automatic collection of remote data into a centralized database will allow for the secure transmission of data with integrated quality control. The native fish database will continue to be maintained off site until the fish section of the LCR MSCP database is fully functional. Development of a new Web interface for the fish database will also begin and will be accessible through LCR MSCP's Web site.

Proposed FY11 Activities: Database and software development will be conducted in FY11. Database design and implementation of a centralized Database Management System (DBMS) will continue in an annually phased approach for all project and species databases. The planning, acquisition, and data modules for the MSCP centralized database will begin development. All data modules will be phased in according to priority for the implementation of the HCP. Data modules consist of an application for input of data (data entry) within a centralized database, to include quality assurance and quality control. Data modules will also include tools for data analysis and data extraction for reporting. The intranet/document/calendar management system (SharePoint 2010) will be upgraded and modified to work with all data modules. All technical information on data management will be accessible through the application/database design and development documents and the project management plan. The development of the geo-document Web map interface will continue and will allow SharePoint users to view documents within a geospatial Web map. The development of remote data collection from field data loggers

will continue. The automatic collection of remote data into a centralized database will allow for the secure transmission of data with integrated quality control.

Pertinent Reports: *Draft LCR MSCP Database Management Framework Requirements Analysis* is available upon request from the LCR MSCP.

Work Task G3: Adaptive Management Research Projects

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$230,000	$388,826.06	$1,427,875.36	$300,000	$300,000	$380,000	$380,000

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

Three principal activities comprise this work task: 1) evaluate species accounts and suggest research to update, expand, and/or refine life history data; 2) review and evaluate conservation actions implemented prior to the LCR MSCP along the Colorado River or implemented by other entities; and 3) assess existing and potential monitoring tools and protocols to improve evaluation capabilities.

This work task enables Reclamation to initiate priority research projects in a timely manner. For example, opportunistic research proposals (e.g., time-sensitive such as spawning or breeding season dependent) can be considered and initiated during the funding year and then be elevated to full research or monitoring status (Section C, D, or F) the following year. Also, experimental techniques can be evaluated through research to

assess their utility, and if found to be useful, they would be incorporated into monitoring activities.

Previous Activities: An evaluation of monitoring techniques for assessing relative abundance of RASU in riverine reaches was conducted, providing population estimates for adult RASU spawning in the Colorado River near Needles, California. A telemetry study was initiated in FY07 to determine range and habitat use by repatriated RASU in Reach 3.

Research was begun to experimentally determine lethal salinity limits for RASU eggs and larvae. Results indicate that upper salinity tolerances are between 10,000 and 15,000 μS/cm for eggs, and 23,000 and 26,000 μS/cm for larvae. Remote sensing applications for PIT-tagged fish were evaluated. This was continued as C23.

FY09 Accomplishments: A study was initiated looking at the hydrology and water management of southwestern willow flycatcher known breeding sites at Topock Marsh. Breeding populations have been declining in Topock Marsh at an alarming rate, and this study will help determine whether the lack of water during the initial part of the breeding season is the reason. Hydrology and standing water were mapped throughout the breeding season in 2009 to get pre-treatment data for comparison with data collected after placing water within the site during FY10 breeding season. Intensive topography and photography were also obtained for the study area. The treatment and monitoring portion of this study will be continued under D2 and D3.

A study was initiated to determine the feasibility of utilizing soil amendments. Amendments tested included compost, manure, hay, wood waste, cotton gin waste, rice hulls, and bio-solids; materials in the form of moist soil amendments were also tested. Initial indications suggest that the bio-solid material, Lassenite Pozzolan, which is primarily amorphous silica, may be a suitable material. Extensive laboratory testing will continue in FY10 under C42 on this substance.

Preliminary assessment of stable isotope analyses as a possible tool for understanding RASU survival in Reach 3 was conducted, resulting in a design for C38. A study design for assessing post-stocking survival of BONY was completed, and the work will begin in FY10 as C39. A study to assess population ecology of RASU and BONY in floodplain lakes and ponds was scoped out. This work also will be initiated in FY10 (see C40). Approval was sought and received from the Lake Havasu Office of the BLM to modify artificial structures placed in Lake Havasu by addition of PIT-tag antennae to facilitate investigations of habitat use by stocked fish. The work is being initiated in FY10 as C41.

During spring FY09, an in situ evaluation of the wedge-wire screen system's effectiveness was conducted at Imperial Ponds on Imperial NWR. The purpose was to determine exclusion potential and entrainment rates of this type of system and its applicability to backwater habitat creation under the LCR MSCP. Entrainment sampling was conducted monthly, from mid-April to early July, when larval densities outside the screen were expected to be highest. Preliminary analysis of the samples taken showed

that the 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.

Entrained eggs and larvae from several taxonomic groups, primarily *Lepomis* sp., *Clupeidae* sp., and *Cyprinidae* sp., were collected. Larger size classes of nonnative fishes (eggs > 1mm) were collected in the supplementary sampling outside of the screen system, but none of these fish species with larger early life stages, (e.g., predatory fishes including largemouth and smallmouth bass) were collected in the entrainment samples.

These results corroborate the results from a model laboratory analysis of the Beal Lake screen system conducted in 2006 and suggest that these screens (with slot sizes of 0.5 mm) are effective at excluding the eggs and larvae of fishes that have early life stages exceeding 1 mm in diameter, but not those with eggs less than 1 mm in diameter. Initial management implications of these results indicate that the wedge wire screen technology may be used as a part of a program to exclude nonnative fishes from protected backwaters but other management actions may be necessary to achieve 100% exclusion of all nonnative fish species.

FY10 Activities: A genetics study will be initiated to determine the population demographics and habitat use of the California leaf-nosed bat. This study will determine the population history of the California leaf-nosed bat along the LCR, determine the distribution of genetic variation in California leaf-nosed bat roost sites, and identify where individuals from different roosts are foraging. This work will be continued in FY11 under C43.

A habitat analysis and development of a population monitoring protocol for *Sigmodon* is being designed and will continue under C27. The purpose of this research is to define the physical structure of the microhabitat utilized by the Colorado River cotton rat at two sites along the LCR where they appear to have relatively high abundance (an indication of high quality habitat). Data from this research can then be utilized in conservation areas for the creation of cotton rat habitat.

Also, a study looking at seasonal movement patterns of Yuma clapper rail will be initiated to determine habitat use during non-breeding times, in order to determine management recommendations for created habitats when breeding is not taking place. This study will continue under C24 in FY11.

Study designs are being finalized for four new investigations to begin in FY11. These include Management of Fish Food Resources in Off-Channel Native Fish Habitats (C44), Ecology and Habitat Use of Stocked RASU in Reach 3 (C45), Physiological Response in BONY and RASU to Transport Stress (C46), and Genetic Monitoring and Management of Recruitment in Bonytail Rearing Ponds (C47).

Other expenditures in FY10 will include additional riparian restoration research on a number of established conservation areas to be supported by G3. Specifically, G3 will be used as initial start-up funding for a groundwater monitoring investigation at three

established LCR MSCP conservation/research areas. This research presents an integrated investigation to: 1) identify areas at risk for groundwater and soil salinization based on existing data, 2) establish a groundwater monitoring system network to determine soil salinity and groundwater conditions in the existing LCR MSCP restoration/conservation areas, 3) develop a salt balance model that can be used to evaluate groundwater elevations and salt accretion/loss in soils and groundwater, and 4) in conjunction with Reclamation, develop strategies for controlling soil and groundwater salinization in these restoration areas, and implement monitoring strategies to help mitigate salinity problems.

Because obligate phreatophytes, such as those in the riparian communities that are being restored by the LCR MSCP, use groundwater and are sensitive to high salinity, improper knowledge and management of available groundwater resources may impact the long-term performance and survival of restored habitats. In addition, information from these investigations may allow for the more efficient use of irrigation water for these managed habitats.

Proposed FY11 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 final report, *Techniques for Monitoring Razorback Sucker in the Lower Colorado River, Hoover to Parker Dams, 2006-2007* has been posted to the LCR MSCP Web site.

Work Task G4: Science/Adaptive Management Strategy

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$50,000	$33,419.32	$185,323.39	$50,000	$125,000	$125,000	$125,000

Contact: Tom Burke, (702) 293-8310, tburke@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: The entire LCR MSCP planning area.

Purpose: Define the process for implementing the LCR MSCP using the best available science and adaptive management processes, and implement the adaptive management process.

Connections with Other Work Tasks (past and future): All science-based work tasks.

Project Description: The HCP conservation measures were designed to meet the biological needs for 26 covered species and to benefit 5 evaluation species. A science strategy, developed in FY06, defines processes for ensuring LCR MSCP implementation using the best available science. This strategy describes a two-tier planning process to ensure effective implementation of research and monitoring actions: first, a 5-year planning cycle, and second, annual work plans covering a three-year cycle. Adaptive management activities will be identified and implemented, including defining the habitat credit process and creating management plans for implemented conservation areas.

Five-year Monitoring and Research Priority: 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 evaluations of various research projects 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.

Annual Work Plan Report: An annual work plan report, which summarizes prior year accomplishments, describes ongoing activities for the current year, 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 five-year monitoring and research priority plan.

Previous Activities: The Science Strategy was developed in FY06-FY07. The first Colorado River Terrestrial and Riparian Ecosystem (CRITER) meeting was held in January 2006 (staff also attended the 2007 CRITER meeting). Fishery staff from the LCR MSCP participated in the 2006 and 2007 annual Colorado River Aquatic Biologists (CRAB) meetings. The first *Five-Year Monitoring and Research Priorities* report was drafted in FY07. A Fish Culture Workshop, hosted by the LCR MSCP, was held in Mesa, Arizona.

FY09 Accomplishments: CRITER and CRAB meetings were attended. Ongoing research and monitoring actions were reviewed through the annual work plan report. The Lake Mohave Native Fish Work Group meeting was hosted by LCR MSCP fishery staff. A new Lake Mead Native Fish Work Group was established to gain support for RASU conservation in Reach 1. A new LCR MSCP Fishery Coordination meeting was convened to discuss status of RASU and BONY and identify focus areas for future research and monitoring for these fishes.

FY10 Activities: Research activities are being reviewed in accordance with the priorities established in the current five-year plan. Annual CRITER and CRAB meetings will be hosted, as well as the Lake Mohave Native Fish Work Group. Presentations are being made to the Upper Colorado River Endangered Fish Recovery Program, the Arizona/New Mexico Chapter of the American Fisheries Society, and the San Juan River Basin Recovery Implementation Program.

A new staff position, Adaptive Management Specialist, will be filled to develop habitat credit procedures, track conservation measure accomplishment, and revise and update the science strategy. Management plans will be developed for existing conservation areas in cooperation with landowners. Habitat credit procedures are being developed to track conservation measure accomplishment.

Proposed FY11 Activities: Research activities are being reviewed in accordance with the priorities established in the current five-year plan. LCR MSCP staff will participate in the annual CRITER and CRAB meetings, as well as the various native fish work group meetings. Management plans will be developed for existing conservation areas in cooperation with landowners. Conservation measure accomplishment will be determined.

The LCR MSCP will begin Phase 2 in FY11. Funding increases for this work task will support the position of the Adaptive Management Specialist, who will assess accomplishments of Phase 1, formalize habitat credit procedures, update the science strategy, and track conservation measure accomplishments.

Pertinent Reports: The *Final Science Strategy* and the *MSCP Five-Year Monitoring & Research Priorities — 2008-2012* are posted on the LCR MSCP Web site.

WORK TASKS SECTION H

EXISTING HABITAT MAINTENANCE

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Work Task H1: Existing Habitat Maintenance

FY09 Estimates	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate*	FY13 Proposed Estimate*
$605,000	$605,000.00	$2,301,000.00	$647,000	$5,359,500	$5,359,500	$5,359,500

*Based on FY11 inflation estimates.

Contact: Terry Murphy (702) 293-8140, tmurphy@usbr.gov

Start Date: FY06

Expected Duration: FY55

Long-term Goal: Maintenance of existing habitat.

Conservation Measures: CLRA2, WIFL2, BLRA2, YBCU2, CRTO2, LLFR2

Location: Lower Colorado River (reaches 1-7)

Purpose: Maintain existing habitat areas, excluding newly created habitat within conservation areas, by implementing actions that will prevent the further degradation or loss of habitat for LCR MSCP covered species.

Connections with Other Work Tasks (past and future): N/A

Project Description: A $25 million fund is being established over a 10-year period to restore habitats suitable for LCR MSCP covered species in the planning areas that have become degraded since the LCR MSCP was initiated. Funding during the initial five years of the program was established at $500,000 per year. Funding in years 6-10 of the program was established at $5,000,000 per year. Both values are indexed to 2003 dollars and adjusted annually for inflation. The degraded habitat condition targeted by this fund is that which occurs because of past LCR operations and maintenance actions that continue into the future. The habitat maintenance fund will be administered by the Program Manager. The process for determining degradation in habitat value as well as how funds are requested, disbursed, and tracked will be defined and refined with the assistance of the Steering Committee.

Previous Activities: This was a new start in FY06.

FY09 Accomplishments: A total of $605,000 was deposited into interest-bearing accounts among the Arizona, California, and Nevada partners. The total dollar value of the fund at the end of FY09, with interest, was $2,552,586.47.

FY10 Activities: A total of $647,000 will be deposited into interest-bearing accounts among Arizona, California, and Nevada partners. A process for requesting, reviewing, selecting, disbursing, and tracking of dollars from the Habitat Maintenance Fund will be drafted and distributed to the Technical Work Group of the Steering Committee.

Proposed FY11 Activities: A total of $5,359,500 is expected to be deposited into the three non-Federal interest-bearing accounts. The process for requesting, reviewing, selecting, disbursing, and tracking of dollars from the Habitat Maintenance Fund is expected to be finalized.

Pertinent Reports: N/A

WORK TASKS SECTION I

PUBLIC OUTREACH

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Work Task I1: Public Outreach

FY09 Estimate	FY09 Actual	Cumulative Accomplishment Through FY09	FY10 Approved Estimate	FY011 Proposed Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate
$40,000	$16,429.75	$77,488.88	$50,000	$70,000	$70,000	$70,000

Contact: Laura Vecerina, (702) 293-8540, lvecerina@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 define and establish outreach programs to increase public awareness.

Connections with Other Work Tasks (past and future): N/A

Project Description: To develop both short-term and long-term outreach goals for the LCR MSCP. To communicate, coordinate, and educate LCR MSCP Steering Committee members, internal and external stakeholders, and the general public about LCR MSCP implementation activities.

Previous Activities: Outreach materials were developed including fact sheets, educational displays, and visual identity materials. Numerous field trips have been conducted. Dedications have been held at conservation areas**.**

FY09 Accomplishments: The focus of FY09 outreach activities was on education. In conjunction with G1, work continued on updating the LCR MSCP Web site to include more information for specific targeted audiences. Reclamation staffed a booth at the Colorado River Water Users meeting, which focused on the Conservation Area sites. A strategy for public outreach was prepared and comments were obtained from the Steering Committee.

FY10 Activities: Public outreach will continue with a focus on education. In October 2009, a dedication was held for the Big Bend Conservation Area. A tour of Planet Ranch and other potential conservation sites was conducted. A field trip to Yuma East Wetlands was scheduled for the Steering Committee in conjunction with the March work group meeting. Based on the public outreach strategy, an outreach action plan will be developed that will outline activities to be implemented in FY11.

Proposed FY11 Activities: Public outreach actions identified in the FY11 Outreach Action Plan will be implemented. The FY12 Outreach Action Plan will be developed.

Pertinent Reports: The public outreach strategy is available upon request.

Appendix A. Letter from Central Arizona Water Conservation District

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CAP
CENTRAL ARIZONA PROJECT

P.O. Box 43020 • Phoenix, AZ 85080-3020
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May 03, 2010

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Gentlemen:

The Multi-Species Conservation Program (MSCP) Non-Federal share for the Federal Fiscal Year 2011, both annually and quarterly, are shown by state below. The inflation index used is 1.191.

Also, please note that Federal Fiscal Year 2011 is year 6 of the program and costs have increased as we move into this next five year category (years 6-10 or 2011-2015).

FY 2011 Non-Federal Share (2003 $)	$13,770,000
FY 2011 Inflation Index	1.191
FY 2011 Non-Federal Share (Escalated $)	$16,400,070

FY 2011 Non-Federal Payments	Existing Habitat Maintenance	Remaining Balance	Total Payment Due
Arizona (25%-Existing Habitat Maint) (15%-Total Non-Federal Share)	$1,339,875.00	$1,120,135.50	$ 2,460,010.50
Nevada (25%-Existing Habitat Maint.) (30%-Total Non-Federal Share)	1,339,875.00	3,580,146.00	4,920,021.00
California (50%-Existing Habitat Maint.) (55%-Total Non-Federal Share.)	2,679,750.00	6,340,288.50	9,020,038.50
Totals	$5,359,500.00	$11,040,570.00	$16,400,070.00

FY 2011 Quarterly Payments		Existing Habitat Maintenance	Remaining Balance	Total Payment Due
Arizona	Q1	$ 334,968.75	$ 280,033.89	$ 615,002.64
	Q2	334,968.75	280,033.87	615,002.62
	Q3	334,968.75	280,033.87	615,002.62
	Q4	334,968.75	280,033.87	615,002.62
	FY Totals	$1,339,875.00	$1,120,135.50	$2,460,010.50
Nevada	Q1	$ 334,968.75	$ 895,036.50	$1,230,005.25
	Q2	334,968.75	895,036.50	1,230,005.25
	Q3	334,968.75	895,036.50	1,230,005.25
	Q4	334,968.75	895,036.50	1,230,005.25
	FY Totals	$1,339,875.00	$3,580,146.00	$4,920,021.00
California	Q1	$ 669,937.50	$1,585,072.14	$2,255,009.64
	Q2	669,937.50	1,585,072.12	2,255,009.62
	Q3	669,937.50	1,585,072.12	2 255,009.62
	Q4	669,937.50	1,585,072.12	2 255,009.62
	FY Totals	$2,679,750.00	$6,340,288.50	$9,020,038.50

Please note that some of the quarterly amounts are not exactly equal due to annual numbers that are not divisible by four.

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,

T Cooke

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 Special Assistant, Bureau of Reclamation
Douglas Dunlap, Financial Analysis and Planning Manager, CAP
Dana Sedig, Senior Financial Analyst, CAP

Section 8.1.1 - Fiscal Year 2011 Inflation Calculation for Lower Colorado River Multi-Species Conservation Program (Actual Indices through September 2009)

Item		Description / Formula		Values		Result
FY	=	Federal Fiscal Year Being Adjusted for Inflation		2011		2011
FY-2	=	Federal Fiscal Year for 2 years prior to Federal Fiscal Year Being Adjusted for Inflation		2009		2009
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	=	202.0/ 152.1	=	1.328
GDPIP Inflation Index for FY	=	Gross Domestic Product Implicit Price Deflator September 30, FY-2 / Gross Domestic Product Implicit Price Deflator September 30, 2002		109.783 / 104.243	=	1.053
Inflation Index for FY	=	(PPI Inflation Index for FY + GDPIP inflation Index for FY)/2		(1.328+1.053)/2	=	1.191
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 1.191	=	$16,400.070
Federal Indexed Funding Obligation for FY	=	(Federal Funding Obligation for FY) X (Inflation Index for FY)		$13,770 X 1.191	=	$16,400.070

All $ are in thousands

Individual State's share in $			
California Share - 50%		50%		$8,200,035.00
Arizona Share - 25%		25%		$4,100,017.50
Nevada Share - 25%		25%		$4,100,017.50
Total Non-Federal Share				$16,400,070.00

Adjusted Split in Individual State Shares		
California - 55%	55%	$ 9,020,038.50
Arizona - 15%	15%	2,460,010.50
Nevada - 30%	30%	4,920,021.00
Total Non-Federal Share	100%	$ 16,400,070.00

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				
X Existing Habitat Percentage Above	16.339869281045800%	16.339869281045800%	16.339869281045800%	16.339869281045800%	16.339869281045800%
Existing Habitat Maintenace Cost	$ 5,359,500.00	$ -	$ -	$ -	$ -
Arizona - 25%	$ 1,339,875.00	$ -	$ -	$ -	$ -
Nevada - 25%	1,339,875.00	-	-	-	-
California - 50%	2,679,750.00	-	-	-	-
Total Existing Habitat Maintenance Cost	**$ 5,359,500.00**	**$ -**	**$ -**	**$ -**	**$ -**

Fiscal Year 2011 Lower Colorado River Multi-Species Program Funding, Indexing and Inflation Adjusted Changes in Funding (Actual Indices through September 2009)

									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	3.0%	3.5%	113.076	1.085	209.070	1.375	1.230	11,214	5,607	5,607	14,511	7,255	7,255
11	2011	3.0%	3.5%	116.469	1.117	216.387	1.423	1.270	27,540	13,770	13,770	32,800	16,400	16,400
12	2012	3.0%	3.5%	119.963	1.151	223.961	1.472	1.312	27,540	13,770	13,770	33,874	16,937	16,937
13	2013	3.0%	3.5%	123.562	1.185	231.800	1.524	1.355	27,540	13,770	13,770	34,976	17,488	17,488
14	2014	3.0%	3.5%	127.269	1.221	239.913	1.577	1.399	27,540	13,770	13,770	36,132	18,066	18,066
15	2015	3.0%	3.5%	131.087	1.258	248.310	1.633	1.446	27,540	13,770	13,770	37,317	18,658	18,658
16	2016	3.0%	3.5%	135.019	1.295	257.000	1.690	1.493	22,164	11,082	11,082	31,007	15,504	15,504
17	2017	3.0%	3.5%	139.070	1.334	265.995	1.749	1.542	22,164	11,082	11,082	32,049	16,025	16,025
18	2018	3.0%	3.5%	143.242	1.374	275.305	1.810	1.592	22,164	11,082	11,082	33,091	16,545	16,545
19	2019	3.0%	3.5%	147.539	1.415	284.941	1.873	1.644	22,164	11,082	11,082	34,177	17,088	17,088
20	2020	3.0%	3.5%	151.965	1.458	294.914	1.939	1.699	22,164	11,082	11,082	35,285	17,643	17,643
21	2021	3.0%	3.5%	156.524	1.502	305.236	2.007	1.755	19,982	9,991	9,991	32,850	16,425	16,425
22	2022	3.0%	3.5%	161.220	1.547	315.919	2.077	1.812	19,982	9,991	9,991	33,949	16,975	16,975
23	2023	3.0%	3.5%	166.057	1.593	326.976	2.150	1.872	19,982	9,991	9,991	35,068	17,534	17,534
24	2024	3.0%	3.5%	171.038	1.641	338.420	2.225	1.933	19,982	9,991	9,991	36,207	18,104	18,104
25	2025	3.0%	3.5%	176.169	1.690	350.265	2.303	1.997	19,982	9,991	9,991	37,406	18,703	18,703
26	2026	3.0%	3.5%	181.455	1.741	362.524	2.383	2.062	8,144	4,072	4,072	15,742	7,871	7,871
27	2027	3.0%	3.5%	186.898	1.793	375.213	2.467	2.130	8,144	4,072	4,072	16,264	8,132	8,132
28	2028	3.0%	3.5%	192.505	1.847	388.345	2.553	2.200	8,144	4,072	4,072	16,793	8,396	8,396
29	2029	3.0%	3.5%	198.280	1.902	401.937	2.643	2.273	8,144	4,072	4,072	17,347	8,673	8,673
30	2030	3.0%	3.5%	204.229	1.959	416.005	2.735	2.347	8,144	4,072	4,072	17,917	8,958	8,958
31	2031	3.0%	3.5%	210.356	2.018	430.565	2.831	2.425	7,500	3,750	3,750	17,048	8,524	8,524
32	2032	3.0%	3.5%	216.666	2.078	445.635	2.930	2.504	7,500	3,750	3,750	17,603	8,801	8,801

33	2033	3.0%	3.5%	223,166	2.141	461,232	3.032	2.587	7,500	3,750	3,750	18,188	9,094	9,094
34	2034	3.0%	3.5%	229,861	2.205	477,375	3.139	2.672	7,500	3,750	3,750	18,780	9,390	9,390
35	2035	3.0%	3.5%	236,757	2.271	494,084	3.248	2.760	7,500	3,750	3,750	19,403	9,701	9,701
36	2036	3.0%	3.5%	243,860	2.339	511,377	3.362	2.851	7,173	3,587	3,587	19,166	9,583	9,583
37	2037	3.0%	3.5%	251,176	2.410	529,275	3.480	2.945	7,173	3,587	3,587	19,797	9,899	9,899
38	2038	3.0%	3.5%	258,711	2.482	547,799	3.602	3.042	7,173	3,587	3,587	20,450	10,225	10,225
39	2039	3.0%	3.5%	266,472	2.556	566,972	3.728	3.142	7,173	3,587	3,587	21,124	10,562	10,562
40	2040	3.0%	3.5%	274,466	2.633	586,816	3.858	3.246	7,173	3,587	3,587	21,820	10,910	10,910
41	2041	3.0%	3.5%	282,700	2.712	607,355	3.993	3.353	7,173	3,587	3,587	22,538	11,269	11,269
42	2042	3.0%	3.5%	291,181	2.793	628,612	4.133	3.463	7,173	3,587	3,587	23,284	11,642	11,642
43	2043	3.0%	3.5%	299,917	2.877	650,614	4.278	3.578	7,173	3,587	3,587	24,051	12,026	12,026
44	2044	3.0%	3.5%	308,914	2.963	673,385	4.427	3.695	7,173	3,587	3,587	24,840	12,420	12,420
45	2045	3.0%	3.5%	318,182	3.052	696,954	4.582	3.817	7,173	3,587	3,587	25,665	12,832	12,832
46	2046	3.0%	3.5%	327,727	3.144	721,347	4.743	3.944	7,173	3,587	3,587	26,504	13,252	13,252
47	2047	3.0%	3.5%	337,559	3.238	746,594	4.909	4.074	7,173	3,587	3,587	27,379	13,690	13,690
48	2048	3.0%	3.5%	347,686	3.335	772,725	5.080	4.208	7,173	3,587	3,587	28,290	14,145	14,145
49	2049	3.0%	3.5%	358,116	3.435	799,770	5.258	4.347	7,173	3,587	3,587	29,223	14,611	14,611
50	2050	3.0%	3.5%	368,860	3.538	827,762	5.442	4.490	7,173	3,587	3,587	30,184	15,092	15,092
51	2051	3.0%	3.5%	379,926	3.645	856,734	5.633	4.639	7,173	3,587	3,587	31,181	15,591	15,591
52	2052	3.0%	3.5%	391,323	3.754	886,720	5.830	4.792	7,173	3,587	3,587	32,207	16,103	16,103
53	2053	3.0%	3.5%	403,063	3.867	917,755	6.034	4.951	7,173	3,587	3,587	33,276	16,638	16,638
54	2054	3.0%	3.5%	415,155	3.983	949,876	6.245	5.114	7,173	3,587	3,587	34,373	17,187	17,187
55	2055	3.0%	3.5%	427,610	4.102	983,122	6.464	5.283	7,173	3,587	3,587	35,514	17,757	17,757
	Total								**626,180**	**313,090**	**313,090**	**1,288,257**	**644,129**	**644,129**

Appendix B. Description of Take

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APPENDIX B-1 Lower Colorado River Multi-Species Conservation Program Federal Flow-Related Covered Actions and Incidental Take Summary Fiscal Year 2009				
Federal Covered Actions ***Biological Assessment*** **Chapter 2**	**Nondiscretionary Actions**	**Discretionary Actions**	**Nondiscretionary Actions Related to Non-Federal Actions[1]**	**2009 Accomplishments[2, 3]**
2.2 BUREAU OF RECLAMATION				
2.2.1 Ongoing Flow-Related Actions				
2.2.1.1 Flood Control (p. 2-3; Table 2-1, p. 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 which was well above that required. In 2009, the Lake Mead elevation varied between 1093.21 and 1112.63 feet mean sea level. Elevations at Lake Mohave and Lake Havasu were managed to target elevations.
2.2.1.2 State Apportionment and Water Contracts (p. 2-5; Table 2-2, p. 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 (p. 2-6; Table 2-3, p. 2-9)	• Issuance of an annual operating plan	• Revision of annual operations through the *Annual Operating Plan* (AOP), pursuant to the Long-Range Operation of	• 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 2009, which governed releases, was issued.

	• 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	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		Annual operations were revised through the Annual Operating Plan, pursuant to the LROC, to reflect current hydrologic conditions. An Intentionally Created Surplus (ICS) Surplus condition was declared for 2009. ICS water was both taken and created in 2009. 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. Excess flow to Mexico in excess of schedule was 64,921 acre-feet. There has not been a review of the LROC. In 2009, there was no unused apportionment in the Lower Division states.
2.2.1.4 Daily Hoover Dam Operations (Table 2-4, p. 2-10)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States, deliver 1944 Water Treaty water, 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, p. 2-11)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States, deliver 1944 Water Treaty water, 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, 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, p. 2-11)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States, deliver 1944 Water Treaty water, 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, 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, and Laguna Dam Reservoir Operations (Table 2-7, p. 2-11)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States, deliver 1944 Water Treaty water, and generate hydropower with water releases for Senator Wash	• Senator Wash, Imperial Dam, and Laguna Dam operations are 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 Dam, and Laguna 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 water releases from Senator Wash. Water releases from Senator Wash, Imperial Dam, and Laguna Dam 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 (p. 2-11) **43 CFR PART 431** (p. 2-14)	• Operational requirements to satisfy 43 C.F.R. 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 C.F.R. Part 431.
2.2.1.6 Lower Colorado Water Supply Project - California (p. 2-15; Table 2-8, p. 2-16)	• Delivery of water under executed Water Supply Project contracts	• Reclamation's execution and administration of individual Water Supply Project contracts	• Participate in the development of and consult in the execution of individual contracts under the Water Supply Project	In 2009, 3,684 acre-feet of use was offset by the pump. of the LCWSP wellfield. This amount was not diverted by IID at Imperial Dam and therefore made available for use to project contractors. All LCWSP was off-set.
2.2.1.7 1944 Water Treaty Deliveries(p. 2-17; Table 2-9, p. 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	• 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	• Delivery of emergency water to Tijuana pursuant to Minute No. 310 of the 1944 Water Treaty and contract • Retention of a portion of Metropolitan's entitlement in Lake Mead to accommodate delivery of water pursuant to Minute No. 310 of the 1944 Water Treaty	Water delivery met the Mexico allotment (1.5 maf) pursuant to the 1944 Water Treaty and related Minutes. A total of 64,921 acre-feet of water passed to Mexico in excess of treaty requirements. Compliance was met with the salinity requirements of Minute No. 242 of the 1944 Water Treaty. Delivery of emergency water to Tijuana pursuant to Minute No. 310 of the 1944 Water Treaty totaled 4,691 acre-feet.

	• Delivery of Mexico allotment pursuant to the 1944 Water Treaty and related Minutes under extraordinary drought conditions • Compliance with the salinity requirements of Minute No. 242 of the 1944 Water Treaty • Delivery of emergency water to Tijuana pursuant to Minute No. 310 of the 1944 Water Treaty and contract	• Operation of variable-speed pumps and diversion canal at SIB to reduce salinity • Execution of contracts to deliver a portion of Mexico's allotment to Tijuana pursuant to Minute No. 310 of the 1944 Water Treaty • Routing of water through the Yuma Division during flood control conditions		Water was routed through the Yuma Project Division for delivery to NIB. Water arriving at NIB is water that stays in the river below Imperial Dam, inflow from the Gila River, and water that enters the river from many returns, including Pilot Knob Wasteway. Delivery of water at SIB totaled 136,862 acre-feet. Drainage pumping and delivery of drainage return flows were made at NIB and SIB.
2.2.1.8 Decree Accounting (p. 2-21; Table 2-10, p. 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 2009 is currently being prepared. Publication will take place during calendar year 2010. Provisional data are available (see Appendix B, Attachment 1) and are summarized below. Provisional Data - Diversions from Mainstream Summary: • Arizona: Diversions = 3,626,497 acre-feet Measured Returns = 665,558 acre-feet Unmeasured Returns = 162,551 acre-feet Consumptive Use = 2,798,388 acre-feet • California: Diversions = 4,985,280 acre-feet Measured Returns = 579,046 acre-feet Unmeasured Returns = 73,689 acre-feet Consumptive Use = 4,332,545 acre-feet • Nevada: Diversions = 457,934 acre-feet Measured Returns = 207,743 acre-feet Unmeasured Returns = 1,602 acre-feet Consumptive Use = 248,589 acre-feet
2.2.2 Future Flow-Related Covered Actions				
2.2.2.1 Specific Surplus and Shortage Guidelines (p. 2-22; Table 2-11, p. 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)	• 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	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.

	• 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		• Delivery of water to water users in the United States pursuant to applicable Federal law, including the Boulder Canyon Project Act and the Decree	
2.2.2.2 Flood Release Contracts (p. 2-24; Table 2-12, p. 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 (p. 2-25; Table 2-13, p. 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 p. 2-26)	---	---	---	51,411 acre-feet of banking was done by AWBA for Nevada in 2009, resulting in this amount of water passing Hoover Dam that would otherwise have not. Repayment of CRWDA Exhibit C obligations resulted in 3,751 acre-feet of water remaining in storage in Lake Mead. Repayment of IOPP overruns resulted in reduced diversions of 423 af in AZ. The Fort Mojave Indian Tribe in CA failed to achieve its IOP repayment amount but incurred an additional overrun for a total of 2,168 af of water being released from storage. System conservation in Yuma Mesa Irrigation and Drainage District resulted in reduced diversions and increased storage of 3,662 af. MWD took delivery of 55,188 af of ICS which was released from storage in Mead, resulting in increased water passing Hoover Dam.
Flow Changes Below Davis Dam to Parker Dam (Table 2-15, after p. 2-26)	---	---	---	51,411 acre-feet of banking was done by AWBA for Nevada in 2009, resulting in this amount of water passing Hoover Dam that would otherwise have not.

				Repayment of CRWDA Exhibit C obligations resulted in 3,751 acre-feet of water remaining in storage in Lake Mead. Repayment of IOPP overruns resulted in reduced diversions of 423 af in AZ. The Fort Mojave Indian Tribe in CA failed to achieve its IOP repayment amount but incurred an additional overrun for a total of 2,168 af of water being released from storage. System conservation in Yuma Mesa Irrigation and Drainage District resulted in reduced diversions and increased storage of 3,662 af. MWD took delivery of 55,188 af of ICS which was released from storage in Mead, resulting in increased water passing Hoover Dam.
Flow Changes Below Parker Dam to Imperial Dam (Table 2-16, after p. 2-26	---	---	---	IID reduced diversions by 3,684 af to make water available to diverters above Parker Dam under the LCWSP. In addition, IID conserved the following amounts which were diverted by MWD and SDCWA above Parker Dam: 105,000 af under the 1988 Conservation Agreement for MWD, and 98,000 af under the CRWDA, and 65,557 af for lining of the AAC for SDCWA. CVWD conserved 26,000 af by CC lining for diversion for SDCWA.
Water Conservation Field Services Program (p. 2-27; Table 2-17, p. 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 (p. 2-28; Table 2-18, p. 2-30) **Note: changed title from "Unauthorized Use"**	• Enforcement of provisions of the Boulder Canyon Project Act in *Arizona v. California* to limit the release and delivery of Colorado River water to authorized users	• Implementation of appropriate policy or rule to address four types of unauthorized use • Execution of water delivery contracts with entities identified as non-contract users	• Consult with states in the development of policies or rules to address four types of unauthorized use • Consult with the states on the execution of water delivery contracts with entities identified as noncontract users	Proposed rule was published July 16, 2008, in the Federal Register (73 FR 40916), resulting in several comments received during the public comment period. For 2009, the comments were under review, and a plan to issue a revised rule is in development.
Unallocated in Arizona, Exclusive of CAP (p. 2-30; Table 2-19, p. 2-31)	• 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 not yet placed

Note: changed title from "Unallocated or Noncontract Water in Arizona, Exclusive of CAP"				under permanent contract. Arizona Department of Water Resources is waiting for the well inventory to be completed before it recommends to the Secretary the entities to enter into contracts for the unallocated Arizona water. The well inventory is scheduled to be completed in 2010.
Central Arizona Project Contract Actions (p. 2-31; Table 2-20, p. 2-31)	• Delivery of water pursuant to executed contracts	• Completion of allocation and execution of contracts for delivery of CAP water subject to Congressional direction	• Review of contracts and consultation on proposed allocation	Water was delivered to the CAP for use by CAP subcontractors and Indian tribes in satisfaction of water delivery contracts. Queen Creek Water Company assigned its rights to 348 acre-feet of CAP water to the Town of Queen Creek; executed on November 22, 2009. Flowing Wells Irrigation District assigned and transferred its rights to 1,481 acre-feet of CAP water to the Town of Queen Creek; executed on December 28, 2009.
Changes in Delivery Related to Water Transfers (p. 2-32; Table 2-21, p. 2-32	• Delivery of water pursuant to contracts that recognize temporary or permanent transfers of water entitlements	• Approval of new contracts or contract changes to recognize temporary or permanent transfers of water entitlements	• Review of contracts and consultation on new or amended contracts that recognize transfers of water entitlements	Basic Water Company assigned and transferred 440 acre-feet to the Southern Nevada Water Authority; documents were executed December 29, 2009. Conservation by IID and delivery by MWD of 75,000 acre-feet of water made available under the Colorado River Water Delivery Agreement that reflects changes in points of diversion and is used to implement the Quantification Settlement Agreement water transfers. In addition, MWD diverted 85,000 of the 105,000 af made available by IID under the 1988 Conservation Agreement.
Changes in Delivery Related to Off-Stream Storage (p. 2-32; Table 2-22, p. 2-33)	• Delivery of water under executed off-stream storage agreements, pursuant to 43 C.F.R. Part 414	• Execution of Storage and Interstate Release Agreements, pursuant to 43 C.F.R. Part 414	• Delivery of water under executed off-stream storage agreements, pursuant to 43 C.F.R. Part 414	51,411 acre-feet of water was banked for Nevada in Arizona by AWBA.
Changes in Amount of Delivery (p. 2-33; Table 2-23, p. 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	Contract with Shepard Water Company for 50 acre-feet was executed on January 30, 2009. Contract with Cha Cha, LLC for 2,100 acre-feet was executed on May 1, 2009.
Changes in Type of Water Use (p. 2-34; Table 2-24, p. 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 (p. 2-34; Table 2-25, p. 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	Approval of Inclusion of 153 acres of land owned by the Ott Family in the Yuma Irrigation District approved November 2009.
Contract Terminations (p. 2-35; Table 2-26, p. 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 contracts were terminated.
2.3 WESTERN AREA POWER ADMINISTRATION[5]	---	---	---	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 (p. 2-77)	---	• Conduct conservation measures for efficient water use	---	Existing practices were continued.
2.5.2.6 Flow-Related Actions (p. 2-82)	---	---	• Water entitlement holder	See section 2.2.1.8 accomplishments in this table.
2.5.3.2 Future Water Conservation Practices (p. 2-77)	---	• Institute new conservation measures for efficient water use	---	No implementation in 2008.
2.5.3.5 Headgate Rock Dam Operation and Maintenance (p. 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.

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 2008.
4. Bureau of Reclamation. Provisional data from Draft *Colorado River Accounting and Water Use Report; Arizona, California, Nevada; Calendar Year 2008* (see Appendix B, Attachment 1). This can be accessed at http://www.usbr.gov/lc/region/g4000/hourly/use08.pdf.
5. Actions associated with water releases, and associated power generation, are described in the *LCR MSCP Biological Assessment*, section 2.2, Bureau of Reclamation Covered Actions. This can be accessed at http://www.lcrmscp.gov/publications/VolumeIII.pdf.

APPENDIX B-2
Lower Colorado River Multi-Species Conservation Program
Federal Non-Flow-Related Covered Actions and Incidental Take Summary
Fiscal Year 2009

Federal Covered Actions *Biological Assessment* **Chapter 2**	**Covered Actions Summary**			**Covered Actions Implemented**						
	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) (p. 2-36; Table 2-27, p. 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 (p. 2-38)	---	---	---							
Wash Fans (p. 2-40; Table 2-30, p. 2-42)	---	• Wash fan removal	---	4						No Implementation in FY09.
Protected Bankline Maintenance and Care of Unprotected Banklines (p. 2-43)	---	• Protected bankline location and maintenance	---	4	CRIT	a163	SC, AW	1 ac	1,3, and 6	Stabilized 1,200 linear feet of raw bankline.

Levee Maintenance (p. 2-44)	---	• Levee location and maintenance	---							No implementation in FY09.
Desilting Basins (p. 2-46; Table 2-32, p. 2-46)	---	• Sediment dredging upstream of principal canal diversions and disposal sites • Maintenance of settling basins to remove sediment and maintain flows; four principal basins	---		---					No implementation in FY09
Jetties and Training Structures (p. 2-47; Tables 2-33 – 2-34, p. 2-48)	---	• Jetty and training structure location and maintenance	---							No implementation in FY09.
Stockpiles (p. 2-49; Table 2-37, p. 2-49)	---	• Location of three future stock piles	---	7 7 6 6 4 3		a13.5, YDP, DPOC #1, S24 138, a252.6	None	None		Replenished six stockpile sites located at: a13.5, @DPOC #1 site, @ Yuma Desalting Plant, a252.6, c138, and S24 highway site.
Riprap Placement and Haul Roads (p. 2-50)	---	• Haul roads and riprap storage location and maintenance	---	7 6 6 4	--- --- --- ---	0-24 24 -43 0-0 43-49	None None None	0 0 0	1, 3, and 6 1, 3, and 6 1, 3, and 6	Road Mainetenance: Limitrophe Division Miles 64.2 Yuma Division-Miles 75.9 Gila River Area-Miles 20.2 Laguna Division-Miles 10

				4 4 3	--- --- ---	87-107 107-134 134-178 234-276	None None None	0 0 0	1, 3, and 6 1, 3, and 6 1, 3, and 6	Cibola Division-Miles 148 Palo Verde Division-Miles 112.2 Parker Division-Miles 133.8 Mohave Division -Miles 139.2
2.2.3.2 Major Federal Facilities and Miscellaneous Operation, Maintenance, and Replacement (p. 2-50; Table 2-36, after p. 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	---	777	DPOCs I, II, III, and Bypass canals Yuma Mesa Conduit Yuma Mesa, Yuma Valley, & South Gila wells	22-36 27.0 31.0-34.0	None None None	000	1, 3, and 6 1, 3, and 6 1, 3, and 6	DPOC I - Concrete lining repairs, 1/2 mile DPOC II - Replaced concrete panels DPOC III - Replaced road crossing Bypass canal - repaired canal road bankline YMC - Modified concrete valve box and repaired pump at the trifurcation structure Wells (South Gila) - Repaired pumps, electrical panels and misc fense repairs. Replaced lines ofr SG-1, SG-12, and SG-13
Maintenance Activities at the SIB (p. 2-52)	---	• Maintenance of facilities to provide flood flow capacity	---	7	SIB	---	None	0	1, 3, and 6	242 well field-repaired wells

2.2.3.3 Backwater Maintenance (p. 2-53; Table 2-37, p. 2-54)	---	• Backwater maintenance	---							No implementation in FY09.
Mohave Division (p. 2-55; Table 2-38, p. 2-56)	---	• Backwater maintenance	---							No implementation in FY09.
Parker Division (p. 2-57; Table 2-39, p. 2-57)	---	• Backwater maintenance	---	4						No implementation in FY09
Palo Verde Division (p. 2-58; Table 2-40, p. 2-58)	---	• Backwater maintenance	---	4	Palo Verde	110-120	None	0	1,3, and 6	Installed monitoring wells at the following backwaters inlet an doutlet areas: A7, C5, A10, and C10 located in the Palo Verde Division.
Cibola Division (p. 2-58; Table 2-41, p. 2-59)	---	• Backwater maintenance	---							No implementation in FY09.
Imperial Division (p. 2-59; Table 2-42, p. 2-59)	---	• Backwater maintenance	---							No implementation in FY09.
Laguna Division (p. 2-60; Table 2-43, p. 2-60)	---	• Backwater maintenance	---							No implementation in FY09.
Yuma Division (p. 2-60; Table 2-44, p. 2-61)	---	• Backwater maintenance	---							No implementation in FY09.
Limitrophe Division Mitigation Obligations (p. 2-61; Table 2-45, p. 2-62)	---	---	---							No implementation in FY09.
2.2.3.4 Limitrophe Division Maintenance (p. 2-62)	---	---	---							No implementation in FY09.

2.2.4 Future Non-Flow-Related Actions (p. 2-63)	---	---	---							
2.2.4.1 Topock Marsh (p. 2-63)	---	---	---							No implementation in FY09.
2.2.4.2 Laguna Reservoir (p. 2-63)	---	---	---							No implementation in FY09.
2.2.4.3 Bankline Maintenance - Unprotected Banklines (p. 2-65; Table 2-46, p. 2-66)	---	---	---							No implementation in FY09.
2.2.4.4 Proposed Jetties (p. 2-67; Table 2-48, p. 2-67)	---	---	---							No implementation in FY09.
2.3 WESTERN AREA POWER ADMINISTRATION			Maintenance for Davis - Mead 230 kV Transmision line							No implementation in FY09.
2.4 NATIONAL PARK SERVICE										
2.4.2 Riparian Habitat Restoration (p. 2-70)		• Riparian habitat restoration on Lake Mead and Lake Mohave			L. Mead L. Mohave L. Mead & Mohave		Athel Tree tobacoo Tall whitetop Puncturevine Fountain grass Sahara mustard Tamarisk	9,164 ac 23 ac 21.6 ac 0.1 ac 1,022 ac 1,022 ac 8.7 ac		Habitat restoration through removal of exotic plants (gross infested acres).
2.4.3 Fishery Management (p. 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			L. Mohave			0.5 ac		Creation of fish habitat at Princess Cove and Carp Cove, Lake Mohave. Partnership with NDOW.

2.4.4 Boating Access (p. 2-72)		• Maintenance and enhancement of boating access on Lake Mead and Lake Mohave			L. Mead			2,345 sq yds 1,650 sq yds 4,120 sq yds 2,741 sq yds 3,757 sq yds 1,256 sq yds		Existing launch ramps extended: Echo Bay Callville Bay Boulder Harbor Hemenway Harbor Temple Bar South Cover New low water launch ramp constructed at Calville Bay
2.5 BUREAU OF INDIAN AFFAIRS										
2.5.2.1 Ongoing Irrigation System Operation and Maintenance (p. 2-74)		• Irrigation system operation and maintenance for existing Irrigation Projects		3 3 4 6 7	Fort Mohave Cheme-huevi 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 (p. 2-77)		• Operation and maintenance of existing equipment								Continued existing practices.
2.5.2.4 Ongoing Wildland Fire Management (p. 2-88)		• Implementation of fuels management projects								No implementation in FY09.

2.5.2.5 Ongoing Woodland and Shoreline Maintenance (p. 2-82)		• Maintenance on Chemehuevi Woodlands Project								Continued existing practices.
2.5.3.1 Future Canal Lining (p. 2-84)		• Repair, reline, and line irrigation canals								No implementation in FY09.
2.5.3.2 Future Water Conservation Practices (p. 2-85)		• Installation, operation, and maintenance of new equipment								No implementation in FY09.
2.5.3.3 Future Farmland Development (p. 2-85)		• Develop additional agricultural acreage, including construction of irrigation systems								No implementation in FY09.
2.5.3.6 Future Wildland Fire Management (p. 2-88)		• Implementation of new fuels management projects								No implementation in FY09.
2.6 FISH AND WILDLIFE SERVICE										No Non-Flow-Related Actions are covered by the LCR MSCP.
2.7 BUREAU OF LAND MANAGEMENT										No Non-Flow-Related Actions are covered by the LCR MSCP.

APPENDIX B-3
Lower Colorado River Multi-Species Conservation Program
Non-Federal Covered Activities and Incidental Take Summary
Fiscal Year 2009

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] (p. 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] (p. 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 Ariz. Dept. 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 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 (p. 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	6	Yuma Valley	---	---	---	1 and 3	195 miles of canal maintenance and 60 miles of open drain maintenance.

	• 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							
2.2.3.1 Arizona Game and Fish Department Programs and Activities								
Vegetation and Habitat Management Programs (p. 2-8)	• Aquatic, wetland, and riparian habitat maintenance and restoration activities							No implementation in FY09.
Fish Surveys (p. 2-8)	• Surveys for Federally listed and nonnative fish species							10 nights and 8 days of largemouth bass electro-fishing surveys (Colorado River main channel, and associated reservoirs and backwaters), and 4 nights of trammel netting on Lake Havasu.
Fish Stocking (p. 2-9)	• Stocking of trout							One trout stocking of approximately 2000 fish at the La Paz County Park Lagoon.
Maintenance of Navigation Aids (p. 2-9)	• Place and maintain aids to navigation							195 buoys inspected and maintained.
Law Enforcement Patrol Activities (p. 2-9)	• Administer law enforcement and boating safety program using watercraft patrols							2,950 hours of water craft law enforcement on the Colorado River.
2.3 CALIFORNIA								
2.3.1 Ongoing Flow-Related Covered Activities[1] (p. 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] (p. 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 • The facilities and equipment through which electric power is generated and transmitted • The appurtenant works that support these facilities, including access and service roads, electric power and communication transmission lines and substations, docks, boat ramps, and bankline protection	4 6	Palo Verde Irrigation District Bard Water District	---	---	---	1 and 3 1 and 3	
2.4 NEVADA								
2.4.1 Ongoing Flow-Related Covered Activities[1] (p. 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] (p. 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 (p. 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 FY09.
2.4.3.1 Nevada Department of Wildlife Programs and Activities (p. 2-18)	Implementation of select Federally funded: • Aquatic, wetland, and riparian habitat maintenance and restoration activities • Aquatic, wetland, and riparian revegetation enhancement activities • Place and maintain aids to navigation and boating access	--- --- 3	--- --- Clark County, down-stream of Davis Dam	--- --- 257.5-275.0	--- --- None	--- --- 0	--- --- 1 and 3	A total of 59 habitat modules were placed on approximately 5.0 acres at Carp, Box, Shoshone, and Arrowhead Coves on Lake Mohave. Cooperative project with NPS and AGFD. No implementation in FY09. 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

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United States Department of the Interior

U.S. Fish and Wildlife Service
Arizona Ecological Services Field 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 24, 2009

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 2008 Accomplishment Report and Consistency Review of Fiscal Year 2010 Work Plan and Budget

This responds to your memorandum of August 17, 2009, requesting review by the Fish and Wildlife Service (FWS) of the combined document containing the Fiscal Year 2008 Accomplishment Report and the Fiscal Year 2010 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 2008 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 2008 covered by the LCR MSCP (October 1, 2007-September 31, 2008), including the measurement of incidental take that occurred during this period. We have reviewed the information provided and conclude that the document meets the requirements for the annual report for the LCR MSCP under the section 10(a)(1)(A) permit and the incidental take section of the biological and conference opinion. All covered actions and activities and implementation of the Conservation Plan are suitably described and documented.

Also contained in the Accomplishment Report is an accounting of funds expended by Reclamation and project proponents during Fiscal Year 2008 that would be credited to the cost of LCR MSCP implementation. The FWS concurs with the amounts included on page 3, Table 1-1b, for a credit to Reclamation of $876,667.00, San Diego County Water Authority of $3,298,070.00, and The Metropolitan Water District of Southern California of $1,826,895.00 against future expenditures.

The Fiscal Year 2010 Work Plan and Budget contains the work tasks and estimated costs for LCR MSCP implementation during Fiscal Year 2010 beginning on October 1, 2009. 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 (602) 242-0210 (x236) or me (x244).

Deldon T. Bill
for 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

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Appendix D. LCR MSCP Closed Work Tasks

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Work Task		FY Closed	Total Accomplishment
A	**Pre FY09**		
G2	Annual Report Writing and Production (transferred from G2)	FY07	$165,789.34
B	**Pre FY09**		
B9	Boulder City Wetland Ponds	FY05	$4,370.00
C	**Pre FY09**		
C1	Brown-Headed Cowbird Trap Assessment	FY06	$125,989.00
C17	Senator Wash Razorback Sucker Stock Assessment	FY05	$45,000.00
C18	Point Count Design and Sample Size Evaluation	FY05	$49,920.00
C19	Southwestern Willow Flycatcher Feather Colorimetry	FY05	$20,970.00
C20	Southwestern Willow Flycatcher Prey Base Study	FY05	$104,981.00
C21	Yellow Billed Cuckoo Demographics Study	FY05	$112,964.00
C22	Yellow Billed cuckoo Survey's Demographic Study and Survey Protocol Evaluation	FY05	$50,971.00
C6	Insect Population Biology in Riparian Restoration	FY07	$101,441.00
C9	Razorback Sucker and Bonytail Pen Rearing Tests	FY07	$111,040.00
C16	Evaluation of Past Bonytail Stockings	FY07	$55,333.00
	Pre FY09 Total		**$778,609.00**
C	**FY09**		
C23	Evaluation of Remote Sensing Techniques for PIT-Tagged Fish	FY09	$358,138.21
	Cumulative Total Closed C Work Tasks		**$1,136,747.21**
D	**Pre FY09**		
D11	Vegetation Type Mapping	FY05	$725,873.00
D4	Southwestern Willow Flycatcher Habitat Monitoring	FY08	$277,041.41
	Pre FY09 Total		**$1,002,914.41**
D	**FY09**		
D4	Southwestern Willow Flycatcher Habitat Monitoring - Adjustment		$780.62
	Cumulative Total Closed D Work Tasks		**$1,003,695.03**
E	**Pre FY09**		
E10	Walker Lake	FY05	$0.00

E11	Draper Lake	FY05	$0.00
E19	Needles-Topock (AZ RM 240) Stabilization	FY05	$0.00
E20	Pintail Slough	FY05	$95,000.00
E22	Pratt Agricultural Lease	FY05	$5,088.00
E23	Mittry Lake Fire Rehabilitation Project	FY05	$0.00
E12	Butler Lake	FY07	$121,350.00
E13	McAllister Lake	FY07	$172,474.00
E-6	Cottonwood Genetics Study	FY07	$259,405.00
E-7	Mass Transplanting Demonstration	FY07	$329,235.55
	Pre FY09 Total		**$982,552.55**
E	**FY09**		
E8	Seed Feasibility Study	FY09	$859,825.69
E26	Headquarters Lake	FY08	$147.62
	Cumulative Total Closed E Work Tasks		**$1,842,378.24**

Notes: D10 System Monitoring and Studies on Small Mammal Populations was reopened in FY11.

Appendix E. Financial Statement

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E-1. Required Contributions

	FY06	FY07	FY08	FY09	Total
Reclamation					
Cash	6,072,381.00	6,291,054.00	6,655,509.00	6,784,470.00	25,803,414.00
Total	**6,072,381.00**	**6,291,054.00**	**6,655,509.00**	**6,784,470.00**	**25,803,414.00**
Arizona					
Cash	471,863.10	488,855.40	517,175.90	866,420.50	2,344,314.90
Habitat Maintenance	135,375.00	140,250.00	148,375.00	151,250.00	575,250.00
Total	**607,238.10**	**629,105.40**	**665,550.90**	**1,017,670.50**	**2,919,564.90**
Nevada					
Cash	1,838,148.82	1,904,342.55	2,014,665.43	1,884,091.00	7,641,247.80
Habitat Maintenance	135,375.00	140,250.00	148,375.00	151,250.00	575,250.00
Total	**1,973,523.82**	**2,044,592.55**	**2,163,040.43**	**2,035,341.00**	**8,216,497.80**
California					
Cash	**3,220,869.10**	**3,336,856.05**	**3,530,167.67**	**3,266,131.22**	**13,354,024.04**
MWD	1,887,361.54	1,955,327.46	2,068,604.00	1,939,074.72	7,850,367.74
IID	500,971.43	519,011.96	549,079.48	559,718.78	2,128,781.65
CVWD	273,257.15	283,097.43	299,497.92	305,301.15	1,161,153.65
LADWP	154,845.72	160,421.88	169,715.48	173,003.99	657,987.07
SDCWA	145,737.14	150,985.30	159.732.19	0	296,722.44
PVID	122,067.53	126,463.31	133,789.60	136,382.00	518,702.44
SCPPA	63,760.00	66,056.07	69,882.84	71,236.94	270,935.85
SCE	54,651.43	56,619.49	59,899.60	61,060.23	232,230.75
Bard	6,072.38	6,291.05	6,655.52	6,784.47	25,803.42
CRBC	6,072.38	6,291.05	6,655.52	6,784.47	25,803.42
Needles	6,072.38	6,291.05	6,655.52	6,784.47	25,803.42
Funding Credit					
SDCWA	**0**	**0**	**0**	**162,827.28**	**162,827.28**
Habitat Maintenance	**270,750.00**	**280,500.00**	**296,750.00**	**302,500.00**	**1,150,500.00**
Total	**3,491,619.10**	**3,617,356.05**	**3,826,917.67**	**3,731,458.50**	**14,667,351.32**
TOTAL	**12,144,762.02**	**12,582,108.00**	**13,311,018.00**	**13,568,940.00**	**51,606,828.02**

E-2. Funding Credits

San Diego County Water Authority:

Credits Earned

FY	Credits Earned	Composite i	2003 Dollars	Total 2003 Dollars
2005	145,737.14	1.019	143,019.76	143,019.76
2006	500,000	1.083	461,680.51	604,700.27
2007	250,000	1.122	222,816.39	827,516.66
2008	3,298,069.94	1.187	2,778,491.95	3,606,008.61

Credits Used

FY	Total 2003 Credits Available	2003 Credits Used	Composite i	Current Year Credits
2009	3,606,008.42	134,568.00	1.210	162,827.28
2010	3,471,440.42			

The Metropolitan Water District:

Credits Earned

FY	Credits Earned	Composite i	2003 Dollars	Total 2003 Dollars
2008	1,834,768.57	1.187	1,545,719.10	1,545,719.10

Bureau of Reclamation:

Credits Earned

FY	Credits Earned	Composite i	2003 Dollars	Total 2003 Dollars
2004	3,381,440.00	1.000	3,381,440.00	3,381,440.00
2005	5,980,712.00	1.019	5,869,197.20	9,250,637.20
2006	506,149.00	1.083	467,358.26	9,717,995.40
2007	3,869,537.00	1.122	3,448,785.20	13,166,780.60
2008	876,677.00	1.187	738,565.29	13,905,345.89
2009	1,170,697.00	1.210	967,518.18	14,872,864.10

Appendix F. Reports Published in FY09

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These reports are available on the LCR MSCP Web site

Work Task	**Report Title**
C2:	Report on *Astragalus geyeri* var. *triquetrus* (threecorner milkvetch) and *Eriogonum viscidulum* (sticky buckwheat) within Lake Mead National Recreation Area
C10:	Effects of Disease Treatments on Growth of Razorback Sucker
C11:	Passive Integrated Transponders in *Gila elegans*: Location, Retention, Stress, and Mortality
C13:	Razorback Sucker Studies on Lake Mead, Nevada and Arizona 2007-2008 Annual Report
D1:	Marsh Bird Surveys — 2007
D2:	Southwestern Willow Flycatcher Surveys, Demography and Ecology along the Lower Colorado River and Tributaries, 2008. Annual Report
D5:	Final Report for the Operation of Two Monitoring Avian Production and Survivorship (MAPS) Stations on the Lower Colorado River, 2006 Breeding Season
D5:	Monitoring Avian Production and Survivorship (MAPS) Stations on the Lower Colorado River, 2007 Breeding Season
D5:	Winter Bird Monitoring Using Constant Effort Mist-Netting at Three Sites along the Lower Colorado River 2005-2006
D5:	Winter Bird Monitoring Using Constant Effort Mist Netting at Two Sites along the Lower Colorado River 2006-2007
D6:	Lower Colorado River Riparian Bird Surveys, 2007
D6:	Annual Report on the Lower Colorado River Riparian Bird Surveys, 2008
D6:	Lake Mead Delta Bird Surveys 2002-2006

D7:	Yellow-Billed Cuckoo Distribution, Abundance, and Habitat Use Along the Lower Colorado and Tributaries, 2006 Annual Report
D7:	Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use Along the Lower Colorado River and its Tributaries, 2007 Annual Report
D7:	Yellow-billed Cuckoo Distribution, Abundance and Habitat Use on the Lower Colorado River and Tributaries, 2008 Annual Report
E3:	‘Ahakhav Tribal Preserve Re-vegetation Research and Development Project: Annual Report 2006
E4:	Palo Verde Ecological Reserve Restoration Development Plan: Phase 4
E4:	Palo Verde Ecological Reserve Restoration Development and Monitoring Plan: Phase 5
E9:	Hart Mine Marsh Conservation Area Restoration Development and Monitoring Plan
E16:	Screening and Evaluation of Potential Conservation Areas: October 2008 Trip Reports
E24:	Cibola National Wildlife Refuge Unit 1 Conservation Area Restoration Development and Monitoring Plan: Phase 1
E24:	Cibola NWR Unit 1 Conservation Area 2007 Annual Monitoring Report
E25:	Site Improvement Plan for the Boy Scout Property, Laughlin, Nevada
E25:	Big Bend Conservation Area Restoration Development and Monitoring Plan: Overview
F1:	Riparian Habitat Monitoring at the Cibola NWR Nature Trail Site: 2006
F3:	Small Mammal Colonization at Habitat Creation Sites along the Lower Colorado River: 2007
F4:	Post-Development Bat Monitoring of Habitat Creation Areas along the Lower Colorado River – 2007 Acoustic Surveys

F4: 2007 Preliminary Results for the Capture of Bats at Riparian Habitat Creation Sites along the Lower Colorado River

F4: Lower Colorado River Bat Monitoring Protocol

G3: Techniques for Monitoring Razorback Sucker in the Lower Colorado River, Hoover to Parker Dams, 2006–2007, Final Report