



# Lower Colorado River Multi-Species Conservation Program

*Balancing Resource Use and Conservation*

## Final Implementation Report, Fiscal Year 2010 Work Plan and Budget, Fiscal Year 2008 Accomplishment Report



June 2009

# 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  
The Cocopah Indian Tribe

### Conservation Participant Group

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



# **Lower Colorado River Multi-Species Conservation Program**

## **Final Implementation Report, Fiscal Year 2010 Work Plan and Budget, Fiscal Year 2008 Accomplishment Report**

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

**June 2009**

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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
U of A	University of Arizona
UCD	University of California, Davis
USFWS	U.S. Fish and Wildlife Service
USGS	United States 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 responding to the need to balance the use of Lower Colorado River (LCR) water resources and the conservation of native species and their habitats in compliance with the Endangered Species Act (ESA). This is a long-term 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 (50-year) 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 sucker (RASU) and 620,000 bonytail (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 at <http://www.lcrmscp.gov>.

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. 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 FY08, a summary of work underway during FY09, and proposed work to be performed during FY10. It also documents research and monitoring activities undertaken in support of the LCR MSCP. Incidental Take for covered actions implemented during FY08 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 Lower Colorado River Multi-Species Conservation Program**

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

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	\$1,826,895	\$0	The Metropolitan Water District of Southern California

\*Credits/Deficits are shown in current fiscal year dollars and will be adjusted for inflation when applied to a future funding obligation or repayment occurs.

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**

<b>Fiscal Year</b>	<b>Required Federal Funding</b>	<b>Required Non-Federal Funding</b>	<b>Total Required Funding</b>	<b>Program Accomplishment</b>	<b>Cumulative Program Accomplishment</b>
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
				<b>Total:</b>	<b>\$55,158,120</b>

### **FY10 Contributions and Adjustments**

As outlined in Table 1-1a, the annual funding commitment for FY10 is \$11,214,000, based on the 2003 estimate, and \$14,510,916 after the Composite Inflation Index of 1.294 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 FY10 are shown below. Section 8.3 of the FMA allows for adjusted non-Federal funding during the first 10 years of the program. The FY10 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. FY10 Contribution Schedule**

<b>Funding Entity</b>	<b>FY10 Contributions</b>	<b>FY10 Adjusted Contributions</b>
<b>Federal:</b>	<b>\$7,255,458.00</b>	<b>\$7,255,458.00</b>
<b>Non-Federal:</b>	<b>\$7,255,458.00</b>	<b>\$7,255,458.00</b>
<i>California</i>	<i>\$3,627,729.00</i>	<i>\$3,990,501.90</i>
<i>Arizona</i>	<i>\$1,813,864.50</i>	<i>\$1,088,318.70</i>
<i>Nevada</i>	<i>\$1,813,864.50</i>	<i>\$2,176,637.40</i>
<b>Total:</b>	<b>\$14,510,916.00</b>	<b>\$14,510,916.00</b>

## 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, Reclamation withdrew \$159,732.19 from SDCWA and \$435,742.00 from Metropolitan for implementation of the 2001 BO activities. These amounts were part of their FY08 LCR MSCP required funding contribution. In addition, Reclamation withdrew an additional \$3,298,069.94 from SDCWA's account and \$1,826,895.33 from Metropolitan's account. In FY08, requirements under the 2001 BO specifically related to the Secretarial Implementation Agreement (SIA) were completed and the remaining funds were withdrawn. While the FY08 LCR MSCP required funding is not a credit, the additional funding is a credit as shown in Table 1-1b.

## 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 account for the benefit of implementing the LCR MSCP. Table 1-3 provides total funds contributed through FY08 with interest, FY09 contributions, and FY10 projected contributions. No funds have been withdrawn from any of the accounts to date.

**Table 1-3. Existing Habitat Maintenance Fund**

Funding Partner	FY08 Contributions	Cumulative through 2008*	FY09 Contribution	FY10 Projected Contribution
California:	\$296,750	\$992,503.27	\$302,500	\$323,500
Arizona:	\$148,375	\$444,052.83	\$151,250	\$161,750
Nevada:	\$148,375	\$457,265.11	\$151,250	\$161,750
<b>Total:</b>	<b>\$593,500</b>	<b>\$1,893,821.21</b>	<b>\$605,000</b>	<b>\$647,000</b>

\*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 FY08.

### **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 FY10 Program and FY08 Accomplishment**

The minimum funding required in the LCR MSCP program documents for FY10 is \$14,510,916. Reclamation is proposing an annual program budget totaling \$20,729,810, as shown in Table 1-4. Table 1-5 shows by work task: FY08 estimates and actual accomplishment, cumulative program accomplishment (FY04-FY08), FY09 approved program, FY10 proposed program, and out-year funding for FY11 and FY12. Out-year funding estimates are not adjusted for future inflation.

**Table 1-4. FY10 Proposed Program Funding**

<b>Program Area</b>	<b>FY10 Funding</b>
Program Administration	\$1,313,220
Fish Augmentation	\$1,390,000
Species Research	\$2,972,000
System Monitoring	\$2,345,000
Conservation Area Development and Management	\$10,127,590
Post-Development Monitoring	\$885,000
Adaptive Management Program	\$1,000,000
Existing Habitat Maintenance	\$647,000
Public Involvement	\$50,000
<b>Total:</b>	<b>\$20,729,810</b>

Reclamation will ensure the minimum program accomplishment occurs that meets the Indexed Annual Contribution outlined in Table 1-1a of \$14,510,916; however, Reclamation is presenting work tasks totaling \$20,729,810 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 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 FY10, 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 FY11 or FY12, 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 FY08, Reclamation estimated work tasks totaling \$14,947,500. Actual LCR MSCP costs for FY08 were \$15,797,674.77. In accordance with the FMA, Reclamation received a credit of \$876,677 for FY08. The SDCWA received a credit for FY08 in the amount of \$3,298,069.94, and MWD received a credit in FY08 in the amount of \$1,826,895.33 (Tables 1-1b and 1-1c).

**Table 1-5. Annual Funding Matrix**

<b>Work Task</b>	<b>Name</b>	<b>FY2008 Estimate</b>	<b>FY2008 Actual Accomplishment<sup>1</sup></b>	<b>Cumulative Through FY2008</b>	<b>FY2009 Approved Estimate</b>	<b>FY2010 Proposed Estimate</b>	<b>FY2011 Projected Estimate<sup>2</sup></b>	<b>FY2012 Projected Estimate<sup>2</sup></b>
<b>A</b>	<b>Program Administration</b>							
A-1	Program Administration	\$1,187,000.00	\$965,406.01	\$3,585,517.01	\$1,231,780.00	\$1,313,220.00	\$1,313,220.00	\$1,313,220.00
Closed <sup>3</sup>	Work Tasks Pre-FY08		\$254.34	\$254.34				
		<b>\$1,187,000.00</b>	<b>\$965,660.35</b>	<b>\$3,585,771.35</b>	<b>\$1,231,780.00</b>	<b>\$1,313,220.00</b>	<b>\$1,313,220.00</b>	<b>\$1,313,220.00</b>
<b>B</b>	<b>Fish Augmentation</b>							
B-1	Lake Mohave Razorback Sucker Larvae Collection	\$200,000.00	\$149,085.82	\$810,319.82	\$200,000.00	\$200,000.00	\$200,000.00	\$200,000.00
B-2	Willow Beach National Fish Hatchery	\$235,000.00	\$334,013.77	\$953,847.77	\$350,000.00	\$250,000.00	\$250,000.00	\$250,000.00
B-3	Achii Hanyo Rearing Station	\$50,000.00	\$102,288.46	\$257,067.46	\$170,000.00	\$100,000.00	\$100,000.00	\$100,000.00
B-4	Dexter National Fish Hatchery	\$130,000.00	\$140,519.61	\$507,846.61	\$250,000.00	\$180,000.00	\$180,000.00	\$150,000.00
B-5	Bubbling Ponds Fish Hatchery	\$235,000.00	\$303,301.12	\$818,678.12	\$335,000.00	\$250,000.00	\$250,000.00	\$250,000.00
B-6	Lake Mead Fish Hatchery	\$50,000.00	\$48,190.46	\$202,557.46	\$50,000.00	\$50,000.00	\$50,000.00	\$50,000.00
B-7	Lakeside Rearing Ponds	\$175,000.00	\$173,950.09	\$745,591.09	\$175,000.00	\$150,000.00	\$150,000.00	\$150,000.00
B-8	Fish Tagging Equipment	\$75,000.00	\$66,890.83	\$307,933.83	\$75,000.00	\$75,000.00	\$75,000.00	\$75,000.00
B-10	Uvalde National Fish Hatchery	\$60,000.00	\$74,191.86	\$391,313.86	\$60,000.00	\$85,000.00	\$100,000.00	\$100,000.00
B-11	Overton Wildlife Management Area	\$75,000.00	\$16,879.79	\$123,593.79	\$175,000.00	\$50,000.00	\$50,000.00	\$50,000.00
Closed <sup>3</sup>	Work Tasks Pre-FY08	\$0.00	\$0.00	\$4,370.00	\$0.00	\$0.00	\$0.00	\$0.00
		<b>\$1,285,000.00</b>	<b>\$1,409,311.81</b>	<b>\$5,123,119.81</b>	<b>\$1,840,000.00</b>	<b>\$1,390,000.00</b>	<b>\$1,405,000.00</b>	<b>\$1,375,000.00</b>

Work Task	Name	FY2008 Estimate	FY2008 Actual Accomplishment <sup>1</sup>	Cumulative Through FY2008	FY2009 Approved Estimate	FY2010 Proposed Estimate	FY2011 Projected Estimate <sup>2</sup>	FY2012 Projected Estimate <sup>2</sup>
<b>C</b>	<b>Species Research</b>							
C-2	Sticky Buckwheat and Threecorner Milkvetch...	\$11,000.00	\$10,000.00	\$30,000.00	\$11,000.00	\$11,000.00	\$11,000.00	\$11,000.00
C-3	MSCP Covered Species Profile Development	\$15,000.00	\$4,637.56	\$248,777.56	\$15,000.00	\$15,000.00	\$15,000.00	\$15,000.00
C-4	Relict Leopard Frog	\$11,000.00	\$12,667.29	\$38,576.29	\$11,000.00	\$11,000.00	\$11,000.00	\$11,000.00
C-5	Effects of Abiotic Factors on Insect Populations...	\$90,000.00	\$82,971.14	\$138,981.14	\$90,000.00	\$90,000.00	\$90,000.00	\$0.00
C-7	Survey and Habitat Characterization for MacNeill's Sootywing	\$160,000.00	\$88,573.21	\$359,180.21	\$145,000.00	\$80,000.00	\$0.00	\$0.00
C-8	Razorback Sucker Survival Studies	\$205,000.00	\$190,297.91	\$797,002.91	\$25,000.00	\$0.00	\$0.00	\$0.00
C-10	Razorback Sucker Growth Studies	\$125,000.00	\$159,000.24	\$328,901.24	\$125,000.00	\$125,000.00	\$125,000.00	\$25,000.00
C-11	Bonytail Rearing Study	\$165,000.00	\$128,801.82	\$366,763.82	\$165,000.00	\$165,000.00	\$165,000.00	\$50,000.00
C-12	Demographics... of Repatriated Razorback Suckers...	\$215,000.00	\$174,728.02	\$532,990.02	\$200,000.00	\$200,000.00	\$200,000.00	\$0.00
C-13	Lake Mead Razorback Sucker	\$150,000.00	\$147,816.23	\$813,503.23	\$150,000.00	\$300,000.00	\$300,000.00	\$300,000.00
C-14	Humpback Chub Program Support	\$10,000.00	\$0.00	\$38,297.00	\$200,000.00	\$70,000.00	\$60,000.00	\$20,000.00
C-15	Flannelmouth Sucker Habitat...	\$80,000.00	\$81,892.97	\$324,810.97	\$80,000.00	\$80,000.00	\$25,000.00	\$0.00
C-23	Evaluation of Remote Sensing Techniques...	\$145,000.00	\$148,207.26	\$287,152.26	\$60,000.00	\$0.00	\$0.00	\$0.00

Work Task	Name	FY2008 Estimate	FY2008 Actual Accomplishment <sup>1</sup>	Cumulative Through FY2008	FY2009 Approved Estimate	FY2010 Proposed Estimate	FY2011 Projected Estimate <sup>2</sup>	FY2012 Projected Estimate <sup>2</sup>
C-24	Avian Species Habitat...	\$150,000.00	\$86,935.13	\$86,935.13	\$375,000.00	\$200,000.00	\$200,000.00	\$150,000.00
C-25	Imperial Ponds Native Fish...	\$225,000.00	\$210,841.42	\$210,841.42	\$225,000.00	\$235,000.00	\$250,000.00	\$250,000.00
C-26	Raceway Rearing of Razorback Sucker...	\$100,000.00	\$621.85	\$621.85	\$100,000.00	\$70,000.00	\$70,000.00	\$0.00
C-27	Small Mammal Population Studies	\$65,000.00	\$93,190.68	\$93,190.68	\$65,000.00	\$35,000.00	\$0.00	\$0.00
C-28	Nest Predation Effects of Riparian Bird Species	\$0.00	\$0.00	\$0.00	\$145,000.00	\$25,000.00	\$0.00	\$0.00
C-29	Age...of Reach 3 Razorback Sucker Population	\$0.00	\$0.00	\$0.00	\$125,000.00	\$125,000.00	\$35,000.00	\$0.00
C-30	Measures to Reduce Transport of Quagga Mussel	\$0.00	\$0.00	\$0.00	\$100,000.00	\$70,000.00	\$25,000.00	\$0.00
C-31	Razorback Sucker Genetic Diversity Assessment	\$0.00	\$0.00	\$0.00	\$125,000.00	\$125,000.00	\$125,000.00	\$125,000.00
C-32	Salinity, Temperature, and Oxygen Limits for Bonytail and Razorback ...	\$0.00	\$0.00	\$0.00	\$85,000.00	\$85,000.00	\$125,000.00	\$150,000.00
C-33	Survival of 500-mm Razorback Sucker Released in Reach 3	\$0.00	\$0.00	\$0.00	\$75,000.00	\$75,000.00	\$175,000.00	\$175,000.00
C-34	Zooplankton Communities in Off-channel Native Fish Habitats	\$0.00	\$0.00	\$0.00	\$60,000.00	\$60,000.00	\$60,000.00	\$0.00
C-35	Western Bats Roosting Characteristics	\$0.00	\$0.00	\$0.00	\$0.00	\$50,000.00	\$150,000.00	\$150,000.00

Work Task	Name	FY2008 Estimate	FY2008 Actual Accomplishment <sup>1</sup>	Cumulative Through FY2008	FY2009 Approved Estimate	FY2010 Proposed Estimate	FY2011 Projected Estimate <sup>2</sup>	FY2012 Projected Estimate <sup>2</sup>
C-36	Elf Owl Detectability	\$0.00	\$0.00	\$0.00	\$0.00	\$50,000.00	\$150,000.00	\$150,000.00
C-37	Hydrology and Soil Conditioning Avian Riparian Species	\$0.00	\$0.00	\$0.00	\$0.00	\$150,000.00	\$250,000.00	\$250,000.00
C-38	Stable Isotope and Microchemistry Analyses of Fin Rays...	\$0.00	\$0.00	\$0.00	\$0.00	\$80,000.00	\$80,000.00	\$35,000.00
C-39	Post Stocking Distribution and Survival of Bonytail in Reach 3	\$0.00	\$0.00	\$0.00	\$0.00	\$90,000.00	\$220,000.00	\$235,000.00
C-40	Genetic and Demographic Studies ... of RASU and BONY in Off-Channel Habitats	\$0.00	\$0.00	\$0.00	\$0.00	\$75,000.00	\$180,000.00	\$180,000.00
C-41	Role of Artificial Habitat in Survival of RASU and BONY	\$0.00	\$0.00	\$0.00	\$0.00	\$25,000.00	\$75,000.00	\$75,000.00
C-42	... Soil Amendments for Use in Restoration Sites	\$0.00	\$0.00	\$0.00	\$0.00	\$200,000.00	\$200,000.00	\$200,000.00
Closed <sup>3</sup>	Work Tasks Pre-FY08	\$0.00	-\$2,110.00	\$778,609.00				
		<b>\$1,922,000.00</b>	<b>\$1,619,072.73</b>	<b>\$5,475,134.73</b>	<b>\$2,757,000.00</b>	<b>\$2,972,000.00</b>	<b>\$3,372,000.00</b>	<b>\$2,557,000.00</b>
<b>D</b>	<b>System Monitoring</b>							
D-1	Marsh Bird Surveys	\$35,000.00	\$20,146.27	\$118,830.27	\$35,000.00	\$35,000.00	\$35,000.00	\$35,000.00
D-2	Southwestern Willow Flycatcher Surveys	\$575,000.00	\$621,896.84	\$3,170,326.84	\$690,000.00	\$650,000.00	\$700,000.00	\$700,000.00

Work Task	Name	FY2008 Estimate	FY2008 Actual Accomplishment <sup>1</sup>	Cumulative Through FY2008	FY2009 Approved Estimate	FY2010 Proposed Estimate	FY2011 Projected Estimate <sup>2</sup>	FY2012 Projected Estimate <sup>2</sup>
D-3	Southwestern Willow Flycatcher Habitat Monitoring	\$90,000.00	\$81,286.79	\$387,964.79	\$90,000.00	\$90,000.00	\$95,000.00	\$95,000.00
D-4	Southwestern Willow Flycatcher Survey - Hualapai Tribal Lands	\$78,000.00	\$75,233.41	\$277,041.41	\$0.00	\$0.00	\$0.00	\$0.00
D-5	Monitoring Avian Productivity...	\$300,000.00	\$254,903.38	\$1,032,638.38	\$300,000.00	\$250,000.00	\$300,000.00	\$300,000.00
D-6	System Monitoring for Riparian Obligate Avian Species	\$135,000.00	\$124,050.07	\$460,784.07	\$135,000.00	\$210,000.00	\$210,000.00	\$210,000.00
D-7	Yellow-Billed Cuckoo Surveys	\$500,000.00	\$526,687.60	\$1,431,627.60	\$540,000.00	\$540,000.00	\$550,000.00	\$550,000.00
D-8	Razorback Sucker and Bonytail Stock Assessment	\$300,000.00	\$339,719.60	\$1,144,964.60	\$350,000.00	\$400,000.00	\$450,000.00	\$450,000.00
D-9	... Covered Bat Species	\$100,000.00	\$101,177.29	\$345,896.29	\$130,000.00	\$150,000.00	\$150,000.00	\$150,000.00
D-12	Lowland Leopard Frog and Colorado River Toad Surveys	\$0.00	\$0.00	\$0.00	\$0.00	\$20,000.00	\$150,000.00	\$150,000.00
Closed <sup>3</sup>	Work Tasks Pre-FY08	\$0.00	\$5,369.81	\$778,070.81				
		<b>\$2,113,000.00</b>	<b>\$2,150,471.06</b>	<b>\$9,148,145.06</b>	<b>\$2,270,000.00</b>	<b>\$2,345,000.00</b>	<b>\$2,640,000.00</b>	<b>\$2,640,000.00</b>
<b>E</b>	<b>Conservation Area Development and Management</b>							
E-1	Beal Lake Riparian	\$150,000.00	\$120,026.35	\$2,216,561.35	\$180,000.00	\$130,000.00	\$180,000.00	\$180,000.00
E-2	Beal Lake Native Fish	\$50,000.00	\$26,446.69	\$603,183.69	\$70,000.00	\$50,000.00	\$50,000.00	\$50,000.00
E-3	Ahakhav Tribal Preserve	\$145,000.00	\$65,565.30	\$1,295,295.30	\$145,000.00	\$241,000.00	\$250,000.00	\$250,000.00

Work Task	Name	FY2008 Estimate	FY2008 Actual Accomplishment <sup>1</sup>	Cumulative Through FY2008	FY2009 Approved Estimate	FY2010 Proposed Estimate	FY2011 Projected Estimate <sup>2</sup>	FY2012 Projected Estimate <sup>2</sup>
E-4	Palo Verde Ecological Preserve	\$1,185,000.00	\$828,982.19	\$2,268,701.19	\$1,250,000.00	\$1,683,000.00	\$1,800,000.00	\$2,174,000.00
E-5 <sup>4</sup>	Cibola Valley Conservation Area	\$1,703,000.00	\$3,611,928.60	\$8,419,959.60	\$1,000,000.00	\$1,300,000.00	\$1,100,000.00	\$1,300,000.00
E-6	Cottonwood Genetics Study	\$15,000.00	\$0.00	\$259,405.00	\$0.00	\$0.00	\$0.00	\$0.00
E-7	Mass Transplanting Demonstration	\$15,000.00	\$4,410.55	\$329,235.55	\$0.00	\$0.00	\$0.00	\$0.00
E-8	Seed Feasibility Study	\$65,000.00	\$163,444.58	\$727,436.58	\$210,000.00	\$0.00	\$0.00	\$0.00
E-9	Hart Mine Marsh	\$250,000.00	\$182,393.19	\$438,337.19	\$3,125,000.00	\$2,380,000.00	\$500,000.00	\$300,000.00
E-14	Imperial Ponds Cons. Area	\$974,000.00	\$965,430.09	\$6,374,862.09	\$483,000.00	\$651,840.00	\$465,840.00	\$453,840.00
E-15	Backwater Site Selection	\$387,000.00	\$433,665.01	\$1,120,797.01	\$209,000.00	\$640,750.00	\$849,750.00	\$497,500.00
E-16	Conservation Area Site Selection	\$200,000.00	\$234,994.34	\$631,021.34	\$200,000.00	\$360,000.00	\$360,000.00	\$360,000.00
E-17	Topock Marsh...	\$5,000.00	\$10,480.66	\$16,364.66	\$5,000.00	\$10,000.00	\$70,000.00	\$70,000.00
E-18	Law Enforcement and Fire Suppression	\$25,000.00	\$25,218.68	\$27,594.68	\$200,000.00	\$250,000.00	\$325,000.00	\$325,000.00
E-21 <sup>5</sup>	Planet Ranch	\$0.00	-\$802.38	\$19,197.62	\$50,000.00	\$100,000.00	\$9,300,000.00	\$1,500,000.00
E-24	Cibola NWR Unit #1	\$1,213,000.00	\$1,075,422.08	\$1,131,379.08	\$1,072,000.00	\$1,236,000.00	\$1,700,000.00	\$1,500,000.00
E-25	Big Bend Cons. Area	\$0.00	\$0.00	\$0.00	\$80,000.00	\$500,000.00	\$500,000.00	\$75,000.00
E-26	Headquarters Lake	\$0.00	\$0.00	\$0.00	\$265,000.00	\$0.00	\$0.00	\$0.00
E-27	Laguna Division Cons. Area	\$0.00	\$0.00	\$0.00	\$0.00	\$150,000.00	\$300,000.00	\$5,000,000.00
E-28	Yuma East Wetland	\$0.00	\$0.00	\$0.00	\$0.00	\$250,000.00	\$250,000.00	\$250,000.00
E-29	Desert Tortoise	\$0.00	\$0.00	\$0.00	\$0.00	\$195,000.00	\$50,000.00	\$50,000.00
Closed <sup>3</sup>	Work Tasks Pre-FY08	\$0.00	\$110.00	\$393,912.00				
		<b>\$6,382,000.00</b>	<b>\$7,747,715.93</b>	<b>\$26,273,243.93</b>	<b>\$8,544,000.00</b>	<b>\$10,127,590.00</b>	<b>\$18,050,590.00</b>	<b>\$14,335,340.00</b>

Work Task	Name	FY2008 Estimate	FY2008 Actual Accomplishment <sup>1</sup>	Cumulative Through FY2008	FY2009 Approved Estimate	FY2010 Proposed Estimate	FY2011 Projected Estimate <sup>2</sup>	FY2012 Projected Estimate <sup>2</sup>
<b>F</b>	<b>Post-Development Monitoring</b>							
F-1	Habitat Monitoring	\$325,000.00	\$305,647.09	\$967,301.09	\$350,000.00	\$350,000.00	\$425,000.00	\$425,000.00
F-2	Avian Use of Habitat Creation Sites	\$150,000.00	\$157,021.22	\$406,609.22	\$150,000.00	\$170,000.00	\$170,000.00	\$170,000.00
F-3	Small Mammal Colonization of Restoration Sites	\$55,000.00	\$33,109.48	\$100,908.48	\$55,000.00	\$55,000.00	\$55,000.00	\$55,000.00
F-4	Monitoring of Covered Bat Species	\$70,000.00	\$93,145.13	\$163,043.13	\$90,000.00	\$110,000.00	\$110,000.00	\$110,000.00
F-5	Monitoring of Fish Restoration Sites	\$130,000.00	\$137,912.88	\$179,486.88	\$150,000.00	\$150,000.00	\$200,000.00	\$200,000.00
F-6	Monitoring of MacNeill's Sootywing...	\$0.00	\$0.00	\$0.00	\$10,000.00	\$50,000.00	\$50,000.00	\$50,000.00
		<b>\$730,000.00</b>	<b>\$726,835.80</b>	<b>\$1,817,348.80</b>	<b>\$805,000.00</b>	<b>\$885,000.00</b>	<b>\$1,010,000.00</b>	<b>\$1,010,000.00</b>
<b>G</b>	<b>Adaptive Management Program</b>							
G-1	Data Management	\$450,000.00	\$145,357.59	\$621,808.59	\$450,000.00	\$650,000.00	\$950,000.00	\$950,000.00
G-3	Adaptive Management Research Projects	\$230,000.00	\$414,505.30	\$1,039,049.30	\$230,000.00	\$300,000.00	\$380,000.00	\$380,000.00
G-4	Science/Adaptive Management	\$20,000.00	\$8,485.07	\$151,904.07	\$50,000.00	\$50,000.00	\$50,000.00	\$50,000.00
Closed <sup>3</sup>	Work Tasks Pre-FY08	\$0.00	\$0.00	\$165,535.00				
		<b>\$700,000.00</b>	<b>\$568,347.96</b>	<b>\$1,978,296.96</b>	<b>\$730,000.00</b>	<b>\$1,000,000.00</b>	<b>\$1,380,000.00</b>	<b>\$1,380,000.00</b>
<b>H</b>	<b>Existing Habitat Maintenance</b>							
H-1 <sup>6</sup>	Existing Habitat Maintenance	\$593,500.00	\$593,500.00	\$1,696,000.00	\$605,000.00	\$647,000.00	\$5,823,000.00	\$5,823,000.00
		<b>\$593,500.00</b>	<b>\$593,500.00</b>	<b>\$1,696,000.00</b>	<b>\$605,000.00</b>	<b>\$647,000.00</b>	<b>\$5,823,000.00</b>	<b>\$5,823,000.00</b>



Work Task	Name	FY2008 Estimate	FY2008 Actual Accomplishment <sup>1</sup>	Cumulative Through FY2008	FY2009 Approved Estimate	FY2010 Proposed Estimate	FY2011 Projected Estimate <sup>2</sup>	FY2012 Projected Estimate <sup>2</sup>
<b>I</b>	<b>Public Outreach</b>							
I-1	Public Outreach	\$35,000.00	\$16,759.13	\$61,059.13	\$40,000.00	\$50,000.00	\$70,000.00	\$70,000.00
		<b>\$35,000.00</b>	<b>\$16,759.13</b>	<b>\$61,059.13</b>	<b>\$40,000.00</b>	<b>\$50,000.00</b>	<b>\$70,000.00</b>	<b>\$70,000.00</b>
	<b>Program Total:</b>	<b>\$14,947,500.00</b>	<b>\$15,797,674.77</b>	<b>\$55,158,119.77</b>	<b>\$18,822,780.00</b>	<b>\$20,729,810.00</b>	<b>\$35,063,810.00</b>	<b>\$30,503,560.00</b>

<sup>1</sup>Financial accomplishment is reported as obligations rather than expenditures to accurately portray program accomplishment. Starting in FY08 accomplishment will be tracked to the cent to accurately reflect accomplishment.

<sup>2</sup>FY11 and FY12 numbers are not adjusted for projected inflation

<sup>3</sup>Closed work tasks are shown in Appendix D

<sup>4</sup>E-5 Steering Committee approved securing land and water at 4/25/07 meeting

<sup>5</sup>E-21 Steering Committee approved FY09 funding at 4-22-09 meeting

<sup>6</sup>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.

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 FY08 is reported in Appendix B. The USFWS Section 10 Permit and the 2005 BO authorize incidental take resulting from conduct of Federal Covered Actions and non-Federal Covered Activities, and Reclamation's implementation of the Conservation Plan, as long as Conservation Measures and Avoidance and Minimization Measures are in place. Due to the wide range and scope of the program, surrogate measures were used in the program compliance documents to quantify impacts. These same surrogates are used to determine types and levels of any

incidental take known to have occurred in FY08. 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 letters from the USFWS and CDFG for the *Final Implementation Report, Fiscal Year 2009 Work Plan and Budget, Fiscal Year 2007 Accomplishment Report* are provided in Appendix C. Also in Appendix C is a letter from the USFWS confirming completion of the requirements under the 2001 Biological Opinion for the SIA.

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**

		Managed	Year	Projected	Actual	Year
Land Cover Type		Acres <sup>1</sup>	Established	Year To Be	Habitat	Achieved
				Credited <sup>3</sup>	Created (Acres)	
<b>Nurseries (Upland Species)</b>						
E4	PVER, Phase 1	40	FY06	FY10		
	<b>Total</b>	<b>40</b>				
<b>Cottonwood-Willow</b>						
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			
	PVER, Phase 2	78	FY07	FY10		
	PVER, Phase 3	84	FY08	FY11		
	PVER, Phase 4	100	FY09 <sup>2</sup>	FY11		
	PVER, Phase 5	117	FY10 <sup>2</sup>	FY13		
	PVER, Phase 6	220	FY11 <sup>2</sup>	FY14		
	PVER, Phase 7	226	FY12 <sup>2</sup>	FY15		
E14	Imperial Ponds	34	FY11 <sup>2</sup>	FY14		
E24	Unit 1, Crane Roost	154	FY09 <sup>2</sup>	FY12		
	Unit 1, 1/3 Hippy Burn	100	FY10 <sup>2</sup>	FY13		
	Unit 1, 1/3 Hippy Burn	100	FY11 <sup>2</sup>	FY14		
	Unit 1, 1/3 Hippy Burn	138	FY12 <sup>2</sup>	FY15		
E28	Yuma East Wetlands	250-300				
	<b>Total</b>	<b>1,959</b>				
<b>Honey Mesquite</b>						
E5	CVCA, Phase 4	58	FY09 <sup>2</sup>	FY10		
	CVCA, Phase 5	71	FY10 <sup>2</sup>	FY11		
	CVCA, Phase 6	89	FY11 <sup>2</sup>	FY12		
	<b>Total</b>	<b>218</b>				
<b>Marsh</b>						
E14	Imperial Ponds, Field 18	12	FY08	FY10		
E9	Hart Mine Marsh - South	68	FY09 <sup>2</sup>	FY12		
E9	Hart Mine Marsh - North	106	FY10 <sup>2</sup>	FY13		
E28	Yuma East Wetlands	50-100	FY11 <sup>2</sup>	FY11		
	<b>Total</b>	<b>236</b>				
<b>Backwater Isolated</b>						
E14	Imperial Ponds	80	FY07	FY10		
E25	Big Bend	15	FY09 <sup>2</sup>	FY10		
	<b>Total</b>	<b>95</b>				
<b>Total land cover projected to be established through FY15 is 2,548 acres</b>						

<sup>1</sup>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. Land cover types established under restoration research (E1, E3, E6, E7, and E8) are not included in the projected acres at this time.

<sup>2</sup>Projected.

<sup>3</sup>A habitat credit strategy is being developed and will be finalized in FY10.

**Table 1-7. Summary of Fish Augmentation**

<b>REACH</b>	<b>RASU FY 08</b>	<b>RASU PROGRAM</b>	<b>BONY FY 08</b>	<b>BONY PROGRAM</b>
2	770	25,597	57	57
3	9,536	22,884	4,594	20,485
4/5	9,127	38,146	535	8,560
Subtotal	19,433	86,627	5,186	29,102
Grand Total Both Species				115,729

**Table 1-8. Status of Conservation Measures**

Species/Habitat/Action	Code	Description	FY2008 Approved	FY2009 Approved	FY2010 Proposed
Yuma Clapper Rail	CLRA1	Create habitat, 512 acres	C24 E1 E4 E5 E9 E12 E13 E14 E15 E19 E20 E21 E23 F1 F2	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
	CLRA2	Maintain existing important habitat	C24 D1 H1	C24 D1 H1	C3 G1 G4 H1
	MRM1	Define habitat characteristics	C3 C21 D1 D2 D5 D6 F1 F2	C3 C21 C28 D1 D2 D5 D6 F1 F2	C3 C24 D1 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 D1 D2 D5 D6 F1 F2 F4	C3 C28 D1 D2 D5 D6 F1 F2 F4	C3 C24 D1 F1 F2 G1 G4
	MRM5	Monitor selenium levels in backwater			
	CMM1	Reduce risk of loss to wildfire	E18	E18	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			F2 G1 G4
Southwestern Willow Flycatcher	WIFL1	Create habitat, 4,050 acres	C5 C6 C20 C24 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E22 E23 E24 G3 F1 F2	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
	WIFL2	Maintain existing important habitat	C5 C6 C20 C24 D3 D4 E21 H1	C5 C20 C24 D3 D4 E21 H1	C3 D2 D3 D4 E21 F1 G1 G4 H1
	MRM1	Define habitat characteristics	C3 C5 C6 D1 D2 D3 D4 D5 D6 F2	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
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 C21 D1 D2 D3 D4 D5 D6 F1 F2 F4	C3 C5 C21 C28 D1 D2 D3 D4 D5 D6 F1 F2 F4	C24 C28 D2 D3 D4 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation	D2	D2	D2 G1 G4
	CMM1	Reduce risk of loss to wildfire	E18	E18	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			F2 G1 G4
Desert Tortoise	DETO1	Acquire, protect 230 acres	E16	E16	C3 E29 G1 G4
	DETO2	Avoid impacts on individuals and burrows			C3 G1 G4
Bonytail	BONY1	Coordinate conservation efforts with USFWS and recovery programs			

Species/Habitat/Action	Code	Description	FY2008 Approved	FY2009 Approved	FY2010 Proposed
	BONY2	360 acres	C25 E2 E12 E13 E14 E15	C25 C30 E2 E12 E13 E14 E15 E25 E26	C3 C25 C30 C32 C40 E2 E14 E15 E16 E25 E26 G1 G4
	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 C9 C11 C16 D8	B2 B3 B4 B7 B8 B10 C11 C30 D8	B2 B3 B4 B7 B8 B10 C11 C30 C32 C39 C41 G1 G4
	BONY4	Develop (if necessary) additional rearing capacity	B2 B3 B4 B7 B8 B10 C9 C11	B2 B3 B4 B7 B8 B10 C11 C30	B2 B3 B4 B7 B8 B10 C11 C30 G1 G4
	BONY5	Monitor and research, adaptive management pops. and backwater habitat	B7 B8 B9 D8 C11 C16 C23 F5 G3	B7 B8 B9 C11 C30 C34 D8 F5 G3	B7 B8 C11 C23 C30 C32 C34 C39 C40 C41 D8 F5 G1 G4
	MRM5	Monitor selenium levels in backwater	E15	E15	G1 G4
Humpback Chub	HUCH1	\$500,000 to existing programs	C14	C14	C14 G1
Razorback Sucker	RASU1	Coordinate conservation efforts with USFWS and recovery programs			
	RASU2	360 acres	C25 E2 E12 E13 E14 E15	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
	RASU3	Rear/stock 660,000: 24,000 sub-adult/year for 5 years (Parker, Mohave — see plan) 6,000 sub-adult/year for 45 years Lake Havasu 6,000 sub-adult/year for 45 years Parker Dam	B1 B2 B3 B4 B5 B6 B7 B8 B10 B11 C9 C10 D8	B1 B2 B3 B4 B5 B6 B7 B8 B10 B11 C10 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
	RASU4	Develop (if necessary) additional rearing capacity	B2 B4 B3 B5 B6 B7 B8 B10 B11 C9 C10	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
	RASU5	Support ongoing Lake Mohave conservation efforts	B1 B2 B7 B8 C12 D8	B1 B2 B7 B8 C12 C30 C31 C32 D8	B1 B2 B7 B8 C12 C30 C31 C32 C41 G1 G4

Species/Habitat/Action	Code	Description	FY2008 Approved	FY2009 Approved	FY2010 Proposed
	RASU6	Monitor and research, adaptive management pops. and backwater habitat	B2 B7 B8 B11 C8 C10 C12 C17 C23 D8 F5 G3	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
	RASU7	Funding for ongoing USBR/SNWA Lake Mead Studies	B6 B11 C13	B6 B11 C13	B6 B11 C13 G1 G4
	RASU8	Continue conservation efforts identified in ISC/SIA BO	B1 B6 B8 B11 C8	B1 B6 B8 B11 C8 C30	B1 B6 B11 C26 C30 G1 G4
	MRM5	Monitor selenium levels in backwater			G1 G4
Western Red Bat	WRBA1	Status/habitat surveys	D9	D9	C3 D9 F4 G1 G4
	WRBA2	Create 765 acres	C5 C6 D9 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E23 E24 F1 F4	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
	MRM1	Define habitat characteristics	C3 C5 C6 C18 C19 C24 C27 D1 D2	C3 C5 C18 C19 C24 C27 D1 D2	C3 C5 C35 D9 E21 F4 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 C18 C19 C24 C27 D1 D2 F1 F4 G6	C3 C5 C18 C19 C24 C27 D1 D2 F1 F4 G6	C3 F1 F4 G1 G4
	CMM1	Reduce risk of loss of habitat to wildfire	E18	E18	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			
Western Yellow Bat	WYBA1	Conduct surveys for species distribution	D9 F4	D9 F4	C3 D9 G1 G4
	WYBA2	Avoid removal of roost trees (palms)	F4	F4	E16 F4 G1 G4
	WYBA3	Create 765 acres	C5 C6 D9 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E23 E24 F1 F4	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
	MRM1	Define habitat characteristics	C3 C5 C6 C24 C27 D1 D5	C3 C5 C24 C27 C28 D1 D5	C3 C5 C35 D9 E21 F4 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 C27 D5 F1 F4	C3 C5 C27 C28 D5 F1 F4	C3 F1 F4 G1 G4
	CMM1	Reduce risk of loss of habitat to wildfire	E18	E18	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			
Desert Pocket Mouse	DPMO1	Locate occupied habitat, restore disturbed habitat	C27 F3	C27 F3	C3 F3 G1 G4



Species/Habitat/Action	Code	Description	FY2008 Approved	FY2009 Approved	FY2010 Proposed
Colorado River Cotton Rat	CRCR1	Status/habitat surveys — define habitat first 5 years	C27 F3 G3	C27 F3 G3	C3 C27 F3 G1 G4
	CRCR2	Create 125 acres	C27 E1 E3 E4 E5 E6 E7 E8 E16 E19 E21 E22 E24 F1 F3	C27 E1 E3 E4 E5 E6 E7 E8 E16 E19 E21 E22 E24 F1 F3	C3 E9 E16 E21 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 D11 F1 F3	C3 C24 C28 D11 F1 F3	C3 F1 F3 G1 G4
	CMM1	Reduce risk of loss of habitat to wildfire	E18	E18	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	C27 F3 G3	C3 C27 G1 G4
	YHCR2	Create 76 acres	C27 E1 E3 E4 E5 E6 E7 E8 E16 E19 E22 E23 E24 F1 F3	C27 E1 E3 E4 E5 E6 E7 E8 E16 E19 E22 E23 E24 F1 F3	C3 E16 E27 E28 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C24 D11 F1 F3 F4	C3 C24 C28 D11 F1 F3 F4	C3 F1 F3 G1 G4
	CMM1	Reduce risk of loss of habitat to wildfire	E18	E18	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 F1 F2	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
	MRM1	Define habitat characteristics	C3 D1 D5 F1 F2	C3 C28 D1 D5 F1 F2	C3 C24 D1 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 D1 D5 F1 F2 F4	C3 C28 D1 D5 F1 F2 F4	C3 C24 D1 F1 F2 G1 G4
	MRM5	Monitor selenium levels			
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			F2 G1 G4
California Black Rail	BLRA1	Create 130 acres	C24 E1 E3 E4 E5 E8 E9 E12 E13 E14 E15 E23 F1 F2	C24 E1 E3 E4 E5 E8 E9 E12 E13 E14 E15 E23 F1 F2	C3 E14 E16 E26 E27 E28 G1 G4
	BLRA2	Maintain existing occupied habitat	C24 D1 H1	C24 D1 H1	C3 G1 G4 H1
	MRM1	Define habitat characteristics	C3 D1 D5 D6 F1 F2	C3 C28 D1 D5 D6 F1 F2	C3 C24 D1 F2 G1 G4

Species/Habitat/Action	Code	Description	FY2008 Approved	FY2009 Approved	FY2010 Proposed
	MRM2	Monitor and adaptively manage created habitat	C3 D1 D2 D6 F1 F2 F4	C3 C28 D1 D2 D6 F1 F2 F4	C3 C24 D1 F1 F2 G1 G4
	MRM5	Monitor selenium levels			
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			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	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
	YBCU2	Maintain existing habitat	C5 C6 C21 C22 C24 E22 H1	C5 C6 C21 C22 C24 E22 H1	C3 D7 E21 G1 G4 H1
	MRM1	Define habitat characteristics	C3 C5 C6 C22 D1 D5 D6 D7 F1 F2	C3 C5 C6 C22 C28 D1 D5 D6 D7 F1 F2	C3 C5 C24 C28 C37 C42 D5 D6 D7 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 C22 D5 D6 D7 F1 F2 F4	C3 C5 C6 C22 C28 D5 D6 D7 F1 F2 F4	C3 C24 C28 D5 D6 D7 F1 F2 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			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	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
	ELOW2	Install elf owl boxes before Gila woodpeckers established			C3 G1 G4
	MRM1	Define habitat characteristics	C3 D1 D5 D6 F1 F2	C3 C28 D1 D5 D6 F1 F2	C3 C24 C36 C37 C42 D5 D6 E21F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 D5 D6 F1 F2 F4	C3 C28 D5 D6 F1 F2 F4	C3 C24 D5 D6 F1 F2
	MRM3	Research nest competition European starlings			C3 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			F2 G1 G4
Gilded Flicker	GIFL1	Create 4,050 acres reaches 3-7	C5 C6 C24 E1 E3 E4 E5 E6 E8 E19 E21 E22 E23 G24 F1 F2	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

Species/Habitat/Action	Code	Description	FY2008 Approved	FY2009 Approved	FY2010 Proposed
	GIFL2	Install artificial snags until vegetation has matured			
	MRM1	Define habitat characteristics	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C28 D1 D5 D6 F1 F2	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 D5 D6 F1 F2 F4	C3 C5 C28 D5 D6 F1 F2 F4	C3 C24 D5 D6 F1 F2 G1 G4
	MRM3	Research nest competition European starlings			C3 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			F2 G1 G4
Gila Woodpecker	GIWO1	Create 1,702 acres reaches 3-6	C5 C6 C24 E3 E1 E4 E5 E6 E8 E19 E20 E21 E22 E23 E24 F1 F2	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
	GIWO2	Install artificial snags			
	MRM1	Define habitat characteristics	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C28 D1 D5 D6 F1 F2	C3 C5 C24 C37 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 D5 D6 F1 F2 F4	C3 C5 C6 C28 D5 D6 F1 F2 F4	C3 C24 D5 D6 F1 F2 G1 G4
	MRM3	Research nest competition European starlings			C3 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18 G1 G4
Vermilion Flycatcher	VEFL1	Create 5,208 acres	C5 C6 C24 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E22 E23 E24 F1 F2	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
	MRM1	Define habitat characteristics	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C28 D1 D5 D6 F1 F2	C3 C5 C24 C28 C37 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 D5 D6 F1 F2 F4	C3 C5 C28 D5 D6 F1 F2 F4	C3 C24 C28 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation	C1	C1	
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18 G1 G4

Species/Habitat/Action	Code	Description	FY2008 Approved	FY2009 Approved	FY2010 Proposed
	CMM2	Replace created habitat affected by wildfire			F2 G1 G4
Arizona Bell's Vireo	BEV11	Create 2,983 acres	C5 C6 C24 E1 E4 E5 E6 E8 E21 E22 E23 E24 F1 F2	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
	MRM1	Define habitat characteristics	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C28 D1 D5 D6 F1 F2	C3 C24 C28 C37 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 D5 D6 F1 F2 F4	C3 C5 C28 D5 D6 F1 F2 F4	C3 C24 C28 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation			
Sonoran Yellow Warbler	YWAR1	Create 4,050 acres	C5 C6 C24 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E22 E23 E24 F1 F2	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
	MRM1	Define habitat characteristics	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C28 D1 D5 D6 F1 F2	C3 C5 C24 C28 C37 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 D5 D6 F1 F2 F4	C3 C5 C28 D5 D6 F1 F2 F4	C3 C24 C28 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation	C1	C1	
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			F2 G1 G4
Summer Tanager	SUTA1	Create 602 acres	C5 C6 C24 E3 E4 E5 E6 E7 E8 E19 E20 E21 E22 E24 F1 F2	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
	MRM1	Define habitat characteristics	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C28 D1 D5 D6 F1 F2	C3 C5 C24 C28 C37 C42 D5 D6 E21 F2 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 D5 D6 F1 F2	C3 C5 C6 C28 D5 F1 F2	C3 C24 C28 D5 D6 F1 F2 G1 G4
	MRM4	Brown-headed cowbird evaluation	C1	C1	
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E28 G1 G4
	CMM2	Replace created habitat affected by wildfire			F2 G1 G4
Flat-tailed Horned Lizard	FTHL1	Acquire and protect 230 acres	E16	E16	C3 G1 G4
	FTHL2	Implement conservation measures to avoid take			C3 G1 G4

Species/Habitat/Action	Code	Description	FY2008 Approved	FY2009 Approved	FY2010 Proposed
Relict Leopard Frog	RLFR1	10,000/year for 10 years to conservation program	C4	C4	C4 G1
Flannelmouth Sucker	FLSU1	85 acres Reach 3	E15 G3	E15 E25 G3	C3 E15 E16 E25 G1 G4
	FLSU2	80,000/year for 5 years	C15	C15	C15 G1 G4
	FLSU3	Develop management needs/strategies	C15	C15	C15 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C15 F4	C15 C28 F4	C3 G1 G4
	MRM5	Monitor selenium levels in backwater			G1 G4
MacNeill's Sootywing Skipper	MNSW1	Status surveys/habitat — define habitat first 5 years	C7	C7	C3 C7 F6 G1 G4
	MNSW2	222 acres	C7 E1 E3 E4 E5 E19 E21 E22 F1	C7 E1 E3 E4 E5 E19 E21 E22 F1 F6	C3 E1 E3 E4 E5 E16 E21 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 F1 F2 F4	C3 C5 C28 F1 F2 F4	C3 F1 F6 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18 G3	E18 G3	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			
Sticky Buckwheat	STBU1	10,000 year until 2030 to MSCP HCP	C2	C2	C2 G1
Threecorner Milkvetch	THMI1	10,000 year until 2030 to MSCP HCP	C2	C2	C2 G1
California Leaf-nosed Bat	CLNB1	Distribution surveys	D9 F4	D9 F4	C3 D9 G1 G4
	CLNB2	Create habitat near roost sites (priority when creating cottonwood-willow, mesquite habitat for other species)	C5 C6 E21	C5 E21	C3 E1 E3 E4 E5 E8 E16 E21 E24 G1 G4
	MRM1	Define habitat characteristics	C3 C5 C6 C27 D1 F1	C3 C5 C28 C27 D1 F1	C3 C5 D9 E21 F4 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 C27 F1 F4	C3 C5 C27 C28 F1 F4	C3 F4 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18 G1 G4
	CMM2	Replace created habit affected by wildfire			
Pale Townsend's Big-eared Bat	PTBB1	Distribution surveys	D9 F4	D9 F4	C3 D9 G1 G4
	PTBB2	Create habitat near roost sites	C5 C6 E21	C5 E21	C3 E1 E3 E4 E5 E8 E16 E21 E24 E27 E28 G1 G4

Species/Habitat/Action	Code	Description	FY2008 Approved	FY2009 Approved	FY2010 Proposed
	MRM1	Determine habitat characteristics	C3 C5 C6 C24 C27 F1	C3 C5 C24 C27 C28 F1	C3 C5 D9 E21 F4 G1 G4
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 C24 C27 F1 F4	C3 C5 C24 C27 C28 F1 F4	C3 F4 G1 G4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18 G1 G4
	CMM2	Replace created habitat affected by wildfire			
Colorado River Toad	CRT01	Distribution surveys, habitat affinity, limiting factors	C3	C3	C3 D12 G1 G4
	CRT02	Protect existing occupied habitat	H1	H1	C3 G1 G4 H1
	CRT03	Research to establish in unoccupied habitat			C3 G1 G4
Lowland Leopard Frog	LLFR1	Distribution surveys, habitat affinity, limiting factors	C3 G3	C3 G3	C3D12 G1 G4
	LLFR2	Protect existing occupied habitat	H1	H1	C3 G1 G4 H1
	LLFR3	Research to establish in unoccupied habitat	C3 G3	C3 G3	C3 G1 G4
<b>Other</b>					
Topock Marsh Pumping	AMM2	Avoid flow-related impacts on covered species	C21 C22 D2 E17	C21 C22 D2 E17	
Law Enforcement and Fire Suppression	CMM1	Reduce effects of fire and vandalism on created habitats	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 1.** *Stock 20,000 razorback suckers, 250 mm or greater in total length, into the Colorado River between Parker and Imperial dams. This will be completed by 2006.*

**Status:** Completed. The total number of razorback suckers stocked below Parker Dam (reaches 4 and 5) between 2003 and January 2007 was 20,012.

**Table 1-9. Summary of Razorback Sucker Stockings for the 2001 BO**

YEAR	DATE	NUMBER	LOCATION
2005	4-Feb	620	Backwater A-7
	4-Feb	619	Backwater A-10
	21-Apr	729	Backwater A-7
	21-Apr	649	Backwater A-10
	22-Sep	1,089	Backwater A-7
	22-Sep	1,108	Backwater A-10
	<b>Subtotal</b>	<b>4,814</b>	
2006	21-Jan	790	Backwater A-7
	21-Jan	791	Backwater A-10
	31-Mar	851	Backwater A-7
	31-Mar	865	Backwater A-10
	20-Apr	1,613	A-10 Lower
	14-Sep	1,632	A-10 Upper
	14-Sep	728	A-10 Lower
	21-Sep	1,655	Buckskin Mountain Park
	30-Nov	2,530	River Island Park
	<b>Subtotal</b>	<b>11,455</b>	
2007	19-Jan	1,926	River Island Park
	25-Jan	1,143	A-10 Upper
	25-Jan	674	A-10 Lower
	<b>Subtotal</b>	<b>3,743</b>	
	<b>TOTAL</b>	<b>20,012</b>	

**Conservation Measure 2.** *Restore or create 44 acres of backwaters along the LCR between Parker and Imperial dams. Maintenance of these backwaters for native fish and wildlife will be ensured for the life of the water transfers. This will be completed within 5 years of the first water transfers.*

**Status:** Completed. The 44 acres of backwater have been established at the Imperial Ponds Conservation Area and long-term monitoring and management are being tracked under work Task E14. During FY07, excavation and construction for all six ponds, the service roads, and the water supply and drainage system were completed, which created approximately 80 acres of backwater dedicated to native fish and fulfills the establishment requirements of Conservation Measure 2. Maintenance of the backwaters will continue for the life of the transfers under the Imperial Ponds work task.

**Conservation Measure 3.** *Provide \$50,000 for the capture of wild-born or F1 generation bonytails from Lake Mojave to be incorporated into the brood stock for this species and to support rearing efforts at Achii Hanyo Native Fish Rearing Facility. These efforts will be funded for 5 years (2001-2006).*

**Status:** Completed. Reclamation and the USFWS attempted to capture adult bonytail from Lake Mohave during the April to June spawning periods in 2003 and 2004 with no success. Approximately \$50,000 was expended by the two agencies during this effort. Rather than continue the capture effort, Reclamation provided \$200,000 to USFWS in July 2004 to improve rearing capabilities for bonytail at Achii Hanyo Native Fish Rearing Facility.

#### **Conservation Measure 4, Tier 1.**

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

*b. Restore and maintain 372 acres of new replacement southwestern willow flycatcher habitat along the LCR.*

**Status:**

a. 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 of the first 5 years, will be completed in FY10.

b. Completed. The cottonwood-willow land cover types have been created and long-term monitoring and management are being addressed in Work Tasks E4 and E5. Phases 1 and 3 at the Cibola Valley Conservation Area (CVCA) and Phases 1-3 at the Palo Verde Ecological Reserve (PVER) have been identified to fulfill the habitat creation requirements of Conservation Measure 4, Tier 1. In FY08, Reclamation implemented Phase 3 of the PVER by planting 84 acres of cottonwood-willow land cover. By the end of FY08, approximately 372 acres have been planted and are intended to be managed as southwestern willow flycatcher habitat.

The habitat creation requirements for this conservation measure were completed in FY08. Table 1-10 shows how habitat has been established for the 2001 BO at each site. In addition to the required 372 acres of cottonwood-willow land cover, an additional 71 acres were also established at the CVCA in FY08.

**Table 1-10. Cottonwood-Willow Land Cover Types Established for the SIA**

Project	Phase 1	Phase 2	Phase 3	Total Acres
CVCA	91	0	103	194
PVER	21	78	84	183
Grand Total	107	78	189	377

**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 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 razorbacks 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 FY08 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 sucker (RASU) and 200,000 bonytail (BONY) of at least 12 inches in length will be stocked into reaches 3-5.

Through FY08, 61,030 RASU and 29,045 BONY have been stocked into reaches 3, 4, and 5. Since the start of the LCR MSCP, more than 90,075 native fish have been stocked into the lower river in California.

Through FY08, 183 acres of cottonwood-willow land cover have been established at the Palo Verde Ecological Reserve (PVER).

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# **OVERVIEW OF WORK TASKS**

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## Fish Augmentation, Monitoring, and Research

The LCR MSCP will implement 17 conservation measures for four native fish species: 8 conservation measures for razorback sucker (RASU), 5 conservation measures for bonytail (BONY), 3 conservation measures for flannelmouth sucker (FLSU), and 1 conservation measure for humpback chub (HUCH). These conservation measures will be accomplished through work tasks assigned to one of six target areas:

1. Fish Augmentation (Section B)
2. Species Research (Section C)
3. System Monitoring (Section D)
4. Conservation Area Development (Section E)
5. Post-Development Monitoring (Section F)
6. Adaptive Management (Section G)

A brief summary of the work planned for each target area 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. The program has three primary work areas:

1. Acquire fish for grow-out
2. Develop facilities to grow the fish
3. Rear the fish to target size and stock them into the LCR MSCP project areas

(A Fish Augmentation Plan for the LCR MSCP is available on the LCR MSCP Web site.)

**Acquire fish for grow-out.** To obtain sufficient numbers of young fish for grow-out, the LCR MSCP will develop and 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 intended brood stock for the species. Development and maintenance of this stock (underway since 1992) is a recovery goal for RASU, and this action has now become a project feature of the LCR MSCP. In-lake spawning by adult RASU is currently producing sufficient fish larvae for the augmentation program. The LCR MSCP is able to collect these wild larvae directly from the spawning areas on Lake Mohave between January and April each year and deliver them to Willow Beach National Fish Hatchery (NFH). The larvae are reared to meet stocking requirements of the LCR MSCP. A portion of the larvae are reared to subadult size and returned (repatriated) to Lake Mohave to maintain the RASU brood stock. The LCR MSCP will support maintenance of this genetically diverse stock throughout the life of the program. A second brood stock of RASU was developed by the USFWS during the 1990s from Lake Mohave offspring, and is maintained at Dexter NFH.

In January 2007, the exotic quagga mussel was found in lakes Mead, Mohave, and Havasu, and at Lake Mead State Fish Hatchery (SFH) and Willow Beach NFH. To insure that quagga mussels

do not gain access to Bubbling Ponds SFH, RASU larvae will be provided to Bubbling Ponds SFH from the Dexter NFH brood stock. This is a temporary change to the fish acquisition strategy, and the arrangement is acceptable to both the USFWS and AGFD. The RASU brood stock at Dexter NFH originated from Lake Mohave, and their use as brood fish is guided by a genetic management plan. Fish from this stock have been used in the past 15 years.

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 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. A continued area of concern is Dexter having the only brood stock for this species. A review of the BONY brood stock situation will be made during FY09 and the findings will be presented to the Steering Committee in April 2010. A recommendation will be made regarding the need to develop a second brood stock of BONY.

**Develop facilities to grow the fish.** The LCR MSCP will require grow-out facilities for RASU and BONY for many years. The program provides support to the following existing facilities that are currently rearing RASU or BONY, or have agreed to enter into or continue a partnership with the LCR MSCP to provide rearing space for these fishes:

1. Willow Beach NFH (USFWS)
2. Achii Hanyo Native Fish Rearing Facility (USFWS)
3. Dexter NFH (USFWS)
4. Bubbling Ponds SFH (AGFD)
5. Lake Mead SFH (NDOW)
6. Uvalde NFH (USFWS)
7. Overton WMA (NDOW)

Activities required for developing, operating, and maintaining these facilities will be identified in annual work plans, but will most likely include such routine items as:

1. Repair or replace pond liners
2. Develop, repair, or replace water delivery systems including pipes, valves, pumps, well motors, etc.
3. Construct new ponds
4. Install or repair fish collection kettles
5. Repair or replace bird netting and other predator control devices
6. Maintain access roads, work areas, lighting, and security systems (alarms, fences)
7. Repair or replace backup power generators, load banks, and electric service components

**Rear fish to target size and stock fish into LCR.** The HCP provides instructions for RASU and BONY augmentations. The augmentation stockings are of three types. Type I requirements are to stock fish for simple population development and maintenance, with a few thousand fish to be stocked each year for 40 to 50 years. For Type II requirements, fish are to be released in large quantities each year for 5 consecutive years. Concurrent with these latter stockings, extensive



scientific monitoring will be conducted to provide data to the LCR MSCP adaptive management program (AMP). Type III stocking requirements complete specific actions associated with conservation measures from previous endangered species consultations.

**Table 1-11. LCR Stocking Requirements for RASU and BONY (TL = Total Length)**

Species	Location	Notes
RASU	Reach 3	6,000 per year (300 mm TL) for 45 years (Type I)
"	Reach 4/5	6,000 per year (300 mm TL) for 45 years (Type I)
"	Reach 3, 4, 5	24,000 per year for 5 consecutive years with at least 6,000 into Reach 3 and 6,000 into Reach 4/5 for research (Type II)
"	Reach 2	Sufficient numbers to maintain brood stock @ 50,000 adults (Type III)
"	Reach 1	Larvae reared to honor ISG/SIA commitments (Type III)
BONY	Reach 2	5,000 per year (300 mm TL) for 40 years, to begin in 2016 (or upon completion of USFWS's BO actions) (Type I)
"	Reach 3	4,000 per year (300 mm TL) for 50 years (Type I)
"	Reach 4/5	8,000 per year (300 mm TL) for 5 consecutive years for research (Type II)
"	Reach 4/5	4,000 per year (300 mm TL) for 45 years (Type I)

These fish will all be reared at one or more of the hatcheries listed previously. These hatcheries are interrelated and dependent upon each other to achieve this augmentation program. There currently is sufficient capacity among the hatcheries listed above to rear the numbers of fish needed for the Type I stockings through 2011. The current strategy is to rear fish to accomplish Type I and Type III needs, while continuing facility development and improvements to add capacity. Funding increases in FY09 and FY10 will expand capacity at these facilities. Sufficient capacity to start the expanded stocking actions required to initiate the adaptive management research (Type II) is expected to be in place by FY11.

### **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 allows researchers to quantify existing knowledge, identify data gaps, and design and implement species research to fill these data gaps. An intensive fish research program is being planned to utilize the Type II stockings described earlier. This work will be orchestrated over an 8 to 10 year period. A Fishery Advisory Team has been established to look at research needs for BONY and RASU. Species research for fishes is currently focusing on the following areas:

**Fish Propagation and Culturing.** RASU and BONY are rare fishes, and have only been in captivity for a few decades. Propagation and culturing techniques used for other fishes, such as rainbow trout and channel catfish, do not always work for native Colorado River fishes. Razorback Sucker Growth Studies (C10) is looking at ways to maximize growth through manipulation of diet and density. Bonytail Rearing Studies (C11) includes investigations of rearing different life stages and species and development of a specific diet formulation for bonytail. As the recent invasion of quagga mussels impacts fish distribution, a study to evaluate the effectiveness of quagga mussel protocols for removing mussels from transport water began in 2009 (C30).

**Post-Stocking Survival.** A study to assess post-stocking survival of RASU (C8) was completed in FY08. A similar study to evaluate post-stocking survival of BONY is proposed for initiation in FY10 (C39). RASU stocked into Reach 3 during the late 1990s have had remarkable survival. PIT tags were not used for the original stockings, so only general information is known of the stocking history for these fish. The study, Age Characterization of Reach 3 Razorback Sucker Population (C29), was added during 2009 to help evaluate these past stockings in hopes that we may determine reasons for their success. Other studies initiated this year include an assessment of genetic diversity of newly established stocks in reaches 3, 4, and 5 (C31), as well as a study to assess comparative survival of 300 mm and 500 mm RASU released in Reach 3 (C33). Both studies will help us assess the quantity and quality of surviving RASU.

**Brood Stock Development and Maintenance.** The LCR MSCP continues the development and maintenance of the RASU brood stock in Lake Mohave. The Lake Mohave Native Fish Work Group has repatriated more than 100,000 sub-adult fish to date; however, recapture data suggest that fewer than 2,000 have survived. Demographics and Post-Stocking Survival of Repatriated Razorback Suckers in Lake Mohave (C12) began in FY06 to address the question of what happened to these fish. One facet of this work is assessing the effect of fish size at time of release on survival to adulthood. To evaluate this effect, RASU being reared for repatriation to Lake Mohave are now being grown to 500 mm total length.

**Lake Mead Investigations.** The LCR MSCP is continuing the Lake Mead Razorback Sucker Study (C13), a conservation measure from a 2001 BO. This is the twelfth year of the Lake Mead Razorback Sucker Study. A 10-year summary was completed in 2008 (posted to the LCR MSCP website). An interagency work team has been formed to determine the direction of further work. The first task identified is a more extensive evaluation of the Colorado inflow area of the lake. Work Task C13 is being expanded to provide partial funding to this effort, and the work will be closely coordinated with the Grand Canyon AMP.

**Managing Native Fishes in Restored Backwaters.** Creation of backwater habitats for covered fish species is a major goal of the LCR MSCP. Research into operation and maintenance of native fish populations in newly developed ponds at Imperial Refuge began in FY08 (C25). Two studies are currently underway to better understand the ecology of restored backwaters relative to their value as fish habitat. The first study, Determination of Salinity, Temperature and Oxygen Limits for Bonytail and Razorback Sucker (C32), will redefine criteria for these parameters within restored ponds and give us benchmarks for operating water systems so to provide/maintain proper levels of these important parameters. The second study,

Characterization of Zooplankton Communities in Off-channel Native Fish Habitats (C34), will similarly attempt to set benchmark levels for zooplankton communities in developed fish habitats by first assessing levels in extant habitats being used for native fishes within the LCR basin. An additional study component (C40) is proposed for FY10 to develop the population genetics model for management of native fish in off-channel habitats.

**Support Humpback Chub Research in the Grand Canyon.** The HCP outlines specific research actions in the conservation measures for HUCH, Humpback Chub Program Support (C14), provides funding support for conservation activities being conducted under the Glen Canyon Adaptive Management Program. For the first 3 years of the program funds were provided to Willow Beach NFH for caretaking of HUCH. Currently, actions are underway to transfer funds to Dexter NFH for development and maintenance of a refugia population as a safeguard against loss of extant populations in the wild.

**Flannelmouth Sucker Investigations.** FLSU conservation is addressed by Flannelmouth Sucker Habitat Use, Preference, and Recruitment Downstream of Davis Dam (C15), which provides funding to investigate this species in the Colorado River downstream of Davis Dam. This work is in its fourth year and will continue through 2010.

**Remote Sensing for Fish.** Research into ways to census and monitor stocked fish without having to actually capture them, has been underway since 2006. Under Adaptive Management Research Projects (G3), ocular surveys, photography, and video-monitoring techniques were investigated. The final report has been posted to the LCR MSCP Web site. Evaluation of Remote Sensing Techniques for PIT-Tagged Fish (C23) is evaluating the use of stationary PIT-tag detection equipment. This has been an exciting study and should provide a great tool for future monitoring of RASU and BONY.

### **System Monitoring (Section D)**

As described in the HCP, system monitoring will be conducted on existing populations and habitats of covered species to determine species status, distribution, density, migration, productivity, and other ecologically important parameters. Such data are necessary for long-term assessment of species under the AMP.

The system monitoring actions for RASU and BONY are covered in Razorback Sucker and Bonytail Stock Assessment (D8). Monitoring data for FLSU are included in the research actions being conducted for this species, as described earlier. Reclamation annually gathers information on the status of these species by project reach. A status report, depicting the end-of-year status in terms of distribution and abundance of each species, is presented to the LCR MSCP Steering Committee annually.

### **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), Butler Lake (E12), McAllister Lake (E13), Imperial Ponds Conservation Area (E14), Big Bend Conservation Area

(E25), and Headquarters Lake (E26) are all existing or closed work tasks with native fish habitat creation features. Future backwater development for native fishes will be guided by the outcome of Backwater Site Selection (E15) and Conservation Area Site Selection (E16). This work task 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. These are the only native fish sites currently developed.

### **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 the other recovery actions (Upper Colorado River Basin Recovery Implementation Program, San Juan River Recovery Implementation Program, Glen Canyon 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.

Species research and system monitoring efforts emphasize the continuation of existing monitoring programs, where applicable, and accumulation of additional data on existing covered species and their habitats. All known information on the covered species, especially data necessary for habitat creation and maintenance, will be synthesized from past and ongoing research and monitoring programs to quantify existing knowledge and identify data gaps. Species research projects are then be designed to acquire the additional data needed for successful implementation of the conservation measures.

System monitoring programs may be used to guide existing habitat maintenance programs, evaluate existing covered species populations, design avoidance and minimization measures, and provide data for the adaptive management of created and existing covered species habitat. System monitoring programs may utilize single species or multi-species protocols, depending on data priority, existing activities, effectiveness, and efficiency.

Restoration research is being conducted to evaluate habitat restoration and maintenance techniques to ensure that efficient and effective techniques are used through the adaptive management process. Post-development monitoring will be utilized to evaluate whether each habitat creation project is implemented as designed, to determine whether habitat requirements are incorporated for targeted covered species, and to guide habitat management decisions. Information gathered through post-development monitoring will, in turn, be used to further define habitat requirements. Information received from all of the research and monitoring will be utilized in the adaptive management program to gauge effectiveness of existing conservation measures, to propose alternatives or modifications to conservation measures, and to address changes and unforeseen circumstances.

Two documents have been produced in FY08 to help guide the monitoring and research program. *Species Accounts for the Lower Colorado River Multi-Species Conservation Program* was completed in September 2008. Reclamation has developed species accounts for 22 covered species and 5 evaluation species listed in the HCP that utilize terrestrial, marsh, and riparian habitats. These species accounts were based on extensive literature searches for each species and include the latest and best 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 their habitats. The *Final Five Year Monitoring and Research Priorities for the Lower Colorado River Multi-Species Conservation Program: 2008-2012* was also completed in FY08. This document provides a plan that describes the priorities for research and monitoring needs for a 5-year period.

### **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.

In FY08, species research work tasks continued ongoing research projects identified in prior work plans and initiated new research projects based on data requirements identified during species profile development or other monitoring and research activities. Two new species research work tasks were developed in 2008. Avian Species Habitat Requirements work task (C24) was developed to design habitat suitability index models for covered avian species in order to help determine habitat requirements for covered marsh and riparian bird species. Small Mammal Population Studies work task (C27) was developed in order to determine the distribution, habitat requirements, and genetics of covered small mammal species. It is anticipated that these efforts will be completed during FY12 and FY10, respectively.

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 help determine whether management actions can be designed to minimize predation threats, which has been identified as the leading cause of nest failure for southwestern willow flycatchers along the LCR.

Four new work tasks are being developed for FY10. Western Red Bat and Western Yellow Bat Roosting Characteristics Study work task (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. A Hydrology Study (C37) will find out 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 at habitat creation sites. Finally, a Soil Conditioning Study (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.

The HCP outlines specific conservation measures for sticky buckwheat, threecorner milkvetch, and relict leopard frog. Conservation measures for both plant species are limited to providing funding to the Clark County MSHCP Rare Plant Workgroup to support implementation of conservation measures that are beyond the permit requirements of the Clark County MSHCP. Similarly, the HCP conservation measure for relict leopard frog directs funding to the Relict Leopard Frog Conservation Team to support implementation of planned, but unfunded, conservation measures. Sticky Buckwheat and Threecorner Milkvetch Conservation (C2), and Relict Leopard Frog (C4) accomplish these conservation measures.

## **System Monitoring (Section D)**

System monitoring will be 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 FY10, 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 SWFL and its habitat. Presence/absence surveys and life history studies have been conducted system-wide since 1996 and continue under D2. After analyzing information gathered during previous surveys and soliciting expert opinion, a decision was made in FY08 to continue these surveys utilizing a variation of the single-species protocol established in 1996, with the number of site visits decreasing from 10 to 5. Also, additional surveys being conducted by the Hualapai Tribe within the Grand Canyon (D4) were discontinued in FY08 due to changes to existing habitat and recent survey results. Hualapai surveys were suspended in FY09 until conditions change in the Grand Canyon. The Grand Canyon will be flown in FY10 to determine whether habitat conditions warrant surveys. 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 5 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 5-year review will be conducted to assess the efficacy of the protocol and to review the results.

System monitoring for YBCU was initiated in FY06 using data acquired from species research work tasks completed in FY05 (C21, C22). Surveys for YBCU utilize 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 FY08 and for the first time, YBCU has been found nesting at an LCR MSCP restoration site (CVCA).

Multi-species protocols have been developed to monitor additional avian species covered in the LCR MSCP. System monitoring for riparian obligate avian covered species (D6) uses a multi-species protocol and sample plan developed by the United States Geological Survey (USGS) in

FY07. System monitoring was fully implemented during the FY08 breeding season. Surveys will be conducted annually for the first 5 years. Survey interval will then be evaluated during the 5-year program review as outlined in the *Final Science Strategy*.

In FY08, System Monitoring and Research of Covered Bat Species (D9) were conducted using protocols developed in FY06. Acoustic surveys and capture techniques will provide information on bat distribution and habitat use. Data from these studies, along with Post-Development Monitoring of Covered Bat Species (F4), will be used to help design and manage created habitats in Section E. In FY09 for the first time, Reclamation biologists captured a western red bat at the 'Ahakhav Tribal Preserve. This is the first instance of a western red bat being captured anywhere along the LCR main stem.

### 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 FY08, post-development monitoring for habitat characteristics and avian use was conducted at several riparian restoration demonstration sites and habitat creation sites (Table 1-12). Each proposed habitat creation project will be designed to provide habitat requirements for targeted covered species. To evaluate effectiveness in providing these habitat requirements, pre-development monitoring will be conducted for targeted covered species, including avian species (F2), small mammals (F3), bats (F4), and insects (F6 to begin in FY09). Because initial habitat creation efforts are focused on converting agricultural fields into habitat, it is anticipated that habitat suitability indices for covered species at agricultural sites will be determined such that it will not be necessary to conduct pre-development monitoring at the same intensity for future agricultural conversion. Post-development monitoring will occur for these covered species to evaluate effectiveness in providing habitat requirements for the targeted covered species.

**Table 1-12. LCR MSCP Covered Species Post-Restoration monitoring in FY08**

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	
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 FY08, pre-development data was 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 5-year planning cycle has been identified to allow for the receipt of new information, the analysis of that information, and the incorporation of the new information into the design or direction of future work tasks. The 5-year planning cycle will allow for a review of past activities and the setting of priorities for the next 5-year cycle. The *Final Five Year Monitoring and Research Priorities for the Lower Colorado River Multi-Species Conservation Program: 2008-2012* was completed in FY08. Work tasks identified in FY09 under the AMP fill needs identified at LCR MSCP initiation.

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 began in FY08 and will continue in FY09 and FY10.

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 FY08 have been moved to their own work tasks are Avian Species Habitat Requirements (C24), Nest Predation Effects on Riparian Bird Species (C28), and Experiments and Demonstration of Soil Amendments for Use in Restoration Sites (C42).

## 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 evaluation of the physical, chemical, and biological conditions suitable for the establishment and maintenance of healthy fish populations and other backwater associated species in the LCR define the habitat. Maturation and management of the land cover types ultimately create the habitat.

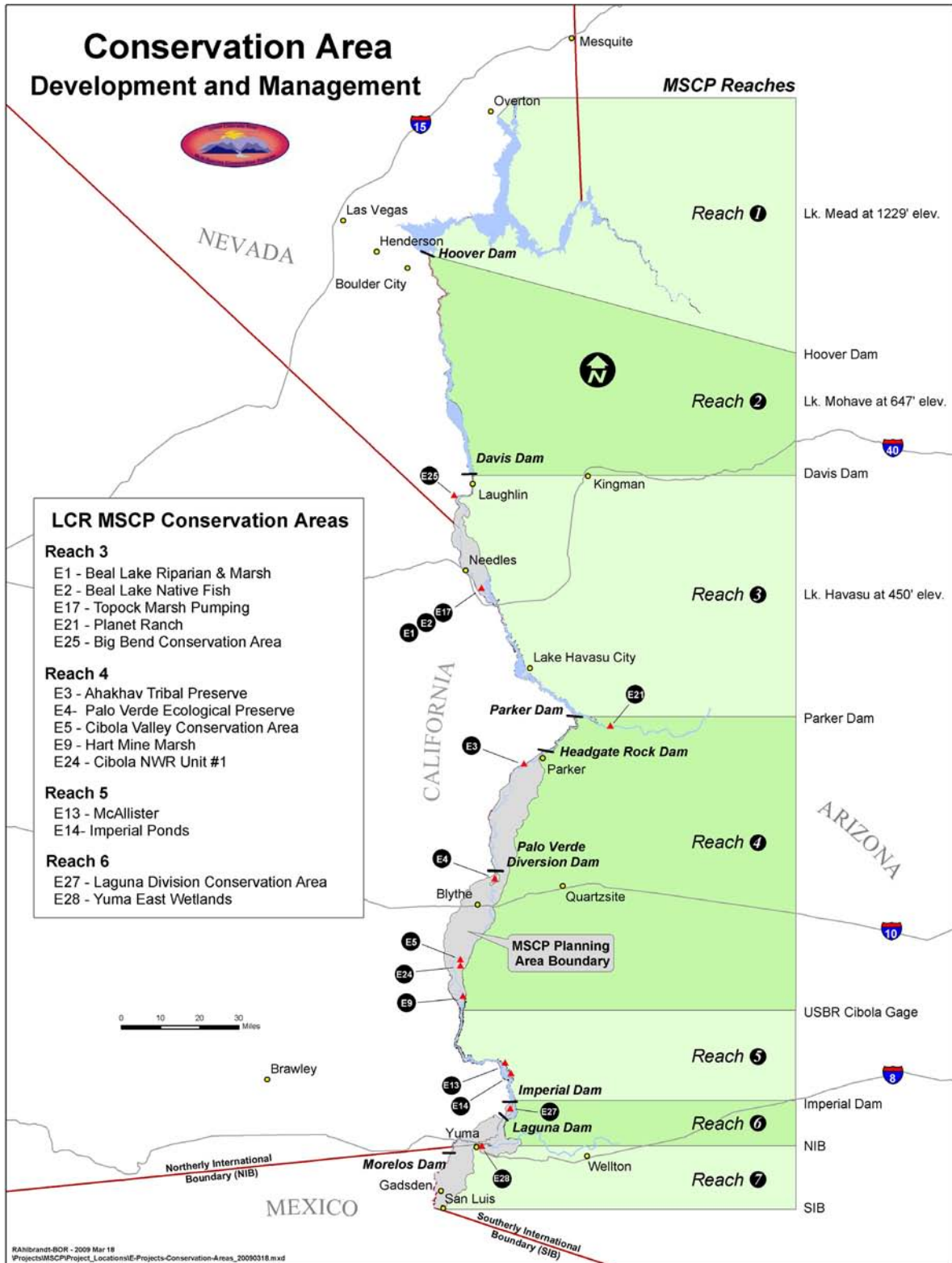
As described in the conservation measures, habitat creation goals for the LCR MSCP include the establishment of:

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

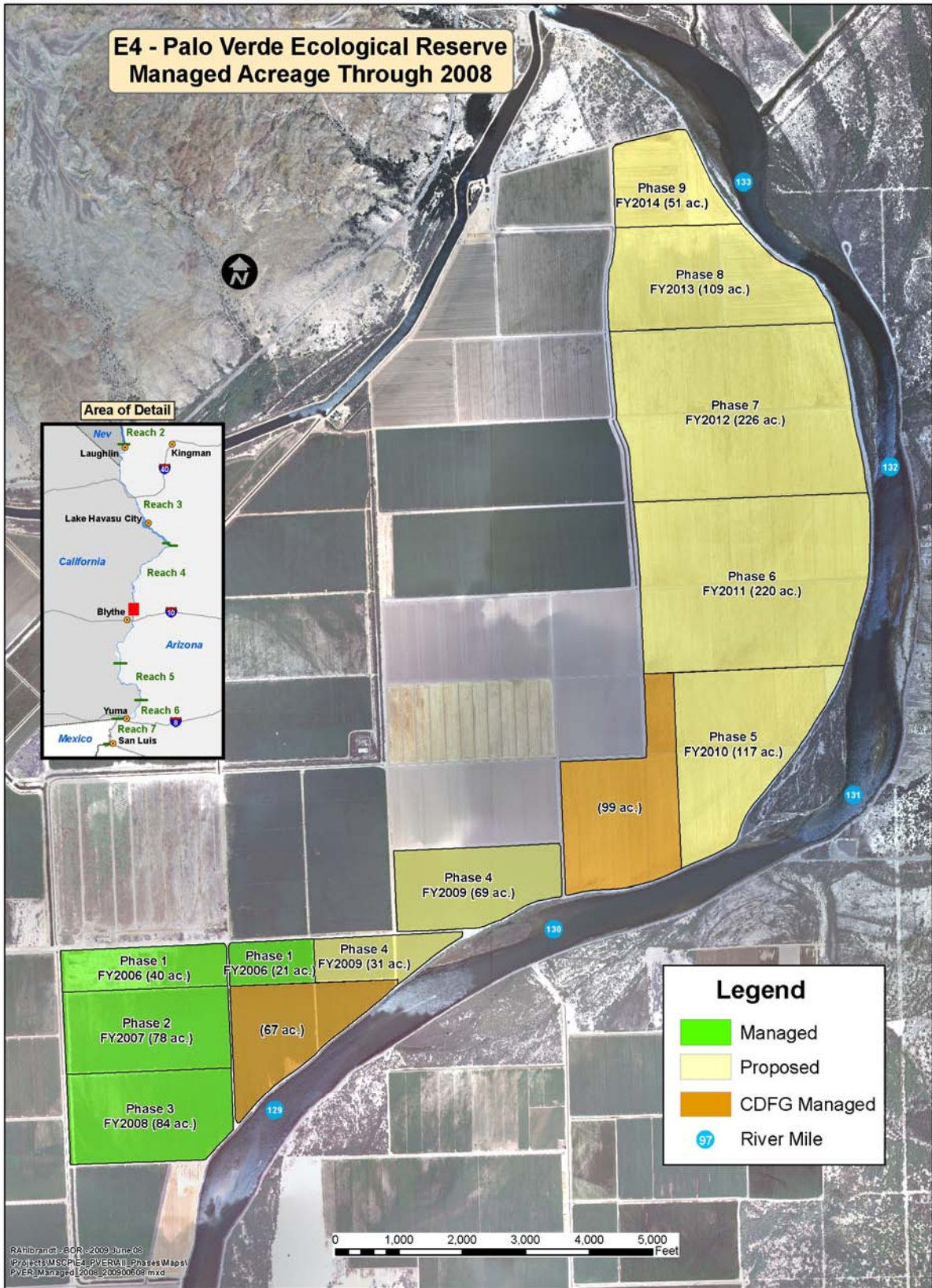
To the extent practicable based on site conditions, cottonwood-willow, honey mesquite, marsh, and backwaters will each be restored in proximity to other land cover types to create integrated mosaics of habitat that approximate the relationships among aquatic and terrestrial communities historically present 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 of the guidelines and their implementation 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 requirements for conservation areas 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

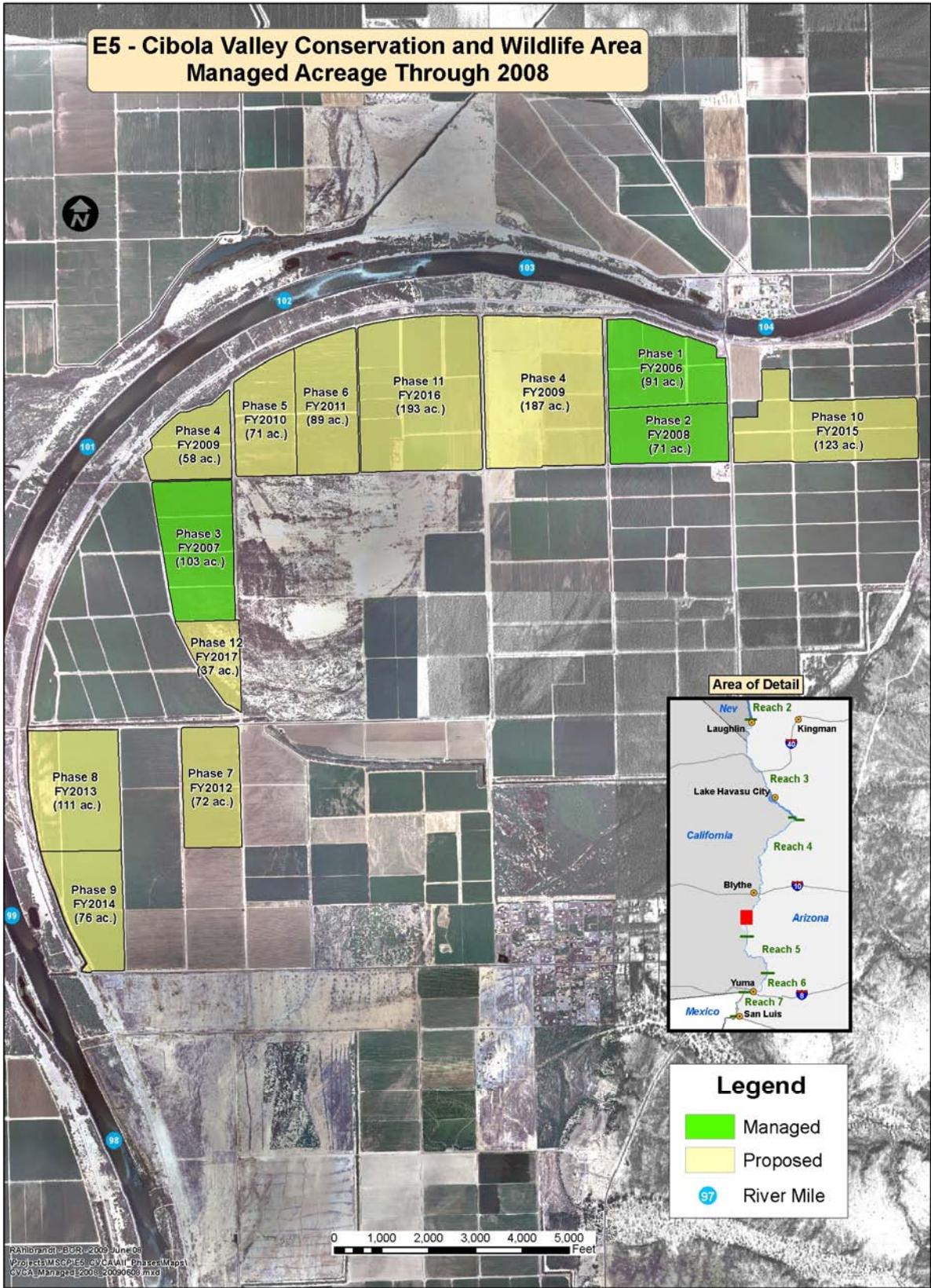
# Conservation Area Development and Management



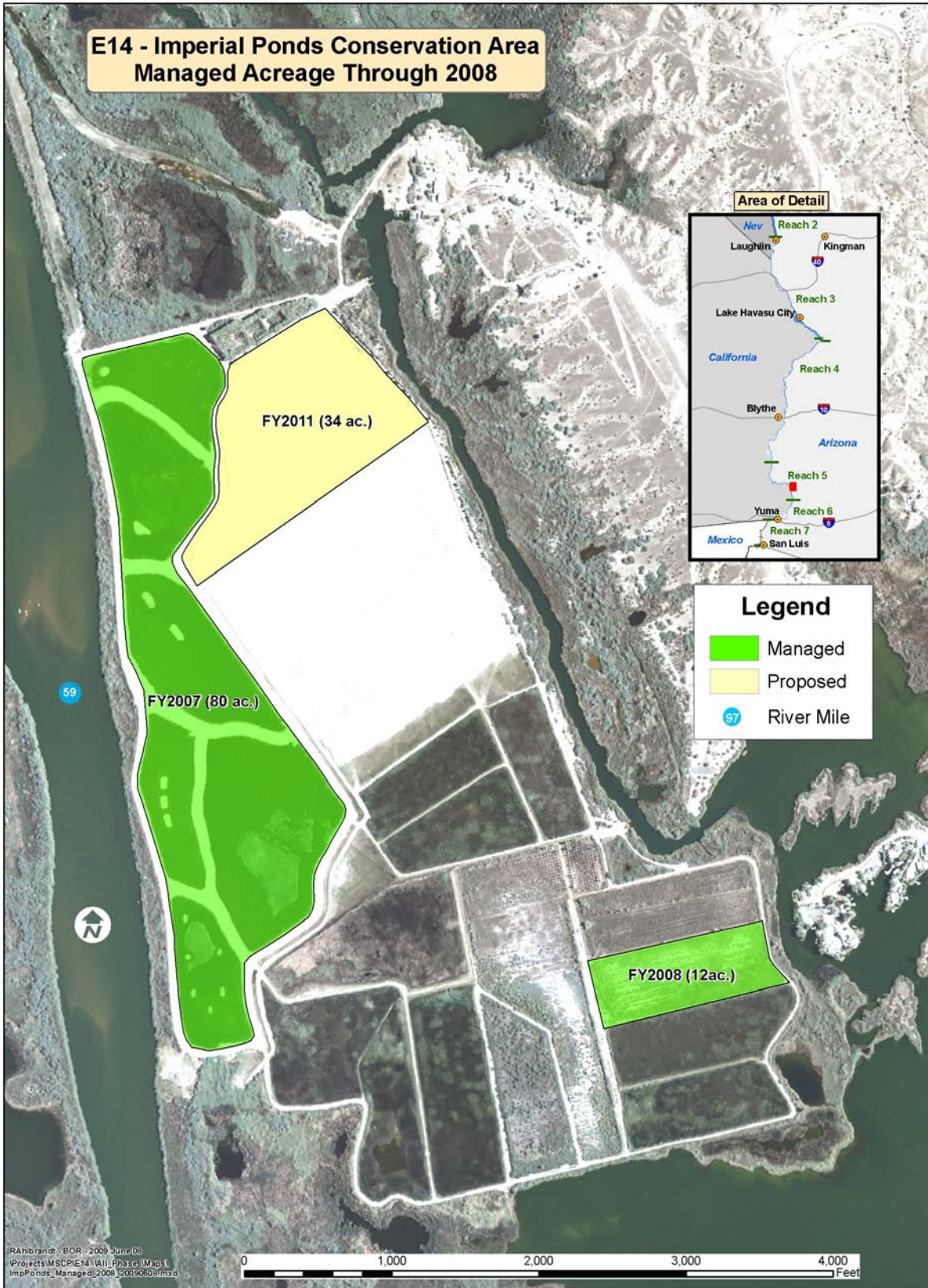
**E4 - Palo Verde Ecological Reserve  
Managed Acreage Through 2008**



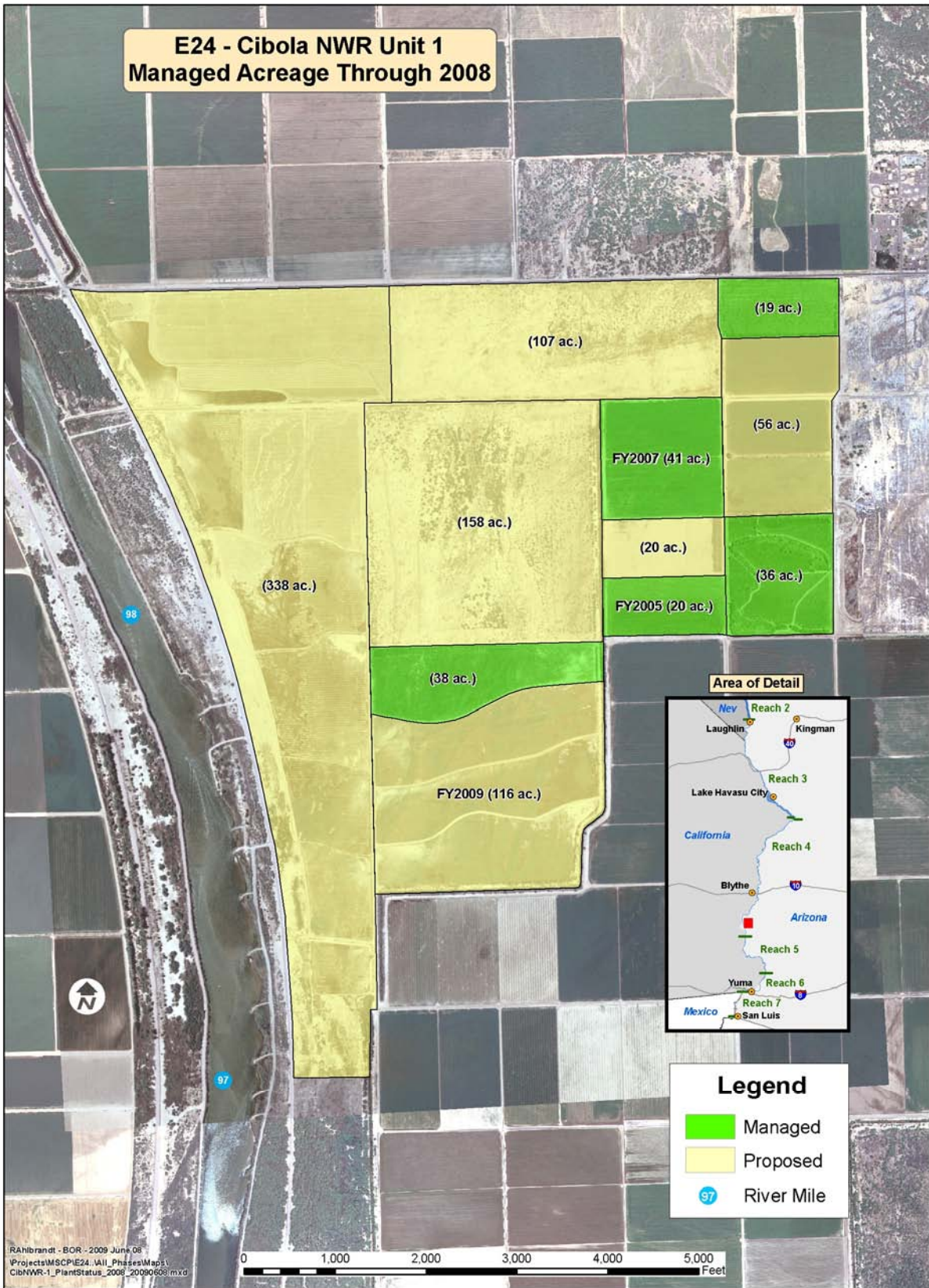
# E5 - Cibola Valley Conservation and Wildlife Area Managed Acreage Through 2008



**E14 - Imperial Ponds Conservation Area  
Managed Acreage Through 2008**



**E24 - Cibola NWR Unit 1  
Managed Acreage Through 2008**



nonnative plant species. Terrestrial restoration research projects underway include Beal Lake Riparian Restoration (E1), 'Ahakhav Tribal Preserve (E3), and Seed Feasibility Study (E8). Costs to manage land cover established under the Cottonwood Genetics Study (E6) and Mass Transplanting Demonstration (E7) are now captured under Cibola Unit #1 (E24).

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 requirements 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: site identification and selection, research and demonstration, and 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/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. Though 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 logistical: site accessibility, available infrastructure, availability of sufficient resources (water); physical: depth to groundwater, soil texture and chemistry, water quality, eutrophic stage; and 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 Adaptive Management Program to properly address and apply newly acquired information, allowing for more accurate assessment of development costs and success potential for future habitat creation projects.



## **FY08 Accomplishments:**

*Conservation Areas.* In January 2008, Reclamation announced the first Request for Projects (RFP). This RFP specifically targets the creation and development of honey mesquite within California and the acquisition of 230 acres of desert tortoise and 230 acres of flat-tailed horned lizard habitat. In following years, subsequent RFPs will be solicited and targeted toward the additional habitat creation cover types.

Two appraisals were completed and presented to the Steering Committee in FY08. The first estimated the cost for securing land and water for E21: Planet Ranch at \$8,300,000. The second appraisal established a value of \$872,000 for securing E25: Big Bend Conservation Area.

*Backwater Site Selection.* Trip reports (Step 3) for reaches 5 and 6 were completed and discussed with the Technical Work Group of the Steering Committee in February of 2008. The remainder of the fiscal year was spent in discussions with land managers and resource agencies to solicit comments from their respective agencies and the public, to guide decisions regarding which backwaters within reaches 5 and 6 should continue into Step 4 of the selection process.

## **FY09 Activities:**

*Conservation Areas.* Two potential activities, acquisition of lands for desert tortoise and flat tailed horned lizard, were identified under the FY07 RFP. After consultation with and after the passing of a land and water resolution by the Technical Work Group, letters of interest were sent to private in-holding land owners within the Chuckwalla Bench Area of Critical Environmental Concern to identify properties to meet the requirements of the desert tortoise conservation measure. To satisfy the flat tailed horned lizard conservation measure, two areas are currently being evaluated and were discussed at the Technical Work Group meeting in February of 2009. A recommendation on which area should be chosen is expected to be presented at the October 2009 Steering Committee meeting.

*Backwater Site Selection.* The program is in the process of defining reach-specific acreage goals for backwaters. These reach-specific acreage goals are intended to clearly define the impact of creation of backwaters to the Steering Committee, stakeholders, and resource agencies, as well as the general public. Site-specific data collection for backwaters in all reaches will be undertaken concurrently with the development of these acreage goals.

## **FY10 Proposed Activities:**

*Conservation Areas.* Appraisals of private in-holdings containing occupied desert tortoise habitat within the Chuckwalla Bench Area of Critical Environmental Concern are expected to be initiated in FY09 and completed in FY10. For flat tailed horned lizards, after both areas have been surveyed for habitat value, a recommendation on which area should be chosen to satisfy the flat tailed horned lizard is expected to be presented at the October 2009 Steering Committee meeting. Assessment of potential conservation areas identified in the FY08 RFP will continue. Identification and evaluation of backwaters on existing bare ground will be initiated.

The Laguna Division has been identified as having the potential for large-scale riparian and marsh restoration. In 2007, the Laguna Division Planning Group was formed to identify potential restoration projects within the division. In 2009, using funds outside of the LCR MSCP, draft alternatives for a large-scale Laguna Division Conservation Area are being created. If the alternatives appear to be technically feasible, cost effective, and adequate water is available to maintain and created habitat then funding will be requested from the LCR MSCP to refine the alternatives and implement the project.

*Backwater Site Selection.* The strategy for selecting acreage targets is expected to be completed and will assist with the prioritization of potential backwater sites. Backwater site selection will commence in reaches 3 and 4. Step 1 will be completed in FY10.

## **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 like 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.

**FY08 Accomplishments:** Land covers created during research efforts at Beal Lake Riparian Restoration and the 'Ahakhav Tribal Preserve were irrigated, managed, and monitored. Both projects will be managed through FY09, at which time a decision will be made to continue research, manage the land cover types as habitat, or close the work tasks.

*Seed Feasibility Study.* Based on results from the 2007 annual report, a contract modification was completed to maximize the benefit of these data and make a more informed decision before proceeding to the large-plot phase of this research. Dominance of cottonwood and poor establishment of willows in the small-plot studies suggest that willow species may not compete well against cottonwood and other plants. A small-scale test plot using only willow species was implemented.

**FY09 Activities:** Irrigation and monitoring of lands created at both the Beal Lake Riparian Restoration and the 'Ahakhav Tribal Preserve are continuing. 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.

*Seed Feasibility Study.* Fiscal Year 2009 activities are guided by results from FY08 research. If willow small-plot studies indicate that willow establishment is poor using seed, or if the monitoring of the 2007 small-plot studies indicate that saltcedar is persistent in high percentages compared to cottonwood, the large-plot studies will not be undertaken and the contract and work task will be closed. If willow establishment appears successful and the 2007 small plots have promising competitive advantages over nonnative weeds, particularly saltcedar, then testing of the most successful treatments on the large scale with standard irrigation infrastructure will be pursued in FY09. We are currently awaiting the report for FY08 to finalize activities for FY09.

**FY10 Proposed Activities:** FY09 was 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. If the results of seed research in FY09 indicated continued research is warranted, the large-scale seed feasibility demonstration would be initiated.

## **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 site identification and selection, conducting research studies and demonstration projects, and while developing and managing created land cover types, information is gathered that may affect understanding of these processes. This feedback, in turn, may serve to modify site selection or establishment approaches for future projects. It 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 it is identified as marsh, backwater, honey mesquite, or cottonwood-willow cover type, will have its own set of site-specific challenges to overcome.

**FY08 Accomplishments:** In 2008, conservation area development continued on lands secured for the program, which allows the LCR MSCP to begin fulfilling the obligations of the program. Working with LCR MSCP partners, three large conservation areas are being developed primarily for cottonwood-willow and honey mesquite. The first conservation area, PVER, was provided by our California partners, contains approximately 1,300 acres of active agricultural lands in Palo Verde Irrigation District, and is owned by the CDFG. The second conservation area, CVCA, contains approximately 1,019 acres of active agricultural lands and was secured by the LCR MSCP, which transferred ownership to the AGFD, and is serviced by the Cibola Valley Irrigation and Drainage District. Finally, the third conservation area, Cibola NWR Unit #1, was added in FY07.

Approximately 84 acres were added to the lands being managed at PVER and 71 acres at CVCA. The total number of acres managed to date is approximately 223 at PVER and 265 at CVCA. Both conservation areas are being irrigated and monitored in accordance with their respective restoration development and monitoring plans, which are posted on the LCR MSCP Web site.

Final construction and permitting documents were completed to allow for the creation of marsh at Hart Mine Marsh starting in FY09.

**FY09 Activities:** Phase 4 at PVER, scheduled for planting in the spring of FY09, is anticipated to establish an additional 100 acres of cottonwood-willow land cover type. Planting of Phase 4 at CVCA is anticipated to establish an additional 58 acres of honey mesquite. Development of approximately 154 acres, which targets cottonwood-willow land cover type, is also scheduled for Cibola NWR Unit #1.

Creation of the southern portion of Hart Mine Marsh, approximately 68 acres, is ongoing and is expected to be complete prior to marsh bird nesting season.

**FY10 Proposed Activities:** Continued cottonwood-willow and honey mesquite land cover types are planned. At PVER, Phase 5 is anticipated to create an additional 117 acres of cottonwood-willow. At CVCA, an additional 71 acres of honey mesquite is scheduled for planting. At Cibola NWR Unit #1, approximately 100 acres of cottonwood-willow land cover is anticipated to be established.

Excavation, contouring, and installation of water control structures in the northern portion of the marsh, approximately 106 acres, are scheduled to begin at Hart Mine Marsh. Final construction of the marsh is not anticipated until FY11.

The Yuma Crossing National Heritage Area, in coordination with the City of Yuma and the Quechan Tribe, has been developing the Yuma East Wetlands over a number of years. A report detailing 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 SC with the FY11 Work Plan in April of 2010. The report will also discuss commitments of the land use agreement and the process for suggesting and implementing adaptive management actions.

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## **WORK TASKS SECTION A**

## **PROGRAM ADMINISTRATION**

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## Work Task A1: Program Administration

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$1,187,000	\$965,406.01	\$3,585,517.01	\$1,231,780	\$1,313,220	\$1,313,220	\$1,313,220

**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 By-Laws for the Steering Committee were approved. A report format was developed for the LCR MSCP Annual Work Plan, and a financial tracking system was developed. A stand-alone Web site was established for the LCR MSCP program. A program decision document for in-kind credit for land and water was also developed and approved by the Steering Committee.

**FY08 Accomplishments:** Program Administration for FY08 continued the management of the LCR MSCP Program. Additional water was secured for the program through the acquisition of 1,419 acre feet of water for the Cibola Valley Conservation Area. A Request for Projects was issued and potential restoration sites for honey mesquite in California were identified. Existing flat-tailed horned lizard and desert tortoise habitat available for protection were also identified. The *Final Implementation Report, Fiscal Year 2009 Work Plan and Budget, and Fiscal Year 2007 Accomplishment Report* was prepared. Financial tracking for the program continued and an annual financial work group meeting was held.

**FY09 Activities:** Program Administration for FY09 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 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 Accomplishment Report* will be prepared. 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.

**Proposed 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 bi-annual Steering Committee meetings, specific work group meetings, and email announcements. The *Final Implementation Report, Fiscal Year 2011 Work Plan Budget, and Fiscal Year 2009 Accomplishment Report* will be prepared. Financial tracking for the program will continue and the annual financial work group meeting will be held. Securing additional land and water for the program will be pursued. Establishing procedures for long-term maintenance will be postponed until FY11.

**Pertinent Reports:** The *Final Implementation Report Fiscal Year 2009 Work Plan and Budget, Fiscal Year 2007 Accomplishments* is posted on the LCR MSCP Web site. The *Implementation Report, Fiscal Year 2010 Work Plan and Budget, Fiscal Year 2008 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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$200,000	\$149,085.82	\$810,319.82	\$200,000	\$200,000	\$200,000	\$200,000

**Contact:** Tom Burke, (702) 293-8310, tburke@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 razorback sucker (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 represent the remaining genomes for RASU and 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 2 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.

Work normally commences in January and extends into April. Equipment is delivered to and staged at Cottonwood Cove, where a field station is established. The lake's shoreline is surveyed by helicopter, and locations of spawning aggregations of RASU are recorded. Crews of two to four staff meet at the field stations at sunset, gather batteries, lights, dip nets, and buckets, and set out by boat to the spawning areas. Razorback sucker larvae attracted to submerged lights suspended from the boat are captured by net and are counted. Crews return to the field station, label buckets of larvae, record their capture success and location, place batteries back on chargers, clean and stow other gear, and place air stones in buckets to maintain adequate oxygen levels. The next morning the larvae are transferred to Willow Beach NFH by either boat or

vehicle, where they are logged in as to date received, number collected, and location. This work is repeated 4 to 6 nights per week through mid-to-late April.

**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.

**FY08 Accomplishments:** As was the case with last year’s collection, high survival for RASU larvae captured in 2005 and 2006, combined with concerns regarding quagga mussel invasion, resulted in a target of only 30,000 larvae being required for 2008. RASU larvae for Bubbling Ponds SFH, which normally come from this venture, will be supplied by Dexter NFH due to quagga mussel issues. Twenty-nine thousand seven hundred sixty-eight (29,768) wild larvae were collected from four areas. Contribution of larvae from each zone by month of capture is presented in Table 1.

**Table 1. Larval RASU Collected from Lake Mohave, 2008**

<i>Zone</i>	<i>January</i>	<i>February</i>	<i>March</i>	<i>April</i>	<i>Total</i>
<b>Nine Mile</b>	0	2,870	3,691	470	7,031
<b>Tequila</b>	0	3,015	4,250	1,751	9,016
<b>Yuma</b>	0	4,050	3,275	2,525	9,850
<b>AOP</b>	0	0	532	3,109	3,871
<b>Total</b>	<b>0</b>	<b>9,935</b>	<b>11,748</b>	<b>7,855</b>	<b>29,768</b>

Reclamation, NDOW, and NPS staff attempted larval collections at 35 sites in the Above Owl Point zone. RASU larvae were present at 26 of the sites visited.

**FY09 Activities:** A target of 25,000 larvae was established at the Lake Mohave Native Fish Work Group meeting. These will be delivered to Willow Beach NFH for rearing. Presence/absence surveys above Owl Point will lead to a continuation of this work in FY09. A survey will be conducted in the lowermost portion of Lake Mohave to search for additional new spawning sites. A status report covering the larval fish collections from 2005 to 2009 will be developed.

**Proposed FY10 Activities:** RASU larval collections will continue. Target levels for FY10 through FY14 are 50,000 larvae annually to produce fish for accelerated species research as required in the HCP (See conservation measures RASU3.1 and RASU6).

**Pertinent Reports:** A status report for the larvae collection program will be developed during FY09.

## Work Task B2: Willow Beach National Fish Hatchery

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$235,000	\$334,013.77	\$953,847.77	\$350,000	\$250,000	\$250,000	\$250,000

**Contact:** Ty Wolters, (702) 293-8310, twolters@usbr.gov

**Start Date:** FY05

**Expected Duration:** FY55

**Long-term Goal:** Fish Augmentation

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

**Location:** Reach 2, Willow Beach, Arizona

**Purpose:** Annually contribute RASU and bonytail (BONY) to the LCR MSCP Fish Augmentation Program.

**Connections with Other Work Tasks (past and future):** Much of the activity at Willow Beach NFH is related to other Work Tasks in Section B, because most of the RASU and BONY reared for the LCR MSCP Fish Augmentation Program spend time at Willow Beach NFH (for further information, please see the Fish Augmentation Plan, which provides an overview of the program and shows the interrelationships between the various hatcheries). Some of the fishery research actions described in Section C are ongoing at this facility, including Razorback Sucker Growth Studies (C10), Bonytail Rearing Studies (C11), Humpback Chub Monitoring Program (C14), 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.** Each year Willow Beach NFH is 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 Facility for further rearing and ultimately for stocking into reaches 3-5 of the lower Colorado River.

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 5000 RASU to 500 mm for repatriation to Lake Mohave.

**Previous Activities:** This coldwater trout 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. Similarly, the hatchery has provided fry to Bubbling Ponds SFH every year since 1997 for rearing and ultimately for return to the lower Colorado River. Since the inception of the LCR MSCP through 2007, a total of 21,165 RASU have been repatriated to Reach 2, and a total of 12,550 RASU have been stocked into Reach 3, bringing the cumulative total to 33,715 RASU stocked from Willow Beach NFH into the LCR.

**FY08 Accomplishments:** A total of 29,768 RASU larvae were received from Lake Mohave, fingerling BONY were distributed to Achii Hanyo for further rearing, and RASU juveniles for repatriation back to Lake Mohave are currently being reared. A total of 1,830 RASU juveniles (>380 mm TL) were distributed to Lake Mohave lakeside rearing ponds (B7). A total of 20 RASU and 7 BONY were repatriated into Lake Mohave (Reach 2). A total of 3,121 RASU were stocked into three backwaters along a 40-mile stretch of river below Davis Dam and Lake Havasu proper (Reach 3). A total of 3,445 RASU were stocked into Beal Lake (Reach 3), bringing the grand total to 6,566 RASU stocked into Reach 3 this year. The majority of funds were for salary and consumable materials (fish feed, medicines, chemicals, etc.). Additional funds that became available in FY08 were used to acquire solar heating panels and bird netting to replace aging units. Also, a new forklift was purchased and delivered to the facility.

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 have been developed and are under review by cooperating resource agencies.

**FY09 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 500 RASU of the 2005 year class, 11,300 RASU of the 2006 year class, 11,700 RASU of the 2007 year class, and 24,000 RASU of the 2008 year class. At the end of 2008 there were approximately 1,100 BONY of the 2007 year class and 20,000 BONY of the 2008 year class at the hatchery. Some of these fish will be transferred to Achii Hanyo (B3). Investigations into efficacy of potassium chloride and formalin for removing quagga mussel from transport tanks at Willow Beach NFH (C30) have been initiated. Two more raceways are being converted to form a recirculation system for production of native fish. Additional solar heating panels and bird netting will be purchased in FY09.



**Proposed FY10 Activities:** The hatchery will receive RASU larvae from Lake Mohave and continue to rear and distribute RASU and BONY for the LCR MSCP Fish Augmentation Program. Protocols developed for addressing issues with quagga mussel during fish distribution will be incorporated into the stocking program. Investigations into efficacy of potassium chloride and formalin for removing quagga mussel from transport tanks at Willow Beach NFH (C30) are anticipated to be completed in FY10.

Production levels are expected to increase in FY09 and again in FY10 to reach annual RASU production of 12,000 fish for research as required in the HCP (see conservation measures RASU3.1 and RASU6).

**Pertinent Reports:** The *2008 Fish Augmentation Summary* is in preparation and will be posted to the LCR MSCP Web site.

## Work Task B3: Achii Hanyo Rearing Station

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$50,000	\$102,288.46	\$257,067.46	\$170,000	\$100,000	\$100,000	\$100,000

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

**Start Date:** FY04

**Expected Duration:** FY55

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

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

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

**Purpose:** Support operation and maintenance of fish-rearing facilities to annually contribute 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 task 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 Facility. 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 Facility 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) near Parker, Arizona. There are seven earthen ponds and these receive Colorado River water from an irrigation canal. There are two house trailers and a storage shed on site, and drinking water is supplied by a shallow well. Fish rearing is seasonal, producing one crop per year. The BONY are brought in from Willow Beach NFH 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 included the purchase and assembly of a new metal building (tank house) and new fiberglass fish tanks. A concrete slab was poured for a new office, feed storage room, and restrooms. During 2007, electrical upgrades were completed, and a restroom and office were finished. Since the inception of the LCR MSCP, 16,046 BONY have been stocked from Achii Hanyo rearing station into the LCR.

**FY08 Accomplishments:** At the start of 2008, 12,151 BONY and 4,080 RASU were on station. A total of 2,129 BONY were harvested and tagged. These fish were stocked at Bill Williams River NWR (Reach 3). An additional 34 BONY from research conducted under Bonytail Rearing studies (C11) were PIT tagged and also stocked into Reach 3. A total of 60 RASU were harvested. These fish received a half-duplex tag (135 khz) and were stocked at Imperial Refuge (Reach 5). Fish research was initiated in 2008 at Achii Hanyo to assess RASU growth to 500 mm TL and polyculture of RASU and BONY under C10. This research is expected to continue for 3 years. A 3-year agreement was initiated in October 2007 (FY08) to provide an additional \$25,000 annually for utilities and maintenance. Additional funds that became available during 2008 were used to purchase a backup generator and upgraded aeration systems for fish-holding tanks in the tank house. The restrooms were completed in 2008.

**FY09 Activities:** The BONY on station for 2009 include 5,156 fish greater than 250 mm TL, and 4,000 young-of-the-year fish. There are also eight RASU greater than 250 mm TL and 479 young-of-the-year fish. Willow Beach NFH will not be transporting BONY or RASU to Achii Hanyo in spring 2009. The production target for 2009 is a harvest of 6,000 BONY at greater than 300 mm TL. A pond-liner and new generator are planned for installation in 2009. Levee roads between and around the ponds will be graded and resurfaced with gravel during the summer.

**Proposed FY10 Activities:** Two additional ponds will be put into service to increase fish production for years FY11-FY15. These fish are required for species research as described in the HCP (see conservation measures BONY 3.3 and BONY 5). The FY10 production goals will increase to 8,000 BONY.

**Pertinent Reports:** An annual progress report will be posted to the LCR MSCP Web site. Fish production data are being incorporated into the *2008 Fish Augmentation Summary Report*.

## Work Task B4: Dexter National Fish Hatchery

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$130,000	\$140,519.61	\$507,846.61	\$250,000	\$180,000	\$180,000	\$150,000

**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, and BONY4

**Location:** Off-river, Dexter, New Mexico

**Purpose:** Operate and maintain the fish-rearing facility, annually contribute RASU and BONY to the LCR MSCP Fish Augmentaion Program, and maintain BONY broodstock through completion of the Fish Augmentation Program for this species.

**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 Fish Rearing Facility, and Uvalde NFH. In addition, fish-rearing research activities outlined in C10, C11, and C30 may be conducted at Dexter NFH.

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

**Previous Activities:** Reclamation and the USFWS have past and ongoing interagency agreements to support rearing and research for RASU and BONY at Dexter NFH. Since the inception of the LCR MSCP through 2007, a total of 136 RASU have been repatriated to Reach 2, a total of 794 RASU have been stocked into Reach 3, and a total of 7,477 BONY have been stocked into Reach 3.

**FY08 Accomplishments:**

**BONY.** USFWS staff hand-stripped eggs and sperm from adult BONY, producing 150,000 fry. A total of 45,000 larvae were transferred to Willow Beach NFH, 25,000 were transferred to Uvalde NFH, 5,000 were transferred to New Mexico State University for research under Work Task C11, and the remaining fry were held on station for rearing. A total of 5,100 fingerling BONY were transferred to Willow Beach NFH for grow out. USFWS staff tagged 2,431 subadult BONY (300+ mm TL), of which 333 were stocked into Beal Lake and 2,098 were stocked into Lake Havasu proper (Reach 3). A total of 535 BONY were stocked into Cibola High Levee Ponds (Reach 4).

**RASU.** USFWS staff hand-stripped eggs and sperm from adult RASU, producing 115,000 fry. 50,000 fry were transferred to Bubbling Ponds SFH for rearing. No RASU were transferred to Dexter NFH from Willow Beach NFH due to ongoing quagga mussel issues. No RASU were stocked into Reach 3.

**FY09 Activities:** The BONY broodstock will be maintained, and the hatchery will produce between 150,000 to 300,000 fingerling BONY for distribution depending upon various agency requests (including Willow Beach NFH, Achii Hanyo Fish Rearing Facility, and Uvalde NFH); A total of 2,000 RASU will be reared to 500 mm TL for repatriation to Lake Mohave, and 4,000 BONY will be reared to 300 mm TL for distribution within Reach 3. A new road grader will be purchased and used to develop and maintain ponds and roadways on the site. This grader will allow construction of three new ponds for production of BONY for Phase II research.

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

**Proposed FY10 Activities:** The BONY broodstock will be maintained. Up to 75,000 fingerling BONY will be produced for distribution to Willow Beach NFH and Achii Hanyo Fish Rearing Facility, 500 to 1,000 RASU will be reared to 500 mm TL for repatriation to Lake Mohave, and 4,000 BONY will be reared to 300 mm TL for distribution within reaches 3-5.

**Pertinent Reports:** The *2008 Fish Augmentation Summary* will be posted to the LCR MSCP Web site.

## Work Task B5: Bubbling Ponds Fish Hatchery

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$235,000	\$303,301.12	\$818,678.12	\$335,000	\$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 warm-water 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 2007, Bubbling Ponds SFH has reared and stocked 24,348 RASU.

**FY08 Accomplishments:** A total of 50,000 fry were received from Dexter NFH in April for rearing, and should reach target size in 2010 and 2011. During 2008 a total of 12,125 RASU were harvested, wire-tagged, and stocked: 88 were repatriated into Lake Mohave, 2,970 were

stocked into Beal Lake, and 9,067 were stocked into four separate locations between Parker Dam and Cibola National Wildlife Refuge.

During 2008 funds were expended for the following: salary and associated costs for fish rearing activities, fencing off of the spring source to the hatchery improved bio-security, staff residence security, a shade structure for tagging, design of intensive culture plans for the hatchery, and nets and materials for live-trapping river otters.

**FY09 Activities:** Bubbling Ponds SFH began 2009 with approximately 60,000 RASU on station. Of this total, 6,000 stem from wild larvae captured in 2005 from Lake Mohave. These fish should reach target size during 2009 and will be repatriated back to Lake Mohave. The remaining fish on station are from Dexter NFH and are expected to go out in 2009 and 2010. An additional 50,000 larvae from Dexter NFH are scheduled to be delivered in spring 2009.

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 will begin in 2009.

Additional funds made available in 2009 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 sterilizing nets and boots.

**Proposed FY10 Activities:** RASU larvae will be received from either Dexter NFH or Willow Beach NFH, RASU from the 2007 and 2008 year classes will continue to be reared, 12,000 RASU (300 mm TL) will be sorted, tagged, and delivered 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 dove-tailed into the new systems.

**Pertinent Reports:** The *2008 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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$50,000	\$48,190.46	\$202,557.46	\$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 the fish-rearing facility to provide RASU for the LCR MSCP Fish Augmentation Program

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

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

**Purpose:** Support Lake Mead RASU studies, complete conservation measures identified in the ISG/SIA BO subsumed under the LCR MSCP, 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 C13 and B11. 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).

**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 for years 6 through 10 (FY11-FY16), during which time the number of RASU needed annually for stocking into reaches 3-5 increases from 12,000 fish per year to 24,000 fish per year.

**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.

**FY08 Accomplishments:** 2,027 larval RASU (1,993 from Las Vegas Bay, 9 from Echo Bay, and 25 from the Overton Arm) were collected from Lake Mead and taken to the hatchery. NDOW delivered and stocked 2,872 juvenile RASU (2006 and 2007 year-classes) into Center Pond at the Overton WMA. Currently 2,963 RASU are being reared at Lake Mead SFH.

**FY09 Activities:** RASU production will continue and include rearing of wild-caught larvae from 2009 and grow-out of sub-adult fish from the 2007 and 2008 year classes. The RASU on station will be utilized in tests conducted under work task C26. Production capability at this site will be assessed and a cost estimate developed for rearing up to 6,000 RASU to 300 mm TL for fish augmentation program needs through 2016.

**Proposed FY10 Activities:** Continued rearing of RASU captured during previous years will occur, and RASU stock will be augmented with 2010 year-class RASU larvae from Lake Mead. Delivery of 2008 year class RASU to Overton WMA will take place.

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

## Work Task B7: Lake-side Rearing Ponds

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$175,000	\$173,950.09	\$745,591.09	\$175,000	\$150,000	\$150,000	\$150,000

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

**Start Date:** FY05

**Expected Duration:** FY16 decision point

**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 and B4, as fish for grow-out ponds will come from Willow Beach NFH, Dexter NFH, and Bubbling Ponds FH. In addition, some of the fish-rearing research activities outlined in C10 and C11 may be conducted at these ponds.

**Project Description:** Lake Mohave is operated by Reclamation as a re-regulation reservoir. It operates annually within a 15-foot vertical elevation range, filling to an elevation of 645.5 feet msl by mid-May and lowering to an elevation of 630.5 feet msl in October. Desert washes, which flow into the reservoir, deposit sediment and create wash fans. Wave actions have redistributed and shaped these sediment deposits into sandbars and in some areas these sandbars isolate the lower portions of the washes from the lake proper. There are at least 10 such sandbars that have ponds behind them when the lake is full. Reclamation and its partners in the Lake Mohave Native Fish Work Group have been using these lakeside 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 throughout the growing season. This 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 into Lake Mohave.

**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. Few of the fish harvested that year grew to that size, and there were approximately 913 young-of-year RASU harvested from four ponds. Volunteer spawning in the ponds may have impeded maximum growth of the RASU.

**FY08 Accomplishments:** In 2008 eight lakeside ponds received 1,229 large RASU (295-460 mm TL) in February, March, and June. The amount and types of fish stocked varied from pond to pond in order to test various hypotheses.

First, it was believed that during 2007, reproduction in the pond hampered optimum growth. One way to test this was to put only males or only females into the pond. During 2008, Willow Cove and North Nine Mile each received 42 RASU males from Bubbling Ponds SFH. These fish averaged 360 mm. At the end of the summer, Willow Cove yielded 21 fish which averaged 450 mm and North Nine Mile yielded only 4 fish which averaged 410 mm. In each case, the fish did not reach the target size of 500 mm TL, despite there being no reproduction and despite the fact that densities were very low. It is possible that heat stress or poor oxygen levels impacted both growth and survival.

For the second test, two ponds were selected to receive BONY as well as RASU to see if the BONY would crop off any young-of-year RASU. Arizona Juvenile (AJ) and Dandy (DD) backwaters each received about 200 RASU and 50 BONY (the RASU averaged 365 mm and the BONY averaged 200 mm). Survival of the stocked RASU was fairly good in both ponds, nearly 75%. There was natural reproduction of RASU in AJ, but the BONY did not appear to have suppressed this, as 911 YOY RASU were collected from the pond. In DD there did not appear to be natural reproduction but we cannot truly be sure. There were six fish harvested, which were less than 400 mm TL (these fish were transferred to Davis Cove). It could not be discerned whether these were volunteer spawners or were just undersized fish that were in the group of fish originally stocked. Two facts were common to both of these ponds: 1) BONY spawned in each pond and hundreds of young-of-year fish were collected, 2) in neither pond did RASU growth reach the target size of 500 mm TL. Also, for each pond, survival of the BONY stocked was 50% and growth increased from 200 mm at stocking to about 290 mm at harvest (all BONY were released to Lake Mohave).

North Chemehueve (NC) and Nevada Larvae (NL) were the two best producers during 2008. Each pond received RASU from Willow Beach NFH in the 365 mm size range. Both ponds saw survival of more than 90% and both yielded some fish over 500 mm TL. In addition, six fish were captured from each pond that measured less than 400 mm TL. These fish were PIT tagged and stocked into Davis Cove. The six fish from NL may have been volunteer spawned because they were considerably less than the size of fish stocked in the spring. For NC, these six fish were larger and could have been part of the original stock.

Yuma Cove received the greatest number of fish (461) and yielded the largest individuals. However, it is not possible to determine a survival rate for Yuma Cove as 1) the pond already had fish in it from last year, and 2) the pond was not completely harvested in 2008. Only a subset of fish was removed, and these were selected as research subjects for an ongoing survival study

in the lake. Large fish were intentionally left in the pond. It is hoped that these fish will spawn in spring 2009 and provide a backup source of larvae, if needed. In addition, about 600 of the volunteer-spawned RASU from AJ were transferred to this site during the fall harvest.

South Sidewinder backwater pond was a complete failure in 2008. None of the 30 RASU appeared to survive the summer. Nevada Egg was not used in 2008 because the berm that isolates it from the lake had been breached by a flash flood due to a local thunderstorm.

**Table 1. 2008 RASU and BONY Repatriated to Lake Mohave**

<b>Ponds RASU</b>	<b># Stocked</b>	<b>Mean Length @Stocking</b>	<b># Harvested</b>	<b>Mean Length @Harvest</b>	<b>% Harvested</b>
Yuma*	461	332	108	519	23
Nine Mile	42	362	4	410	10
Willow	42	355	21	452	50
Nevada Egg	0	0	0	0	0
Dandy	204	365	159	438	78
Arizona Juvenile	200	365	143	426	72
Nevada Larvae	50	365	47	458	94
N. Chemehueve	200	365	181	451	91
S. Sidewinder	30	365	0	0	0
<b>Total</b>	<b>1,229</b>	<b>345</b>	<b>663</b>	<b>454</b>	<b>52</b>
<b>Ponds BONY</b>					
Dandy	50	200	25	298	50
Arizona Juvenile	50	200	25	288	50
<b>Total</b>	<b>100</b>	<b>200</b>	<b>50</b>	<b>293</b>	<b>50</b>

\*Represents fish that were stocked and does not include volunteer spawn fish

**FY09 Activities:** Lakeside ponds will continue to be used for RASU brood stock maintenance and development.

**Proposed FY10 Activities:** Lakeside ponds will continue to be used for RASU brood stock maintenance and development.

**Pertinent Reports:** The *2008 Fish Augmentation Summary* is under development and will be posted to the LCR MSCP Web site.

## Work Task B8: Fish Tagging Equipment

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$75,000	\$66,890.83	\$307,933.83	\$75,000	\$75,000	\$75,000	\$75,000

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

**Start Date:** FY04

**Expected Duration:** FY19 decision point

**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 task 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. Work task C23 is evaluating new PIT-tag technology and results may influence future purchases.

**Project Description:** The LCR MSCP will rear and stock more than 1.2 million native fish into the LCR over the 50-year term of the program. Reclamation currently plans to mark these fish to assess distribution and survival and to provide for effective research and monitoring. This information is required for decision making under the AMP.

Current marking techniques include PIT tagging, wire tagging, fin clipping, radio tagging, and sonic tagging. Funds associated with this work task provide for both the tagging materials and for the detection equipment needed during monitoring and research. Costs are expected to be highest during the first 10 to 15 years of the LCR MSCP and decrease in later years as research actions transition to routine monitoring.

Under conservation measures outlined in the HCP, LCR MSCP will implement an experimental augmentation of 24,000 RASU and 8,000 BONY each year for 5 years (160,000 total), and conduct intensive follow-up monitoring. Reclamation plans to conduct these two actions simultaneously during FY11-FY16, expects to PIT tag all of these fish, and plans to radio tag or sonic tag a subset of these fish. Following completion of this work, Reclamation will evaluate monitoring results through the adaptive management process and assess the need for

continuation of tagging of RASU and BONY through augmentation stockings. This decision is expected to be made in FY19 after observations and analysis have been completed.

**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.

**FY08 Accomplishments:** PIT tags, tagging equipment, and tag readers were purchased as needed to mark fish for monitoring and research. A total of 19,433 RASU and 5,136 BONY were PIT and/or wire tagged and released into the LCR during 2008.

**FY09 Activities:** PIT tags, tagging equipment, and tag readers will be purchased as needed to mark fish for monitoring and research.

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

**Pertinent Reports:** N/A

## Work Task B10: Uvalde National Fish Hatchery

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY011 Proposed Estimate	FY12 Proposed Estimate
\$60,000	\$74,191.86	\$391,313.86	\$60,000	\$85,000	\$100,000	\$100,000

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

**Start Date:** FY06

**Expected Duration:** FY16

**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 Fish Augmentation Program, and provide a facility where species research can occur.

**Connections with Other Work Tasks (past and future):** 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 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 5 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 2006, both fry and fingerling BONY were brought on station from Dexter NFH to assess growth rate and rearing capacity of Uvalde NFH for this species. The fingerling fish averaged 172 mm TL and were stocked into four 1-acre ponds; two ponds were at densities of 500 fish per acre and two ponds were at densities of 1,000 fish per acre. In October, these fish were harvested from the ponds and hauled by tank truck to Dexter NFH. After a 2-week rest period, the fish were measured and tagged for distribution. A total of 2,397 BONY having an average length of 325 mm TL were stocked into Reach 3 of the LCR at Park Moabi, south of Needles, California. Survival following the 180-day growing period, fish harvest, and transport was excellent at 92% (2,744 fish). Growth was remarkable, with 86% of the BONY having attained the target size of 300 mm TL or more in this short time period.

During 2007, BONY fry from 2006 were sorted and measured. A total of 7,500 of these fish averaging 196 mm TL were stocked into grow-out ponds in April. Three 1-acre ponds received 1,000 BONY and three 1-acre ponds received 1,500 BONY. Ponds were harvested in October. One pond that had received 1,000 fish had been lost over summer due to a mechanical problem. Of the remaining five ponds that had started out with 6,500 BONY, more than 5,992 BONY had survived (92%) and roughly 88% reached the target size of 300 mm TL.

During routine fish health inspections in July 2007, a subsample of Guadalupe largemouth bass on station tested positive for Largemouth Bass Virus. This is a restricted pathogen in both Arizona and California. Bonytail 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.

The Guadalupe bass that had been infected were removed from the hatchery and the ponds were dried and completely disinfected. Subsequent tests of all fishes and ponds on station in 2007 came up clean for the LMB Virus.

**FY08 Accomplishments:** Uvalde NFH continued rearing of BONY remaining on station from 2007, which had not been stocked due to LMB Virus issues. These fish are now in the 400+ mm size range. BONY growth studies were repeated using the similar densities as had been used in 2007; however, most of the fish were smaller to start with (94 mm versus 196 mm in 2007). Some 7500 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 LMB Virus and was clean.

**FY09 Activities:** BONY growth research will continue at Uvalde NFH. Tests during 2009 will compare stocking densities of 1,500 fingerlings per acre with 2,000 fingerlings per acre. Future work at the hatchery is dependent upon reinstatement of the hatchery's Class A rating. This will be determined following fish health tests scheduled for July 2009. If the hatchery is clean at that



time, fish on station will then be available for transport and stocking into the lower Colorado River.

**Proposed FY10 Activities:** Continue BONY research on fish growth relative to size and density. Coordinate and cooperate with fish feeding trials utilizing the new BONY diet formulation being developed under Work Task C11. Tag, transport, and stock out BONY as available from completed research actions.

**Pertinent Reports:** The scope of work is available upon request from the LCR MSCP. A report covering the growth study research is available on the LCR MSCP Web site.

## Work Task B11: Overton Wildlife Management Area

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$75,000	\$16,879.79	\$123,593.79	\$175,000	\$50,000	\$50,000	\$50,000

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

**Start Date:** FY06

**Expected Duration:** FY16

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

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

**Location:** Reach 1, Overton, Nevada.

**Purpose:** Provide additional rearing capacity for RASU, and complete RASU conservation measures identified in the 2001 BO.

**Connections with Other Work Tasks (past and future):** This work is closely related to B6 and C13. Once developed, the rearing ponds at the Overton WMA will receive juvenile RASU from Lake Mead SFH for grow out. Fish will then be released into Lake Mead to complete SIA BO conservation requirements. In future years, principally FY11-FY16, work at Overton WMA may include receiving and rearing 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 with 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 rearing of RASU for repatriation to Lake Mead to complete the ISC BO requirements set out in 2001. Fish will be transferred to Overton WMA ponds from Lake Mead SFH.

After the ISC BO commitments are completed, LCR MSCP may utilize the grow-out ponds at Overton WMA to complete other LCR MSCP Fish Augmentation Program needs. These include, but are not limited to, rearing RASU received from Willow Beach NFH to 500 mm TL for repatriation to Lake Mohave to maintain the adult brood stock, and rearing of RASU for reaches 3-5 of the LCR to affect accelerated stocking needs during program years FY11-FY16. Finally,

Overton WMA may provide opportunities to conduct species research that may be required 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 completed in 2007, and prior to stocking native fishes, Reclamation assisted with sampling these ponds to determine species composition.

**FY08 Accomplishments:** A total of 2,872 juvenile RASU (2006 and 2007 year classes) reared at Lake Mead SFH were delivered and stocked into Center Pond during FY08. Recurrent monitoring of ponds and fish was carried out through the end of FY08. Equipment to curtail aquatic vegetation, including a 14-foot aluminum boat and chemical spray unit, was purchased to aid in pond management.

**FY09 Activities:** RASU reared at Lake Mead SFH will be transferred to Overton WMA ponds for further rearing. Sampling and monitoring of ponds and fish will be conducted periodically throughout FY09 and pond stock may be repatriated to Lake Mead. Repairs to water delivery systems and outlet works will continue as needed, and improvements to existing ponds including deepening and boat ramp installation will occur. Funds will be used to initiate an overall RASU management plan to define role of Overton WMA ponds for RASU conservation within Reach 1. Specifically, the relationship between this work task and others associated with Lake Mead RASU (B6, C10, C13, and C26) will be evaluated.

**Proposed FY10 Activities:** Razorback sucker in Overton WMA ponds will continue to be monitored through sampling efforts. RASU from Lake Mead SFH will be stocked for grow-out and repatriation to Lake Mead. Improvements to existing ponds and infrastructure will continue.

**Pertinent Reports:** The scope of work and cooperative agreement are available upon request.

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## **WORK TASKS SECTION C**

### **SPECIES RESEARCH**

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## Work Task C2: Sticky Buckwheat and Threecorner Milkvetch Conservation

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$11,000	\$10,000.00	\$30,000.00	\$11,000	\$11,000	\$11,000	\$11,000

**Contact:** Allen Calvert, (702) 293-8311, [acalvert@usbr.gov](mailto:acalvert@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 Clark County MSHCP Rare Plant Workgroup 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 5 years, depending on availability, to keep administrative costs at a minimum.

**Previous Activities:** In FY07, \$10,000 was provided to the Clark County MSHCP Rare Plant Workgroup via a 5-year agreement between Reclamation and the NPS.

**FY08 Accomplishments:** In FY08, \$10,000 was provided to the Clark County MSHCP Rare Plant Workgroup via a 5-year agreement between Reclamation and the NPS. These funds were used in 2007 and 2008 for a pilot study to determine a new survey protocol for sticky buckwheat and threecorner milkvetch.

For sticky buckwheat, data collected included associated plant species, cover estimates of all plant species occurring within plots, threats, disturbance, and number and location of all sticky buckwheat plants within each plot. Exotic plant species occurred more frequently within plots, which suggests that as relative cover of exotics increases, native species cover decreases. A cattle

exclosure study determined the effects of grazing and trampling on sticky buckwheat, and no significant difference was found between exclosure plots and control plots from one year of data.

For threecorner milkvetch, data collected included presence/absence of threecorner milkvetch for spatial patterning, plant species composition, cover estimates for each species, disturbance, threats, and threecorner milkvetch counts and locations. Native species had a higher cover than exotics, consecutive years of data will allow for more detailed analyses.

**FY09 Activities:** Funds in the amount of \$10,000 will be transferred to the NPS through a 5-year agreement. A report will be provided to Reclamation summarizing monitoring of threecorner milkvetch and sticky buckwheat.

**Proposed FY10 Activities:** Funds in the amount of \$10,000 will be transferred to the NPS through a 5-year agreement. A report will be provided to Reclamation summarizing monitoring of threecorner milkvetch and sticky buckwheat.

**Pertinent Reports:** The scope of work is available upon request from the LCR MSCP. *Report on Astragalus geyeri var. triquetrus (Threecorner Milkvetch) and Eriogonum viscidulum (Sticky Buckwheat) within Lake Mead National Recreation Area - 2008* will be posted on the LCR MSCP Web site.



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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$15,000	\$4,637.56	\$248,777.56	\$15,000	\$15,000	\$15,000	\$15,000

**Contact:** Theresa Olson, (702) 293-8127, [tolson@usbr.gov](mailto: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 were completed for nine LCR MSCP covered species that use backwater, marsh, or riparian/marsh interface habitats. Species accounts for RASU, BONY, and FLSU

included sections on distribution, historical habitat modifications, systematics and morphometrics, hybridization, habitat, reproduction, diet, age, and growth.

Data on distribution, migration, habitat, nesting, food habits, and conservation and management were incorporated for California black rail, Yuma clapper rail, western least bittern, southwestern willow flycatcher, and western yellow-billed cuckoo. The species account for Colorado River cotton rat included data on distribution, systematics, habitat, nesting, food habits, and conservation and management.

Species accounts for the 25 covered species and 5 evaluation species listed in the HCP that utilize terrestrial, marsh, and riparian habitats have been developed. 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 5-year plan and will be completed according to importance, urgency, and cost. Other potential research and monitoring opportunities, either identified through this process or by other scientists or conservation programs, that are outside of the scope and purpose of the LCR MSCP have also been listed to further non-LCR MSCP conservation activities.

**FY08 Accomplishments:** The species accounts were finalized in FY08. Literature searches, literature acquisition, and data compilation was conducted by biologist staff to update species accounts as needed. This is a living document and will be updated as new information regarding species is gathered.

**FY09 Activities:** Information will be gathered from recent literature and will be incorporated into the species accounts on a 5-year cycle.

**Proposed FY10 Activities:** Information will be gathered from recent literature and will be incorporated into the species accounts on a 5-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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$11,000	\$12,667.29	\$38,576.29	\$11,000	\$11,000	\$11,000	\$11,000

**Contact:** Allen Calvert, (702) 293-8311, [acalvert@usbr.gov](mailto: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 5 years, depending on availability, to keep administrative costs at a minimum.

**Previous Activities:** In FY06 and FY07, funds in the amount of \$10,000 were transferred to the NPS through a 5-year agreement.

**FY08 Accomplishments:** Funds in the amount of \$10,000 were transferred to the NPS through a 5-year agreement. In 2008, a report was generated to document 2008 activities. Major relict leopard frog conservation activities supported by these funds included:

1. A total of 150 tadpoles and 389 frogs were released to augment current experimental sites; one new spring was added in 2008.
2. Diurnal and nocturnal surveys were conducted year-round at established and experimental sites; egg masses were seen at 10 of 13 sites.
3. Five potential sites have been discussed for future translocation of frogs.
4. The Relict Leopard Frog Conservation Team met on two occasions.

**FY09 Activities:** Funds in the amount of \$10,000 will be transferred to the NPS through a 5-year agreement. A report will be provided to Reclamation summarizing calendar year 2009 monitoring of experimental and natural populations of relict leopard frogs, and frog rearing and relocation activities.

**Proposed FY10 Activities:** Funds in the amount of \$10,000 will be transferred to the NPS through a 5-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.

**Pertinent Reports:** The scope of work is available upon request from the LCR MSCP. *Relict Leopard Frog Monitoring, Management, and Research – 2008 Activity Report* will be posted on the LCR MSCP Web site.

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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$90,000	\$82,971.14	\$138,981.14	\$90,000	\$90,000	\$90,000	\$0

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

**Start Date:** FY06

**Expected Duration:** FY11

**Long-term Goal:** Species Research

**Conservation Measures:** MRM1 (WIFL, YBCU, GIFL, GIWO, VEFL, BEVI, YWAR, SUTA, WRBA, WYBA, CLNB, PTBB)

**Location:** Cibola NWR Unit #1 (E24: Nature Trail and Mass Transplanting Demonstration Sites) (Reach 4, Cibola NWR, Arizona, 1/2 mile east of River Mile 97) and Cibola Valley Conservation Area (E5) (Reach 4, Reclamation, Hopi Tribe, and Mohave County, Arizona, south of River Mile 103). Beal Riparian and Marsh (E1) (Reach 3, Havasu NWR, Arizona, 0.5 miles east of river miles 238-239).

**Purpose:** The purpose of this study is to determine what abiotic factors may affect insect populations in riparian restoration sites.

**Connections with Other Work Tasks (past and future):** Work task C5 developed from Southwestern Willow Flycatcher Prey Base Study (C20). Work task C20, completed in 2006, identified insects and spiders eaten by the southwestern willow flycatcher. Work task C6 was folded into work task 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. Growing plants will not alone guarantee insect abundances large enough to feed and support bird and bat populations. Two abiotic factors, plant water content and plant nitrogen content, greatly influence abundances of plant-feeding insects. Both of these factors can be manipulated, depending on soil conditions, by controlling plant irrigation and fertilization. Immigration of insects into restoration sites also should be considered. Sites producing low abundances of insects may support bird and bat populations if insect immigration is high.

Insect densities will be estimated on different species of restored plants grown under different irrigation and fertilizer treatments. Water and nitrogen contents will 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 (see Location 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. Most arthropods captured on branches were spiders. Arthropods were sampled in August, when arthropods were most abundant, and arthropod mass, but not abundance, increased with increasing leaf percent-nitrogen. Branch percent-water was homogenous among trees, due to uniform irrigation, and did not influence arthropod numbers or masses. Percent leaf-nitrogen of trees planted for bird habitat should be monitored, and possibly increased, to maximize arthropod prey.

The second study examined the effectiveness of small pools, installed to retain irrigation water, on increasing taxa of arthropods at Beal Lake, Havasu NWR. Arthropods (mostly flies, gnats, and moths) were collected with three Malaise traps. One trap placed over a pool containing standing water, and one trap placed away from pools, captured insects comprising more bees and wasps and fewer flies and gnats than one trap placed between two pools. 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.

**FY08 Accomplishments:** Examination of the effects of plant water and nitrogen contents on arthropod abundance and mass was repeated at the Palo Verde Ecological Reserve. Arthropod abundances and masses were compared on 64 fertilized and unfertilized *Salix exigua* shrubs and *Populus fremontii* trees. Nitrogen contents of randomly-selected trees were increased by hand-applying urea in April 2008, and trees were sampled in May, June, and July. Arthropods were collected by bagging and fumigating branches, sorted by guild, counted, and weighed. Branch samples were taken from trees and analyzed for percentages of water and nitrogen. Insect abundances and masses were compared between tree species and fertilizer treatments and regressed against plant nutrient concentrations.

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 noteworthy effect on insect abundance and mass.

**FY09 Activities:**

1. Estimate and compare nutritional values (nitrogen contents) of different insects and spiders that provide food for birds at restoration sites; this is a follow-up to work in 2008 that examined effects of plant-nitrogen contents on abundances and masses of insects and spiders.
2. Compare abundances of moths with activities of bats at the Beal Lake Restoration Site. Moths will be trapped periodically from April 1 to October 1, 2009, and counted per size-class. Abundances will be compared with bat activities monitored with Anabat.
3. Examine the importance (proportion of abundance and mass) of insects that immigrate into, rather than develop within, restoration sites. Beal Lake is an example of a restoration site that benefits from an abundance of immigrant insects (see FY07 Accomplishments above). Traps can be placed around restoration sites to estimate immigration.

**Proposed FY10 Activities:** Work on 1 and 2 above (FY09 Activities) will continue through FY10. This includes additional work examining the effects of plant water and nitrogen contents on insect abundance and diversity that may be required depending on the results from FY08 and FY09. A comparison of moth abundances with bat activities may be performed at 'Ahakhav Tribal Preserve in conjunction with number 2 above. Moths would be trapped periodically at 'Ahakhav from April 1 to October 1, 2010 and counted per size class. Abundances would be compared with bat activity monitored at the permanent station site at 'Ahakhav.

**Pertinent Reports:** 1) *Wiesenborn, W.D., and S.L. Heydon. 2007. Diets of breeding Southwestern Willow Flycatchers in different habitats. Wilson Journal of Ornithology 119:547-557,* and 2) *Wiesenborn, W.D., S.L. Heydon, and K. Lorenzen. 2008. Pollen loads on adult insects from tamarisk flowers and inferences about larval habitats at Topock Marsh, Arizona. Journal of the Kansas Entomological Society 81:50-60,* are available on the LCR MSCP Web site.

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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$160,000	\$88,573.21	\$359,180.21	\$145,000	\$80,000	\$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

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

**Purpose:** The purpose of this work task is to survey the MacNeill's sootywing distribution along the lower Colorado River and determine its habitat requirements. 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 work task F6 during FY09-10. Work task F6 monitors habitat created for sootywings.

**Project Description:** The butterfly and its host plant, quailbush (*Atriplex lentiformis*), will be surveyed within the LCR MSCP boundaries. Preliminary annual surveys will cover one third of the flood plain. Surveys will record GPS coordinates of stands of quailbush and estimate the plant's area of coverage. 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). GPS coordinates will be recorded.

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:** We surveyed between Parker Dam and Imperial Dam during 2006 and between Imperial Dam and the SIB during 2007. We counted numbers of adults and their behaviors (nectaring, oviposition, etc.) 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 quailbush plants. Adults were found feeding at flowers of six plant species: heliotrope, sea purslane, tamarisk, honey mesquite, alkali-mallow, and arrowweed. Heliotrope was the most frequent nectar source during spring, and tamarisk was the most frequent nectar source during summer. A seventh plant species used for nectar (the weedy succulent, *Portulaca oleracea*) was identified south of Yuma.

We completed a study of host-plant selection by ovipositing sootywings begun 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 most-influenced by plant size and leaf nitrogen-content acting simultaneously. All plants ( $n = 9$  of 39 plants sampled) that exceeded 1.6 m in canopy radius, 64% in water content, and 3.2% in leaf nitrogen received eggs. We presented preliminary recommendations for restoring sootywing habitat based on our survey and study results in the FY07 Annual Report.

**FY08 Accomplishments:** We completed our preliminary survey 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 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.

We also completed a comparison of nectaring frequencies on 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 open sun than in shade. Nectarings per flower were greater on *S. verrucosum*, the species with fewer flowers per plant. We measured amounts of nectar remaining in heliotrope flowers after landings by adults. Female sootywings landed on plants supporting inflorescences with more nectar than did males. Amounts of nectar in flowers decreased after landings by females but not by males. Work and expenditures by the cooperator has been delayed and thus the work has been extended to February of 2010.

MacNeill's sootywing skippers diapause (overwinter) as mature larvae. We examined the effects of moisture on diapause-termination (continued development to pupae). Nineteen diapausing larvae were collected on December 3, 2007 at Blythe, Yuma, and El Centro and brought into the laboratory at Boulder City on January 22, 2008. Seven of the larvae were placed in water for 10 minutes, with the remainder kept dry. We monitored their daily development to pupae and to adults. All larvae developed to pupae, regardless of wetting, during January 25 to February 13, 2008. Wetting likely had no effect on diapause-termination, because larvae instead responded to higher air temperatures inside the laboratory. Development periods from mature larvae to pupae (2-22 days) varied greatly, whereas development time from pupae to adults (14-18 days) was more constant. Environmental factors that trigger emergence of adults during spring remain unknown.

**FY09 Activities:** Fall and winter during FY09 will be spent analyzing data collected during summer 2008, including the survey results, and writing reports. Activities during spring and summer will include:

1. Importance of amino acids in nectar in flowers selected by sootywings. This is a follow-up to our examination of the importance of nectar sugar content.
2. Importance of shade in sootywing thermoregulation. We will attempt to monitor body temperatures of sootywings in the field using an infrared thermometer.
3. Other potential projects are a) predation and parasitism of sootywing larvae, and b) patterns of dispersion by sootywings among host plants and nectar sources (i.e., how far do sootywings move around?)

**Proposed FY10 Activities:** Fall and winter during FY10 will be spent analyzing data collected during summer 2009, including the survey results, and writing reports. Activities during FY10 will cease when the Cooperative Agreement with UC Riverside expires. Most work during this period will consist of analyzing data collected during summer 2009 and writing reports.

**Pertinent Reports:** Wiesenborn, W.D., and G.F. Pratt. 2008. Selection of *Atriplex lentiformis* host plants by *Hesperopsis graciellae* (Lepidoptera: Hesperiiidae). Florida Entomologist 91:192-197.

## Work Task C8: Razorback Sucker Survival Studies

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$205,000	\$190,297.91	\$797,002.91	\$25,000	\$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 Work Task 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 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 A-10 backwater. Attempts were also made to assess flathead catfish numbers in these areas, but an insufficient number of flathead catfish was 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.

**FY08 Accomplishments:** Routine site monitoring and associated evaluations were conducted with results similar to past years: few stocked RASU were contacted greater than 30 days post-release except in backwater A-10. A project final report was completed. 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.

**Proposed FY09 Activities:** The project was completed in FY08. A formal oral presentation will be made to the LCR MSCP Steering Committee or to a subgroup designated by that committee.

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

## Work Task C10: Razorback Sucker Growth Studies

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$125,000	\$159,000.24	\$328,901.24	\$125,000	\$125,000	\$125,000	\$25,000

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

**Start Date:** FY06

**Expected Duration:** FY12

**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 growth of subadult RASU to maximize total length at release and reduce rearing time in hatchery.

**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 over a 5-year period for investigations into rearing and culture of RASU. The goal is to investigate ways to accelerate growth of RASU through manipulation of physical, chemical, and biological attributes of the rearing environment (e.g., manipulate feed, fish density, water temperature, water hardness, turbidity, lighting, presence/absence of cover). Current hatchery practices rear 250-300 mm TL fish in roughly 3 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 were nocturnal was determined in 1992 by observations of biologists from the Lake Mohave Native Fish Work Group. Even so, hatchery managers are just 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.

**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). And finally, ideas and hypotheses are being formulated into numerous small experiments, testing one variable at a time.

**FY08 Accomplishments:** Reclamation is working cooperatively with AGFD to study factors affecting growth of RASU. A report was submitted by AGFD titled *Effects of Disease Treatments on Growth of Razorback Sucker*. Four chemicals commonly used to treat for *Ichthyophthirius multifiliis* were examined to evaluate their effects on growth of RASU. The intent is to incorporate learned information and the best technologies into Bubbling Ponds SFH for facility improvements to accelerate RASU growth and improve survival. Final designs were completed for installation of intensive culture tanks at Bubbling Ponds SFH.

At Willow Beach NFH, a RASU growth study was completed in recirculating raceway units. Preliminary results from these studies will be included in a report in FY09.

RASU and BONY that had been polycultured at Achii Hanyo FRS were harvested in December 2008. A total of 60 RASU grew to an average of 469 mm TL and 2,163 BONY reached 300+ mm TL.

**FY09 Activities:** USFWS will conduct the second year of polyculture for RASU and BONY in the same ponds at Achii Hanyo FRS and raceways at Willow Beach NFH used during the first year of the study. The USFWS is also 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 FY10 Activities:** Research investigations on RASU growth will continue to be implemented.

**Pertinent Reports:** The scopes of work are available upon request.

## Work Task C11: Bonytail Rearing Studies

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$165,000	\$128,801.82	\$366,763.82	\$165,000	\$165,000	\$165,000	\$50,000

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

**Start Date:** FY06

**Expected Duration:** FY12

**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, some of the investigations to be carried out under this work task may be conducted at hatcheries identified in Section B.

**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.

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

**FY08 Accomplishments:** The multi-year-class production study for BONY, conducted at Dexter NFH, was completed in November 2008. Results show little difference in length gained but apparent difference in weight gained between ponds with multiple year classes and those without. Weight gain in ponds without adults present was significantly greater than in ponds with adults present. Dexter NFH staff spawned adult BONY and prepared ponds for fry production, released 90 female BONY from brood stock in three ponds, and stocked six ponds with 4,000 BONY fry. The ponds were sampled monthly and weight and length data were collected. The ponds were then harvested and total weight, survival, and length/weight data were collected. The female BONY were separated from the larvae and returned to the brood stock.

A new agreement was signed in FY08 between Reclamation and Dexter NFH to investigate and formulate a species-specific diet for BONY. Year one investigations are complete; protein source and protein-to-energy ratio in grower diets for juvenile BONY have been assessed. A report is in progress and will be available upon completion.

Investigations into handling stressors in BONY at Achii Hanyo were completed. A report is available.

**FY09 Activities:** Investigations into the formulation of a species-specific diet for BONY will continue. Survival and growth of juvenile and sub-adult BONY will be evaluated based on the effects of ingredient sources and palatability in grower diets. An investigation of the effects of an optimal diet on thermal optima and thermal tolerance in juvenile BONY is being conducted.

**Proposed FY10 Activities:** The planning process will be completed, field testing implemented, and procedures evaluated to examine relationships between BONY growth and physical, chemical, and biological characteristics of their hatchery rearing environment.

**Pertinent Reports:** The scopes of work and completed work project reports are available upon request.



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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY011 Proposed Estimate	FY12 Proposed Estimate
\$215,000	\$174,728.02	\$532,990.02	\$200,000	\$200,000	\$200,000	\$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 structure for repatriated RASU, and develop a population demographic model for predicting survival and replacement rates to maintain brood stock for the duration of the LCR MSCP.

**Connections with Other Work Tasks (past and future):** None.

**Project Description:** This activity will support ongoing RASU conservation efforts at Lake Mohave to develop and maintain a population of 50,000 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 RASU stocked into Lake Mohave since 1992 were collated and reviewed. Field investigations were implemented during spawning and post-spawning seasons to assess distribution of repatriated fish. Telemetry work was initiated to examine post-stocking dispersal rates, habitat selection, and short-term mortality, and to verify existing population models. A population model was refined using new data to estimate abundance and to describe critical, dynamic life table features such as mortality rates. Data are being acquired to assist in the quantitative assessment of fish predators as a mortality factor for newly stocked RASU.

Extensive radio and sonic tracking of fish was used to assess distribution and survival. Demographic modeling was used to assess population structure. The study was designed as a multi-year, iterative process. Observations and conclusions from first-year activities provided direction for work in subsequent years.

Initial findings in FY06 and FY07 showed that the 300-mm TL RASU 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 plan is to release more of these larger fish through the end of 2009. These fish will then be monitored and their relative survival assessed for up to 24 months. Field studies are expected to be completed at the end of FY10, with a final completion report available in FY11.

**FY08 Accomplishments:** The sonic studies initiated in 2007 were continued, and a second, 6-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 Activities:** Activities during FY09 will continue investigations initiated in FY07, including determining survival of target fish released throughout Lake Mohave. Annual monitoring will be conducted November 2008, March 2009, and May 2009, and population demographic modeling will continue as new data are available. A third sonic telemetry study will be initiated using large (500+ mm TL) adult RASU collected from Yuma and Davis Cove backwaters.

**Proposed 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 may 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.

**Pertinent Reports:** A report for the 2007-2008 field studies has been posted to the LCR MSCP Web site.

## Work Task C13: Lake Mead Razorback Sucker Study

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$150,000	\$147,816.23	\$813,503.23	\$150,000	\$300,000	\$300,000	\$300,000

**Contact:** Ty Wolters, (702) 293-8463, twolters@lc.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 the studies are to:

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

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

**Previous Activities:** The SNWA began a monitoring program for RASU in Lake Mead in 1995, partnering with NDOW and Reclamation. Between 1995 and 2004, some 200 adult and 30 juvenile RASU were captured. Aging data showed that a low level of recruitment has occurred in at least 22 of the past 30 years. This remarkable recruitment has happened in the face of extensive non-native fish populations and declining lake elevations. A summary report of the first 10 years of the study was completed and posted to the LCR MSCP Web site.

**FY08 Accomplishments:** 2008 was the twelfth year of this cooperative study. Trammel netting surveys during the spawning season resulted in the capture of 72 RASU (24 from the Muddy River/Virgin River inflow area, 8 from Echo Bay, and 40 from Las Vegas Bay), 21 of which were recaptures. Twenty-seven of the RASU collected were subadult fish. Aging and growth data were again collected, and evaluation of captured fish suggests continued, recent recruitment in Lake Mead. Larval RASU were also collected during the spawning season in a joint effort between Reclamation, NDOW, SNWA, and BIO-WEST, Inc. Larvae were delivered to Lake Mead SFH for rearing. Monitoring of sonic-tagged fish continued in an effort to gather information on habitat use and movements of RASU. Data obtained from these fish once again indicated shifts in the Muddy River/Virgin River, Echo Bay, and Las Vegas Bay spawning locations.

**FY09 Activities:** Monitoring actions will continue. These efforts will include larval sampling, adult trammel netting, and fin-ray collection and aging of subadult and adult RASU. An additional 12 razorback suckers will be collected from Floyd Lamb State Park. These fish will be implanted with sonic transmitter tags and repatriated to Lake Mead. Of the 12 fish, 4 will be released near the mouth of the Muddy/Virgin River, 4 will be released in the back of Echo Bay, and 4 will be released into Las Vegas Bay. Data from continued monitoring of these RASU will further assist in understanding the size and habitat use of the populations of RASU in Lake Mead, help document the exchange of fish between the Muddy River/Virgin River spawning site and the Echo Bay spawning area, identify problems or habitat shifts associated with the known spawning aggregates, and provide information on recruitment patterns in Lake Mead.

An interagency team will be convened that will utilize the 10-year review to determine future monitoring, research, and management activities.

**Proposed FY10 Activities:** Research and monitoring will be conducted on RASU ecology in Lake Mead, as described in the report, *Lake Mead Razorback Sucker Monitoring Recommendations*, available on the LCR MSCP Web site. An increase in funding is proposed to conduct a cooperative study between Reclamation and the Glen Canyon Adaptive Management Program (AMP) on Lake Mead in the Colorado River inflow area.

**Pertinent Reports:** The *Annual Lake Mead RASU Study: 2007-2008* and the 10-year comprehensive report, *RASU Studies on Lake Mead, Nevada and Arizona 1996-2007* have been posted to the LCR MSCP Web site.

## Work Task C14: Humpback Chub Program Support

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$10,000	\$0	\$38,297.00	\$200,000	\$70,000	\$60,000	\$20,000

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

**Start Date:** FY 05

**Expected Duration:** FY 55

**Long-term Goal:** Provide \$10,000 per year to 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 at Dexter NFH.

**Project Description:** The LCR MSCP will provide \$10,000 per year for 50 years (a total of \$500,000) 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 3-year period (FY06-08).

**FY08 Accomplishments:** Monitored progress on agreement with USFWS.

**FY09 Activities:** HUCH from the Little Colorado River will be transferred to Dexter NFH to develop a refugium population. The HUCH from Willow Beach NFH will also be transferred to Dexter NFH. A 3-year agreement will be initiated between Reclamation and USFWS for development of this HUCH refugium, including development and implementation of a captive management plan for these fish. The total amount of the agreement will be \$200,000. This was originally planned to be obligated in FY09; however, the funds will now be obligated over a 3-year period.

**Proposed FY10 Activities:** Support for HUCH conservation in coordination with USFWS and Glen Canyon AMP will continue, and a site visit to Dexter NFH to review progress on refugia development will be conducted.

**Pertinent Reports:** N/A

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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$80,000	\$81,892.97	\$324,810.97	\$80,000	\$80,000	\$25,000	\$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, 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 3-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. More results are available in the FY06 annual report. Field sampling in FY07 focused primarily on FLSU spawning aggregations and the young fish that resulted. We captured a total of 104 adults, which generated a population estimate of 2,471 adult FLSU, similar to the 2006 estimate. Additionally, 7 juveniles and 19 larvae were collected. Numerous schools of juvenile fish (25-60 mm) were visually identified and 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.

**FY08 Accomplishments:** Telemetry work continued with tracking of about 15 active transmitters. Ninety-six detections provided valuable data on habitat use, site fidelity, and home ranges to add to the habitat use database. 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. Sampling methods consisted of small mesh trammel nets, boat electrofishing, beach seining, snorkeling, larval lights, and dip nets. This effort resulted in the capture of 28 adults (fin clipped for aging purposes), two sub-adults (321 and 365 mm) captured in the backwaters of Topock Gorge, and hundreds young-of-year (12-33 mm). More than a dozen rearing areas for larvae and early juveniles were located in backwaters and slackwater habitats. Fin-clipped adults averaged 15 years of age (range 7-26).

**FY09 Activities:** Continuation of FY08 sampling is planned. This includes telemetry, larval collections, electrofishing, and trammel netting with smaller meshed nets to increase contacts with juvenile life stages. Relative abundance surveys will expand south of the California state line. Additional fin clips for aging will be collected.

**Proposed FY10 Activities:** Monitoring and research actions from FY09 will be continued, habitat maps will be critiqued, and the ratio of FLSU habitat used to habitat available will be evaluated.

**Pertinent Reports:** The annual report for FY08 is in preparation and will be posted to the LCR MSCP Web site.



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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$145,000	\$148,207.26	\$287,152.26	\$60,000	\$0	\$0	\$0

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

**Start Date:** FY07

**Expected Duration:** 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.

**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. In conjunction with fish-tagging operations, flat-plate PIT-tag antennae were set in the bottom of holding tanks with tagged fish introduced above the antennae. Netting was set at known distances (0, 2, 4, and 6 inches) above the antennae. Individual detections were recorded to determine maximum detection distance.

PIT-tag receivers, batteries, and associated equipment were then installed in water-proof containers for field deployment. 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. Modifications were made as needed to improve reliability in the field. Data were collected and submitted to ASU for analysis and will be evaluated in a final report with recommendations for final application to the system monitoring program.

**FY08 Accomplishments:** Deployment of remote detection equipment at known RASU and BONY spawning sites was conducted. Four, 2-channel remote sensing units were deployed 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 conducted in conjunction with RASU larvae collection field trips in an effort to reduce travel costs. Between February 13 and April 30, 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 Activities:** Remote PIT-tag sensing units will again be deployed at spawning sites during the larval fish collection period (February to April). Up to three additional remote sensing units will be constructed for use on Lake Mohave and for use in main stem and off-channel applications. Different antennae configurations will be evaluated in an effort to expand detection area per channel. Solar battery charging systems will be evaluated to extend the deployment time in secure, off channel sites. A final report will be prepared.

**Proposed FY10 Activities:** Remote sensing will be incorporated into continued RASU and BONY monitoring as part of work tasks D8, C12, and F5.

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

## Work Task C24: Avian Species Habitat Requirements

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY07	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$150,000	\$86,935.13	\$86,935.13	\$375,000	\$200,000	\$200,000	\$150,000

**Contact:** Barbara Raulston, (702) 293-88396, braulston@usbr.gov

**Start Date:** FY08

**Expected Duration:** FY12

**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 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. Results from these studies will be utilized in created habitats. 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 need to be determined.

The HCP also requires the creation 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 will be utilized in created habitats. Habitat creation projects

will provide habitat requirements for multiple covered species to effectively and efficiently complete these conservation measures.

**Previous Activities:** The monitoring plan and sampling methods used for this study were developed under Work Task D6, System Monitoring for Riparian Obligate Avian.

**FY08 Accomplishments:**

**System-wide and Created Habitat Avian Monitoring.** In 2008, a Cooperative Agreement was initiated with the Great Basin Bird Observatory (GBBO). The purpose of the study is to assess the habitats of the LCR MSCP covered species and to determine avian use of habitat creation sites, and to monitor the bird communities within the LCR MSCP area (avian surveys completed under D6). Twenty territories (if possible, depending on the species' rarity) per covered species will be paired up with 20 non-use sites from the same geographic and habitat type over a 2-year period. In 2008, habitat data was gathered at 48 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 (under D6 in 2007), for which more detailed methods are designed to provide complementary information. Because data was still being collected in October 2008, and a more accurate representation of the results will be possible with two years of data, this information will be combined and reported in 2009.

**Marsh Bird Habitat Monitoring.** A 2-year study was initiated to determine habitat preferences of the three covered marsh bird species, Yuma clapper rail, California black rail, and least bittern. Hydrology and vegetation will be monitored to correlate conditions with marsh bird use of the area.

This study is being conducted on Imperial NWR in fields 16 and 18. Field 18 was prepared (cleared and contoured) for restoration in 2008 and planted with wetland vegetation during the summer. Field 16 is adjacent to Field 18 and already contains wetland and riparian vegetation, and covered marsh bird species are present there. Information collected in Field 16 and data from Field 18 as it develops into marsh and riparian habitat will be used to adaptively manage marsh habitat in the future.

Twenty-one monitoring wells were installed in Field 16 and 69 wells were installed in Field 18 between July 20 and August 5. The wells were installed to monitor the hydrologic regime in each field. Four vegetation surveys were completed at each well location in Field 18. Live and dead stem density of each emergent plant species and the minimum, maximum, and mean height of each species within a 0.5-m square adjacent to each monitoring well was measured on each of four dates. The percent vegetative cover within 15 meters of each well location was estimated and mapped and the salinity and pH were measured adjacent to each well.

Two permanent survey routes around the perimeter of both fields 16 and 18 have been established to survey for marsh birds. Survey points are 50 m apart. Field 16 was surveyed four times and Field 18 was surveyed twice. Call broadcast surveys were used, and the location of

each bird detected was mapped by estimating the location of the response call. Incidental detections were also recorded.

Field 18 is dominated by California bulrush, but common threesquare bulrush and cattail are also common or co-dominant in the southern end of the field. *Phragmites*, an invasive volunteer, is sparse throughout most of the field except in the northwestern edge of the field where it is dominant. Saltcedar is sparse, but present on the extreme southern boundary of the field.

No LCR MSCP covered species were detected in Field 18 during the marsh bird surveys, but least bitterns were detected incidentally during vegetation surveys. Clapper rail, least bittern, and California black rail were detected in Field 16 during marsh bird surveys. In Field 17, which is adjacent to the area being surveyed, clapper rail and black rail were heard.

**Yellow-billed Cuckoo Habitat Modeling.** In July 2008, a project to develop a GIS-based model of yellow-billed cuckoo breeding habitat was initiated. This type of model can identify the relative importance of individual variables or a combination of variables in influencing the distribution of a species. The model will contribute to the assessment of alternative designs and management of habitat created for the yellow-billed cuckoo on the LCR.

To date, the following steps have been taken towards the development of the GIS based model:

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 comprised of 30-X 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.

#### **FY09 Activities:**

**System-wide and Created Habitat Avian Monitoring.** Monitoring activities begun in 2008 will continue. Bird densities derived from detection ratios are being calculated and habitat data are being analyzed and will be reported in the 2008 and 2009 annual reports. Recommendations of conservation actions under the adaptive management process outlined in the LCR MSCP Science Strategy (USBR 2006) will be addressed in the final report in 2009.

**Marsh Bird Habitat Monitoring.** The remaining 25 monitoring wells were installed in Field 16 in December 2008. Monthly vegetation surveys will continue throughout the winter and into the

breeding season in both fields 16 and 18. Marsh bird surveys will resume in February. Data will be evaluated on preferred vegetation and hydrologic regime of black rails, clapper rails, and least bittern. This information will be used to adaptively manage Field 18.

**Yellow-billed Cuckoo Modeling.** LCR YBCU detections collected in 2008 and 2007 will be overlaid onto the 2006 model output to assess the temporal accuracy and stability of the model. Change detections between 2001 and 2007 will be conducted to determine the stability of YBCU habitat. The model will then be applied throughout LCR MSCP boundary area.

**Proposed FY10 Activities:** Avian surveys will continue system-wide and within habitat conservation areas. Data gathered from the marsh bird study will be finalized in a report. This information will be used to develop marsh and wetland habitat at future LCR MSCP habitat creation sites. A draft annual project report is anticipated in December 2009 and a final report in January 2010.

**Pertinent Reports:** *Annual Report on the Lower Colorado River Riparian Bird Surveys, 2008* will be posted to the Web site. Study plans for Marsh Bird Habitat Monitoring and Yellow-billed Cuckoo Modeling are available upon request.

## Work Task C25: Imperial Ponds Native Fish Research

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$225,000	\$210,841.42	\$210,841.42	\$225,000	\$235,000	\$250,000	\$250,000

**Contact:** Jeff Lantow, (702) 293-8557, jlantow@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 newly 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. The work will be directed by native fish experts who will interpret all field data and make recommendations as appropriate to guide the overall operation and future management of the ponds for native fish refugia.

A fishery coordination and advisory team will be formed with representatives from the USFWS, Reclamation, AGFD, and ASU. This team will meet on-site, quarterly throughout the period of study to keep all parties abreast of ongoing activities.

**Previous Activities:** This is a new start for FY08.

**FY08 Accomplishments:** Monitoring of pond temperature, conductivity, pH, and dissolved oxygen began in September (FY07) and continued at fixed water quality stations within each pond on a monthly basis from October to May, and twice a month from May through September FY08. During the hottest months, June-September, water was pumped into all six ponds between midnight and 7:30 a.m. to maintain adequate dissolved oxygen and lower water temperature.

A total of 577 RASU were split between two ponds and stocked in November 2007, and two ponds were stocked with a total of 1,601 BONY in December 2007. All fish were PIT tagged prior to release. After the stockings 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 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.

Spawning activity was not observed in any ponds stocked with native fish due to poor water clarity, but 23 RASU larvae were collected in pond 1, and juvenile BONY were observed and collected in pond 3. Eight adult RASU and one adult BONY were captured during autumn sampling along with 64 juvenile BONY in one pond. In addition, a suite of nonnative fish species was captured in all six ponds: threadfin shad (*Dorosoma petenense*), redear sunfish (*Lepomis microlophus*), bluegill (*Lepomis macrochirus*), warmouth (*Lepomis gulosus*), common carp (*Cyprinus carpio*), and mosquitofish (*Gambusia affinis*).

**FY09 Activities:** Monitoring of pond temperature, conductivity, pH, and dissolved oxygen will continue along with the deployment of remote PIT-tag scanning units. An estimate of recruitment will be made using mark-recapture for young-of-year BONY in January FY09. Spawning activity will be monitored using a combination of remote PIT-tag scanning units and direct observation. Supplemental stockings of RASU are planned for December and January FY09, and renovation of at least one pond is planned in order to eliminate or reduce nonnative fish species. Mapping software and aerial photography will be used to map discrete habitats in each pond and habitat use data will be acquired using remote PIT-tag scanning units or additional techniques as made available. Data comparisons will include evaluation of BONY and RASU population parameters relative to physico-chemical and habitat features of each pond, and to presence of non-native species.

**Proposed 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, rip-rap shore, gravel substrate, aquatic vegetation, and pond survival and recruitment.

**Pertinent Reports:** A progress report covering the 2007-2008 field seasons has been posted to the LCR MSCP Web site. The study plan for the research activities, which began in October 2008, is available upon request.



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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$100,000	\$621.85	\$621.85	\$100,000	\$70,000	\$70,000	\$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, NV.

**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 Work Task 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 Work Task B6.

**Project Description:** This project will investigate and evaluate rearing of RASU in flowing raceways at Lake Mead SFH. The study will investigate ways to deliver food, efficiency of food conversion, feeding rate, growth of RASU, and physical condition of fish. End-of-year results will be compared with similar parameters for RASU being reared for the LCR MSCP 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 investigating ways to acquire water from deeper, cooler areas of Lake Mead. The current timeline projects that acquisition of a new water source is 3-5 years away. 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 raceways at Lake Mead SFH.

**Previous Activities:** Reclamation, SNWA, and NDOW have cooperatively been rearing RASU from Lake Mead in tanks at the hatchery (See B6).

**FY08 Accomplishments:** Meetings were held at Lake Mead SFH to evaluate physical conditions of raceways. Due to shut down of water lines and pumps for quagga mussel removal, no actions were taken beyond development of a cooperative agreement between Reclamation and NDOW. Both parties agreed to slip this project one year. Construction of the test apparatus will be completed in 2009 with field testing to occur for two consecutive summers following development.

**FY09 Activities:** Work will begin with construction of the proposed test apparatus followed by a brief evaluation to assess available flow and temperature ranges. Rearing trials are expected to begin in May. These trials will evaluate such parameters as growth rate, condition factor, and food conversion efficiency.

**Proposed FY10 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 and cooperative agreement between Reclamation and NDOW are available upon request from the LCR MSCP.

## Work Task C27: Small Mammal Population Studies

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$65,000	\$93,190.68	\$93,190.68	\$65,000	\$35,000	\$0	\$0

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

**Start Date:** FY08

**Expected Duration:** FY10

**Long-term Goal:** Species research to determine distribution, habitat requirements, and genetics of covered small mammal species.

**Conservation Measures:** CRCR1, YHCR1.

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

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

**Connections with Other Work Tasks (past and future):** Data collected as part of Small Mammal Colonization (F3) will also be analyzed as part of the effort to determine species distribution of the two cotton rat species found along the LCR. Previous presence/absence surveys on small mammal populations were conducted under D10.

**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.

**Previous Activities:** *Sigmodon* spp. were captured at the Pratt Agricultural and Cibola Nature Trail sites during presence/absence surveys conducted in previous years. After completion of

species accounts (C3), data gaps were identified for *S. arizonae plenus* and *S. hispidus eremicus*. Preliminary work was completed to design system monitoring and research studies to provide information on habitat use, population status, and distribution range of these covered species. Presence/absence surveys were conducted at several sites to gather data on distribution and to refine protocols.

**FY08 Accomplishments:** 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 large 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.

**FY09 Activities:** Genetic sequencing of collected samples will continue and data collected in 2007 and 2008 is being used to focus trapping efforts in 2009. Efforts will be made to survey vegetation at sites known to have self-sustaining populations of *Sigmodon*. This information will be used to provide recommendations for plant species to be used as ground cover at restoration sites.

**Proposed FY10 Activities:** Data will be compiled for a full genetic analysis in 2010. This data will be summarized and summarized in a final report.

**Pertinent Reports:** The study plan is available upon request from the LCR MSCP.

## Work Task C28: Nest Predation Effects on Riparian Bird Species

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$145,000	\$25,000	\$0	\$0

**Contact:** Theresa Olson, (702) 293-8127, [tolson@usbr.gov](mailto:tolson@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, and areas where larger populations of open cup nesters currently exist, such as Bill Williams River NWR, Arizona.

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

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

**Project Description:** This study will gather information pertaining to relative nest predation pressures and predator communities by determining identity of nest predators at real and artificial nests, determining interaction between patch size, surrounding landscape matrix, and potential for nest predation, linking female behavior and nest microclimate with nest predation, and evaluating the potential for nest predation to be offset if nest microclimate can be manipulated to reduce predation pressure. Nest predator communities will be assessed by documenting predator visits to real nests of species such as the SWFL, BEVI, and YWAR by utilizing nest cameras. In addition, artificial nests with cameras will be placed at sites differing in size and landscape characteristics. An additional set of artificial nests with plasticine (clay eggs) and quail eggs, but without cameras, will be used to determine whether relative nest predation rate differs among areas that differ in size and broader habitat context. Utilizing both real and artificial nests will not only be able to economically cover more areas, but will also test the

validity of utilizing artificial nest technique. Nest cameras will record both nest predation events as well as female behavior associated with nesting (such as time incubating, time off nest). Nest microclimate will be measured utilizing temperature/humidity data loggers once the nests have been vacated. Three habitat types will be compared for predator pressure.

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

**FY08 Accomplishments:** See G3

**FY09 Activities:** Video cameras will be installed at natural and artificial nests to determine predator composition of nests of LCR open cup nesting passerines. Cameras will be camouflaged to reduce visual impact, and will utilize infrared to detect night predators. Artificial nests will contain plasticine eggs to retain distinctive tooth or beak marks that allow identity of potential nest predators. Nests will be monitored in several areas of the three habitat types. Microclimate will be measured at each nest utilizing temperature/humidity data loggers directly below the nest once it has been vacated, either due to predation, abandonment, or successful fledging. Cameras will also be utilized to determine female behavior at nest.

**Proposed FY10 Activities:** A final report will be due in March 2010.

**Pertinent Reports:** The annual 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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY010 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$125,000	\$125,000	\$35,000	\$0

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

**Start Date:** FY09

**Expected Duration:** FY11

**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 in Reach 3.

**Connections with Other Work Tasks (past and future):** This work is related to B2, B3, B4, and B5 as fish from these facilities may be encountered and data collected will help assess potential survival and population structure resulting from RASU stockings. This study began under G3 to evaluate the ageing technique developed by Bio/West, Inc. 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:** New start in FY08 under G3.

**FY08 Accomplishments:** See G3.

**FY09 Activities:** Collect specimens from field activities in Reach 3 to obtain upwards of 300 RASU fin ray samples for aging. Fin ray sections will be analyzed and fish ages will be determined. Aging data along with past stocking information will be used to determine disparate stocking success. Information will be disseminated in an annual progress report.

Tissue samples will also be collected during these field activities. These samples will be analyzed to evaluate the genetic composition of this population (C31).

**Proposed FY10 Activities:** Continue fin ray sample collection to increase sample size to better understand factors influencing stocking success.

**Pertinent Reports:** The annual progress report for 2009 will be completed in November 2009.



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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$100,000	\$70,000	\$25,000	\$0

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

**Start Date:** FY09

**Expected Duration:** 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 adults 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 B2, B3, B4, B5, B6, B7, B10, and B11 as RASU and/or BONY are moved between these sites and the 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 adults 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 and providing them 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 Hanyou NFRS (B3), and directly to the river system. Some of these transfers have been halted until such time that assurances can be made that quagga mussel 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.

**FY08 Accomplishments:** None.

**FY09 Activities:** The USFWS and Reclamation will investigate the efficacy of standard protocols for control of motile life stages of quagga mussels from transport tanks. This work will be conducted by Dexter NFH staff at Willow Beach NFH in a two-phase approach.

**Proposed FY10 Activities:** Develop testing apparatus and conduct second phase tests of various treatments to prevent transport of quagga mussel larvae and adults. Research conducted by USFWS is expected to be completed in FY10.

**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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$125,000	\$125,000	\$125,000	\$125,000

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

**Start Date:** FY09

**Expected Duration:** FY15

**Long-term Goal:** Maintain genetic quality of RASU utilized in 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.

**FY08 Accomplishments:** New start in FY09

**FY09 Activities:** Reclamation and Arizona State University initiated a study to assess razorback sucker genetics for the LCR. RASU fin clips, and larvae collected from all spawning areas, reservoirs, river reaches, and off-channel habitats within the LCR MSCP area will be sent to ASU for analysis.

**Proposed FY10 Activities:** Collection of larval RASU from all spawning areas within the LCR MSCP area will continue and larvae will be provided to ASU. This includes collection from river reaches, reservoirs, and off-channel habitats.

**Pertinent Reports:** The study plan is available upon request. A progress report for the 2004 research grant has been received, reviewed, and accepted. The report, *Continued Studies of Razorbacker Genetics*, has been posted to the LCR MSCP Web site.

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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$85,000	\$85,000	\$125,000	\$150,000

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

**Start Date:** FY09

**Expected Duration:** FY12

**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.

**Previous Activities:** Laboratory research began in FY07 under work task G3. Salinity levels chosen for experimentation indicated that upper salinity tolerances ranged from 10,000 to 15,000  $\mu\text{S}/\text{cm}$  and from 23,000 to 26,000  $\mu\text{S}/\text{cm}$  for RASU eggs and larvae, respectively. Observations during our larval trials showed that long-term survival may be possible at salinities as high 23,000  $\mu\text{S}/\text{cm}$  when larval RASU are properly acclimated. A plan for additional research to refine threshold salinity levels was developed following the first study year.

**FY08 Accomplishments:** Under G3, research to determine RASU early life stage salinity thresholds continued in FY08. Refined values for upper salinity tolerances were observed to range from 11,000 to 12,000  $\mu\text{S}/\text{cm}$  for eggs and from 27,300 to 27,750  $\mu\text{S}/\text{cm}$  for larvae.

**FY09 Activities:** Salinity research will continue with the evaluation of salinity tolerances for fingerling RASU. In addition, an apparatus to test threshold levels of dissolved oxygen will be developed and tested. Initial studies to determine hatchability of RASU eggs and survivability of

RASU larvae under different levels of dissolved oxygen will also be conducted. A study design to evaluate salinity thresholds for BONY eggs and larvae is in development.

**Proposed FY10 Activities:** Proposed work for FY10 includes a continuation of RASU dissolved oxygen studies, a possible start for BONY salinity threshold assays, and a detailed examination of existing literature on thermal tolerances for both of these species. Assessments of future research options will be made based on information gathered through the first three years of this study.

**Pertinent Reports:** A final report for the 2007 research, *Salinity Tolerances for Egg and Larval Stages of Razorback Sucker*, has been completed. This report is being updated to include findings from the 2008 study year.

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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$75,000	\$75,000	\$175,000	\$175,000

**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 work tasks B2 and B5, to fish research work tasks C12 and C13, post-development monitoring work task F5, and to any future work tasks for rearing RASU, as data collected from this study will help evaluate the effect that size of released fish has on survival and ultimately upon 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 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 5-year period. During the first 2 years, 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. Subsets of these fish are being PIT tagged to provide research subjects for this study. This will continue for FY08 and FY09 (there are no study costs allocated for this work, as this rearing is already accounted for under work tasks 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 river, proper. 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:** None specific to this work task. More than 20,000 RASU (>300 mm TL) have been PIT tagged and released into Reach 3 since October 2006, and all are potential 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.

**FY08 Accomplishments:** Fish reared under work tasks B2 and B5 (9,000 RASU) were stocked into Reach 3, of which 6,400 were stocked into Beal Lake to initiate this study.

**FY09 Activities:** Proposed work for FY09 includes coordinating and scheduling the stocking and harvesting activities for the off-channel grow out ponds. This entails the harvest of large RASU (>500 mm TL) from off-channel habitats, and continued PIT tagging of RASU >300 mm TL that were released into Reach 3. The final design of field investigations for FY10-13 will also be completed. Impoundment nets will be developed and tested for recapture of RASU from off-channel grow out ponds. These nets are basically large rooms with multiple doors, allowing for long soak times without overstressing fish prior to harvest. These nets will be deployed and tested in Beal Lake and Davis Cove.

**Proposed FY10 Activities:** The activities listed in FY09 will be continued and monitoring of the Reach 3 population of RASU relative to differential survival will begin. Monitoring will be conducted using electro-fishing and trammel netting of known congregations of RASU.

**Pertinent Reports:** The study design is available upon request.



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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$60,000	\$60,000	\$60,000	\$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 communities of the various flood-plain ponds being used within the LCR to hold and/or rear RASU and/or BONY. Off-channel habitats, including both man-made and natural flood-plain ponds are being used to support communities of RASU and BONY. In some ponds the fish are fed prepared feeds, in some cases the ponds are only fertilized with the assumption that this act boosts development of zooplankton for food, and in some cases neither feed nor fertilizer are added to the ponds and the fish must subsist on whatever food is naturally available.

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

**Previous Activities:** None.

**FY08 Accomplishments:** Preliminary samples were collected from Lake Mohave lakeside ponds (B7). This effort was used to refine sampling procedures and develop a study design for the 2-year study. A written protocol for sample collection, including necessary equipment and procedures, was developed.

**FY09 Activities:** Quarterly zooplankton samples from approximately 25 sites will be collected and analyzed. Sampling sites will include two Overton WMA ponds (B11, Reach 1), eight Lake Mohave lakeside ponds (B7, Reach 2), two Needles Golf Course ponds, Beal Lake, and Office Cove pond (Reach 3), six ponds at Achii Hanyo Fish Rearing Facility (B3) and Parker Dam Pond (Reach 4), and six ponds at Imperial NWR (C25, Reach 5). Additional sampling sites may be evaluated and included over the course of the study year. Sample analysis to identify and enumerate zooplankton will be conducted quarterly at Reclamation's fisheries laboratory.

**Proposed FY10 Activities:** Results from the previous sampling year will be evaluated and methods for sampling and/or analysis will be refined as necessary. Zooplankton sampling from various rearing ponds within the LCR will continue on a quarterly basis. Sample analysis for characterization of seasonal zooplankton communities will also continue quarterly. This study is being extended one year to conduct additional fertilization tests.

**Pertinent Reports:** A progress report will be developed at the conclusion of each sampling year.

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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$0	\$50,000	\$150,000	\$150,000

**Contact:** Allen Calvert, (702) 293-8311, [acalvert@usbr.gov](mailto: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 are determining the distribution of each species as well as determining areas in which capturing the target species is possible.

**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. If so, these characteristics will be used when creating habitat for these species. Thus far, only a 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 have enough bats for the sample.

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

**FY08 Accomplishments:** This is a new start in FY10

**FY09 Activities:** This is a new start in FY10

**Proposed FY10 Activities:** Preliminary work will include developing a scope of work and evaluating survey areas.

**Pertinent Reports:** None

## Work Task C36: Elf Owl Detectability Study

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$0	\$50,000	\$150,000	\$150,000

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

**Start Date:** FY10

**Expected Duration:** FY12

**Long-term Goal:** To determine modifications needed to the current tape-playback presence/absence elf owl survey to make it more efficient and effective.

**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. There is lack of data to support the current presence/absence elf owl survey protocol, and this study will fill that gap. The information will be used to modify the existing tape-playback presence/absence elf owl survey protocol.

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

**Project Description:** Data to support the current tape-playback presence/absence elf owl survey protocol is lacking. A detectability study will be conducted on a known population of elf owls that breeds 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.

Factors that affect the detection of elf owls include distance between survey points, length of time and frequency the call is played at each point, frequency that each point is surveyed in a season, and decibal level of recorded calls. Data from this study will be used to modify the existing elf owl presence/absence survey protocol.

**Previous Activities:** This is a new start in FY10

**FY08 Accomplishments:** This is a new start in FY10

**FY09 Activities:** This is a new start in FY10

**Proposed FY10 Activities:** A scope of work for the project will be developed and a study will be initiated.

**Pertinent Reports:** None

## Work Task C37: Hydrology Studies for Avian Riparian Obligate Species

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$0	\$150,000	\$250,000	\$250,000

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

**Start Date:** FY10

**Expected Duration:** FY15

**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 ground water, and amount of standing water needed underneath habitat for the willow flycatcher and yellow-billed cuckoos in order to duplicate conditions at habitat creation sites.

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

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

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

**Previous Activities:** This is a new start in FY10

**FY09 Activities:** None, this is a new start in FY10. See G3 for FY09 activities.

**Proposed FY10 Activities:** Research will be conducted to determine methods and results of previous hydrology studies at flycatcher and cuckoo sites in the Southwest. An intensively monitored habitat-based hydrological/microhabitat study will be designed to collect data at at known breeding flycatcher and cuckoo locations along the Virgin and lower Colorado rivers. Variables to be monitored may include but are not limited to ground water depth, soil type, soil microbes, standing water, soil moisture, soil moisture capacity across types, humidity, and temperature. Soil and microhabitat response to different irrigation regimes on restoration sites across different soil types will be monitored and compared to conditions found in existing habitats where flycatcher and cuckoo breeding are recorded. Once a sufficient amount of data has been collected on results of irrigation, it can be correlated with existing habitat parameters and restored habitat.

**Pertinent Reports:** None.



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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$0	\$80,000	\$80,000	\$35,000

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

**Start Date:** FY09

**Expected Duration:** FY12

**Long-term Goal:** Assess effectiveness of system monitoring protocols and age specific habitat use data which could be used for habitat creation goals.

**Conservation Measures:** RASU3, RASU6

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

**Purpose:** To determine habitat use and movement patterns of RASU at all life stages and relative to post stocking with in Reach 3 using microchemistry analyses.

**Connections to 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 will look at age related habitat use for RASU within Reach 3 of the Colorado River. This technique will allow us to determine the hatchery origin, habitat types, river locations, and movement patterns of RASU using stable isotopes and microchemistry analyses of pectoral fin ray samples used in the Reach 3 aging study. Similar chemical signatures found in the water samples and portions of the fin rays will identify the association of age specific habitat use and migration patterns.

Water samples will be collected and analyzed throughout Reach 3. Sample areas will include main stem, backwaters, inflows and major washes. Each of these sites will retain a chemical signature specific to a section of river. Pectoral fin rays will also retain this chemical signature when a fish inhabits these same river sections for a minimal amount of time. Chemical signatures of both water samples and fin ray segments will then be compared to provide site-specific habitat use data.

**Previous Activities:** N/A

**FY08 Accomplishments:** N/A

**FY09 Activities:** Initial work captured under C29 (fin ray tissues) and G3 (water samples for background markers).

**Proposed FY10 Activities:** Research activities are pending promising results from stable isotopes and microchemistry analyses being conducted under Work Task G3. If successful in determining different isotopic signatures among different river locations and matching those to isotopic signatures on pectoral fin ray growth rings, this research will be expanded in FY10.

**Pertinent Reports:** N/A

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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$0	\$90,000	\$220,000	\$235,000

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

**Start Date:** FY10

**Expected Duration:** FY15

**Long-term Goal:** Assess effectiveness of 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 to 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 Work Task D8.

**Project Description:** Initially, this study will simply follow stocked fish to determine their fate after being stocked 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

**FY08 Accomplishments:** N/A

**FY09 Activities:** None; the initial study design will be accomplished with funds from G3.

**Proposed FY10 Activities:** Mark, release and follow BONY stocked into Reach 3 under the fish augmentation program. Prepare report of findings. Develop study hypotheses for FY11-12 research.

**Pertinent Reports:** N/A

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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$0	\$75,000	\$180,000	\$180,000

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

**Start Date:** FY10

**Expected Duration:** FY18

**Long-term Goal:** Effective fishery management of backwater habitats developed by program.

**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 work tasks C25 (Imperial Ponds Native Fish Research) and C31 (RASU Genetic Diversity Assessment).

**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 Yuma Cove backwater in 1991 and 1992, along with analyses of the larvae 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 community of these fishes within the LCR MSCP program area over the 50-year life of the program.

This study will collect demographic and genetic information that will lead to recommendations that help to optimize long-term management of off-channel habitats for these two critically endangered fishes. Genetic data will be captured from larvae, juvenile, and adult RASU and BONY from at least two replicate groups of 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 both effective and census population sizes, and to quantify patterns of survivorship.

There are three phases to the study: field observations, lab analyses of genetic materials, and modeling of populations dynamics. The study will require multiple years of data collection and analyses, and 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

**FY08 Accomplishments:** N/A

**FY09 Activities:** Initial study design will be accomplished with funds from G3. Tissues from RASU and BONY being reared and monitored at Imperial Ponds (C25) will be collected under work task C31.

**Proposed FY10 Activities:** Specific numbers of adults of each species will be selected and stocked into ponds on Imperial Refuge, and samples of any young produced will be collected and analyzed. Samples of young produced in ponds with extant populations 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 reports and progress reports will be provided.

**Pertinent Reports:** N/A

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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$0	\$25,000	\$75,000	\$75,000

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

**Start Date:** FY10

**Expected Duration:** FY12

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

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

**Location:** Reach 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 work task 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 on 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 to native fishes being released through the LCR MSCP. The information will be used to determine future stocking locations. For example, if the structures provide a benefit and are used as cover by native fishes, fish could be released in the vicinity of these structures. If not so, such areas would be avoided.

**Previous Activities:** N/A

**FY08 Accomplishments:** N/A

**FY09 Activities:** None, initial study design will be accomplished with funds from G3.

**Proposed FY10 Activities:** Existing artificial reefs on Lake Havasu and Lake Mohave will be selected as study sites. PIT-tag antennae will be constructed and deployed on and around structures by Reclamations' dive team. Marked fish will be released in the vicinity and observed.

Use of artificial structures by the fish will be recorded. Data will be analyzed and data developed into annual reports.

**Pertinent Reports:** N/A

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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$0	\$200,000	\$200,000	\$200,000

**Contact:** Barbara Raulston, (702) 293-88396, braulston@usbr.gov

**Start Date:** FY10

**Expected Duration:** FY15

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

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

**Location:** Reclamation's Denver TSC laboratory, the Colorado River Indian Tribe's 'Ahakhav Preserve, Parker, Arizona, and possibly other restoration sites on the LCR.

**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):** Breeding habitat for willow flycatchers is being determined through studies completed under D2 and breeding habitat for yellow-billed cuckoos is being determined through studies completed under D7. Habitat parameters for other obligate riparian species, such as summer tanagers, yellow warblers, and Bell's vireos that may benefit from these type of studies are being addressed under Work Task D6. In 2007, a Service Agreement with Reclamation's Denver Technical Service Center produced a preliminary literature and product search to gather information on soil amendments for use in habitat restoration projects. In 2008-2009, a second Service Agreement was started under work task G3 to provide additional information on Lassenite Pozzolan and to write a complete study proposal. In 2009, laboratory work for soil amendment experiments will begin to determine the feasibility of Lassenite Pozzolan for restoration purposes.



**Project Description:** After a review of soil amendments and their associated costs, availability, water retention capabilities, etc., a product called Lassenite Pozzolan was identified as the most feasible and appropriate product for improving water retention and irrigation practices of sandy soils. Although the production company has tested the material for use on golf courses in desert environments, there are several differences in the use proposed by Reclamation that require further examination. Depending on results from these controlled experiments, application demonstrations may be conducted on site at the Colorado River Indian Tribe's 'Ahakhav Preserve, where sandy soil conditions exist. Other demonstration areas may be identified in the future.

**Previous Activities:** None, this is a new start in 2010.

**FY09 Activities:** None, See G3 for FY09 activities.

**Proposed FY10 Activities:** Areas that require further study prior to field testing include 1) the effective influence from application of the product, 2) movement of product under flood irrigation conditions, 3) application rates and soil moisture effects at the surface and upper root zones of targeted riparian plants, 4) facilitation of surface water movement from irrigation source to distant areas compared to untreated soils, and 5) the wicking capability of the product. These will be explored through several laboratory tests performed by soil scientists at Reclamation's Denver Technical Service Center's modeling facility. This facility allows for the construction of small-scale models for simulation experiments under controlled conditions.

**Pertinent Reports:** *Feasibility of Using Soil Amendments to Increase Water Retention at Restoration Sites on the LCR* is available from the LCR MSCP.

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## **WORK TASKS SECTION D**

### **SYSTEM MONITORING**

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## Work Task D1: Marsh Bird Surveys

FY08 Estimates	FY08 Actual	Cumulative Accomplishment FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$35,000	\$20,146.27	\$118,830.27	\$35,000	\$35,000	\$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, AZ and CA.

**Purpose:** Monitor Yuma clapper rail (CLRA), California black rail (BLRA), and western least bittern (LEBI) along 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. Protocol developed for D1 will also be used for F2.

**Project Description:** Yuma clapper rail surveys have been conducted annually since the 1980s. Prior to implementation of the LCR MSCP, a study was conducted to determine if 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 all 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.

**FY08 Accomplishments:** Marsh bird surveys were conducted between the I-40 bridge, near Needles, California, and Lake Havasu during March, April, and May 2008. Total CLRA detections ranged from 35 to 58 individuals per survey period. Total LEBI detections ranged from 3 in March to 23 during the May survey period. No BLRA were detected during the 2008 survey. Data were compiled and sent to the USFWS in August 2008.

**FY09 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. Also, Reclamation will enter historical CLRA survey data, currently stored by the USFWS, into the LCR MSCP database.

**Proposed FY10 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:** *Yuma Clapper Rail Surveys along the LCR at Topock Gorge, 2007* will be posted to the LCR MSCP Web site.

## Work Task D2: Southwestern Willow Flycatcher Presence/Absence Surveys

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$575,000	\$621,896.84	\$3,170,326.84	\$690,000	\$650,000	\$700,000	\$700,000

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

**Start Date:** FY05

**Expected Duration:** FY55

**Long-term Goal:** System monitoring for southwestern willow flycatcher.

**Conservation Measures:** MRM1, MRM2, MRM4 (WIFL)

**Location:** Reaches 1-7 along the LCR, the Virgin River between the Virgin River Gorge and Lake Mead, NPS lands in the Grand Canyon below Separation Canyon, and Pahranaagat NWR. Life history study sites are located at 1) Pahranaagat NWR in east-central Nevada, 2) along the Virgin River at Mesquite, Nevada, 3) along the Virgin River, near Mormon Mesa, Nevada, and 4) Topock Marsh, Havasu NWR, Arizona.

**Connections with Other Work Tasks (past and future):** Information gathered under this work task, D3, and D4 provide data on SWFL population numbers and demographics along the LCR. Information provided from C1 will be used in connection with this work task for future analysis of brown-headed cowbird trapping.

**Project Description:** Presence/absence surveys are conducted along the LCR from the Southerly International Boundary with Mexico (SIB) to Separation Canyon in the Grand Canyon (excluding Hualapai tribal lands), including the lower Virgin River, lower Bill Williams River, and lower Gila River. Life history and cowbird control studies are conducted at four known breeding areas.

**Previous Activities:** Presence/absence surveys and life history studies for SWFL have been conducted along the LCR since 1996.

**FY08 Accomplishments:** Presence/absence surveys were conducted at 77 sites in 16 study areas along the LCR and its tributaries in 2008. Life history studies were conducted at four sites, including: Pahranaagat NWR, Nevada; Mesquite, Nevada; Mormon Mesa, Nevada; and Muddy River, Nevada; Grand Canyon, Arizona; Topock Marsh, Arizona; and Bill Williams NWR, Arizona. Studies included banding, nest monitoring, extensive vegetation analysis, and microclimate analysis. Brown-headed cowbird trapping studies were discontinued, but information from life history studies were utilized to determine effectiveness post-trapping.

Willow flycatchers were detected on at least one occasion at 42 sites. Resident, breeding SWFLs were detected at 9 sites within the following six study areas: Pahrnagat NWR, Mesquite, Mormon Mesa, Muddy River, Topock Marsh, and Bill Williams River NWR. Resident flycatchers were also detected at Grand Canyon and 'Ahakhav, Arizona, but breeding was not confirmed. No flycatcher detections were recorded at any sites south of Bill Williams River NWR after June 22, 2008, and no breeding was confirmed south of Bill Williams River NWR.

A total of 24 adult flycatchers were captured in 2008; 18 were new captures, and 6 were banded in previous years and were recaptured at the four life history study areas and at Muddy River, Grand Canyon, and Bill Williams River NWR. An additional 65 adults banded in previous years were resighted. A total of 74 nestlings from 29 nests were banded; 6 previously unbanded fledglings were also banded. A total of 73 territories were recorded in these areas with 51 territories consisting of paired flycatchers and 22 consisting of unpaired individuals. Of the 95 adult flycatchers identified to individuals in 2007, 54 (57%) were located in 2008. Of the 50 banded juveniles from 2007, 2 were recaptured and identified in 2008. Two individuals originally banded as nestlings in 2005 and two banded in 2006 were also recaptured.

Nest success was calculated for 55 SWFL nests observed at the four life history study sites, and at Muddy River, Grand Canyon, and Bill Williams River NWR. Thirty (55%) nests were successful and fledged young, 23 (42%) failed, and 2 were unknown (3%). Depredation was the major cause of nest failure, accounting for 40% of all failed nests and 52% of nests that failed after flycatcher eggs were laid. Brown-headed cowbird brood parasitism was observed in 8 of 48 nests (17%).

Vegetation and microhabitat data were collected from occupied and non-use habitats to further define habitat characteristics. Comparison of microclimate characteristics tends to show that on average, nests were located in areas that exhibited greater soil moisture and higher relative humidity.

In 2008, a 5-year summary report was finalized for work conducted from 2003 to 2007. Survey and study results were compiled and management recommendations were discussed.

**FY09 Activities:** Presence/absence SWFL surveys will be conducted at approximately 80-100 sites, in 16 study areas, along the Virgin River, Pahrnagat NWR, and the LCR to the Southerly International Boundary. Grand Canyon below Separation Canyon was reviewed from the air and habitat has deteriorated; thus, the Grand Canyon sites will not be surveyed in FY09.

Life history studies are being conducted at Pahrnagat NWR, Mesquite, Mormon Mesa, and Topock Marsh. Studies include banding, nest monitoring, vegetation analysis, and microclimate analysis. The brown-headed cowbird trapping study has been completed, but post-trapping data will be collected.

**Proposed FY10 Activities:** Reclamation will continue to conduct presence/absence SWFL surveys along the Virgin River, Pahrnagat 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, this area will once again be surveyed.



Life history data will continue to be collected at four sites, including Pahranaagat 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.

**Pertinent Reports:** *Southwestern Willow Flycatcher Surveys, Demography, and Ecology along the LCR and Tributaries, 2008* is posted on the LCR MSCP Web site. *Southwestern Willow Flycatcher Surveys, Demography, and Ecology along the LCR and Tributaries, 2003-2007 5-year Summary Report* is posted on the LCR MSCP Web site.

## Work Task D3: Southwestern Willow Flycatcher Habitat Monitoring

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$90,000	\$81,286.79	\$387,964.79	\$90,000	\$90,000	\$95,000	\$95,000

**Contact:** Theresa Olson, (702) 293-8127, [tolson@usbr.gov](mailto:tolson@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 have not been implemented.

**Long-term Goal:** Monitor the effects of reduced flows and the associated reduction in groundwater table, specifically associated with the SIA, on southwestern willow flycatcher breeding habitat between Parker and Imperial dams.

**Conservation Measures:** MRM1, MRM2 (WIFL)

**Location:** Reaches 4 and 5, CA and AZ.

**Purpose:** Continue to monitor SWFL habitat condition 5 years after implementation of all water transfers covered under the SIA.

**Connections with Other Work Tasks (past and future):** This work task, in conjunction with surveys conducted under D2, will provide information necessary for the Existing Habitat Maintenance (H1). Data collected may also be used in future habitat creation projects listed under Section E.

**Project Description:** In 2005, Reclamation began monitoring 372 acres of SWFL breeding habitat to document changes in habitat conditions specifically attributable to covered SIA activities, and will continue to do so until 5 years after implementation of all water transfers covered under the SIA.

**Previous Activities:** In 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.

**FY08 Accomplishments:** The previously identified 372 acres of SWFL breeding habitat at 11 sites, along with two control sites, were monitored between Parker and Imperial dams by collecting and analyzing microclimate data, groundwater monitoring, and vegetation monitoring, using similar protocols to those in place for the life history studies. Daily, weekly, and seasonal cycles in groundwater levels were apparent. Water levels drop during afternoon hours when evapotranspiration is high and on weekends when water releases from Parker Dam decline. Seasonal cycle in groundwater levels mirrors the seasonal fluctuations in river flow. Analysis of groundwater data indicates a strong correlation between piezometer water levels and releases from Parker Dam. Data did not show strong correlations between piezometer water level and soil moisture within the habitat monitoring sites. There is data to suggest that river operations, in addition to regional climatic conditions, influence soil moisture.

**FY09 Activities:** The 372 acres of SWFL breeding habitat between Parker and Imperial dams will 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 provided in the 2009 annual SWFL report.

**Proposed FY10 Activities:** The 372 acres of SWFL breeding habitat between Parker and Imperial dams will 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 5-year database will be conducted.

**Pertinent Reports:** *Southwestern Willow Flycatcher Surveys, Demography, and Ecology along the LCR and Tributaries, 2008* is posted to the LCR MSCP Web site. *Southwestern Willow Flycatcher Surveys, Demography, and Ecology along the LCR and Tributaries, 2003-2007 5-year Summary* is posted to the LCR MSCP Web site.

## Work Task D4: Southwestern Willow Flycatcher Presence/Absence Survey — Hualapai Tribal Lands

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$78,000	\$75,233.41	\$277,041.41	\$0	\$0	\$0	\$0

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

**Start Date:** FY05

**Expected Duration:** Closed. This task may be re-initiated depending on habitat suitability.

**Long-term Goal:** System monitoring for the SWFL on Hualapai tribal lands within the Grand Canyon.

**Conservation Measures:** MRM1, MRM2 (WIFL)

**Location:** Hualapai tribal lands in the Grand Canyon downstream of Separation Canyon, AZ.

**Purpose:** Conduct SWFL surveys on Hualapai tribal lands in the Grand Canyon as part of the system monitoring program. Identify SWFL population, breeding sites, and specific threats to SWFL habitat on tribal lands.

**Connections with Other Work Tasks (past and future):** Surveys conducted under this work task provide system monitoring coverage for SWFL in areas not covered by D2. Protocols used in D2 are replicated under this work task to provide comparable data.

**Project Description:** Reclamation provided the Hualapai Tribe funding to conduct presence/absence surveys for SWFL on tribal lands within the Grand Canyon. These surveys are conducted on sensitive tribal lands not included in the system-wide SWFL monitoring program. These surveys enable the Tribe to manage occupied SWFL by avoiding and minimizing disturbance to nesting SWFL, and provide data to the system monitoring program.

**Previous Activities:** Reclamation has funded SWFL surveys on Hualapai tribal lands since 1997.

**FY08 Accomplishments:** The Hualapai Tribe surveyed seven sites on tribal lands within the Grand Canyon between Separation Canyon and Lake Mead. Important recreational areas such as Spencer Creek were surveyed and appropriate management actions have been undertaken to minimize impacts to SWFL breeding sites (limiting visitor access, changing helicopter flight patterns). Surveys were conducted from May 8 to July 23, 2007. A single singing male was found at Lower Iceberg Canyon during the third survey (June 5, 2007) and the fourth survey (June 19, 2007). The individual was singing regularly and maintained a territory. Banding status

was unknown, and this bird was not encountered during subsequent surveys. No other birds were located in 2008. Habitat qualities have declined in several sites with many trees falling down, and dry conditions under the stands. Other areas, where water was available from springs or falls such as Columbine Falls and Spencer Creek, remained in good condition.

**FY09 Activities:** After the 2008 field season, Reclamation and the Hualapai Tribe determined that SWFL surveys would not be conducted on tribal lands within the Grand Canyon in FY09 due to low lake levels. Habitat reconnaissance will be completed by helicopter in the spring of FY09 to determine whether conditions warrant future surveys.

**Proposed FY10 Activities:** Habitat degradation and recent survey results may preclude the need for additional surveys in FY10. Surveys may be initiated again in future years as conditions change or additional data is required. Habitat reconnaissance will be completed by helicopter in the spring of FY10 to determine whether conditions warrant future surveys.

**Pertinent Reports:** *Southwestern Willow Flycatcher Surveys in Lower Grand Canyon, FY2008* is available upon request.

## Work Task D5: Monitoring Avian Productivity and Survivorship

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$300,000	\$254,903.38	\$1,032,638.38	\$300,000	\$250,000	\$300,000	\$300,000

**Contact:** Chris Dodge, (702) 293-8115, cdodge@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 is 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 stations located at habitat creation sites may also be used for post-development monitoring.

**Project Description:** This project intensively monitors habitat creation sites and sites that represent habitat typically found along the LCR for avian use. Banding collects more detailed information about avian species use patterns and demographics. This site-specific data can be used to characterize habitats and, along with less intensive, widespread monitoring methods, is used to monitor habitat use, population trends, and demographics of avian species along the LCR.

The MAPS program monitors avian populations, using a standardized protocol, throughout the United States, Canada, and Mexico. Long-term population trend data is collected by conducting intensive banding throughout the breeding season. Data collected are analyzed by the Institute for Bird Populations, 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 at the Cibola Nature Trail Demonstration site on Cibola NWR. In 2005, an additional MAPS station 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 IBP recommends conducting MAPS stations a minimum of 5 years to acquire site-specific data. After 5 years, each site will be evaluated and a decision will be made to continue, discontinue, or move the MAPS station to a new location.

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 west and the MOSI 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 since 2005. Summer MAPS banding has been conducted at the Cibola NWR site since 2002 and at Havasu NWR since 2005. In addition, a MAPS station was run for 5 years on Colorado River Indian Tribe lands, near Headgate Rock Dam (2000-2004), in mixed native and nonnative habitat.

**FY08 Accomplishments:** During the winter, banding was conducted at Cibola NWR and at Havasu NWR, for 2 days a month, from October to February. Banding was conducted for 6 hours a day, and twelve, 12-meter nets were operated at each site. During the winter banding period, 273 individuals were captured at the Cibola site and 84 individuals were captured at the Havasu site.

During the summer, banding was conducted at both sites using MAPS protocol. Banding was conducted for 5 hours a day, beginning a 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 260 captures at the Cibola site and 191 total captures at the Havasu site. Three LCR MSCP listed species were captured, including willow flycatcher (undetermined subspecies; two captures at Cibola and two captures at the Havasu site), yellow warbler (two captures at Cibola, and two captures at the Havasu site), and Bell's vireo (four captures at Cibola).

**FY09 Activities:** Winter banding will be continued in 2009 at the Cibola Nature Trail and Havasu NWR sites. The Havasu site was moved to the Beal Restoration site due to a fire at the original MAPS site. The MAPS banding stations will be continued at both sites during the 2009 breeding season. Color banding of LCR MSCP covered species will be implemented to increase the effective recapture rate. A visual identification of a color-banded bird would qualify as a recapture for statistical purposes.

**Proposed FY10 Activities:** Intensive winter and breeding season monitoring will continue in 2009. Information obtained will be used for the system monitoring program and to inform habitat creation projects listed in Section E.

**Pertinent Reports:** *Operation of Two Monitoring Avian Productivity and Survivorship (MAPS) Stations Along the LCR, 2008, and Operation of Two Winter Banding Stations along the LCR, 2007-8* will be posted to the LCR MSCP Web site.



## Work Task D6: System Monitoring for Riparian Obligate Avian Species

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$135,000	\$124,050.07	\$460,784.07	\$135,000	\$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 (WIFL, YBCU, ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, SUTA)

**Location:** System-wide.

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

**Connections with Other Work Tasks (past and future):** Sample transects, completed under C18, were used to design this monitoring program. 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 creation sites listed in Section E 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.

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 HM III, CW I, and CWII habitat. Single-species surveys for the elf owl are necessary due to the nocturnal nature of this species and its rarity along the LCR.

**Previous Activities:** In FY05-06, 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, a monitoring plan was finalized in 2007. System-wide avian monitoring was conducted during the 2007 breeding season. A double sampling rapid/intensive area search protocol was utilized to provide density estimates of the six focal species and other common species in the LCR MSCP planning area. One hundred and sixty rapid area search plots were randomly chosen using a stratified random sampling design. Strata were defined as region-class combinations using 6 classes and 13 regions. Eighty-eight rapid area search plots of the 160 chosen were surveyed once in FY07. Fifteen of the 88 plots were chosen as intensive plots and surveyed eight times in FY07. The gilded flicker and summer tanager were the only focal species not detected during the area search surveys in FY07.

**FY08 Accomplishments:** In FY08, system monitoring, post-development monitoring, and habitat suitability modeling were combined into one agreement to more efficiently manage avian monitoring programs.

The remaining 72 plots of the 160 that were chosen in FY07 were surveyed as rapid area search plots in FY08. Each rapid area search plot was surveyed twice in FY08, once in May and once in June. A random sub-sample of these plots was surveyed intensively to determine actual numbers of breeding birds present in each plot (10 in 2008). Each intensive area search plot was surveyed eight times between 23 April and 30 June, 2008. 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.

Habitat assessments were conducted within the breeding territories of the focal species as well as in non-use sites randomly selected from the same, or nearest, similar stratum. Forty-eight habitat assessments were conducted in use and non-use area for the focal species in FY08. The FY08 habitat assessment effort focused on the Sonoran yellow warbler and Arizona Bell's vireo. The habitat assessments consisted of the following estimates: 1) photographs of the site; 2) a series of categorical landscape variables; 3) cover and foliage height diversity via point-intercept and a 5-m pole with marked heights; 4) tree density and size (including snags); 5) shrub density; 6) canopy closure, and 7) soil moisture.

During system-wide rapid area searches, 7943 adults of 147 species were recorded. The most common of the focal species was the Bell's vireo, the rarest was the vermilion flycatcher, and gilded flickers were absent during all surveys. The following were the population estimates for the focal species in the LCR MSCP planning area in FY08: 1) Arizona Bell's vireo (6800); 2) Sonoran yellow warbler (5100); 3) Gila woodpecker (1700), and 4) summer tanager (1100). The vermilion flycatcher and gilded flicker, were too rare (or absent, in the latter case) to be subject to detection ratio calculations. A draft report was written for the 2008 system wide riparian surveys.

Twenty-one survey sites and 45 single call stations in suitable habitat in the LCR MSCP planning area were selected to be surveyed for elf owls in FY08. Suitable habitat was defined as historical locations, incidental sightings and HM III, CW I and CW II habitat. Surveys were conducted from March 27 to May 1 and used a tape-playback presence-absence survey protocol. No elf owls were detected during surveys.

**FY09 Activities:** A software program to automate the calculation of the detection ratios is being developed. Preliminary analysis of the habitat assessment data for the Sonoran yellow warbler and Arizona Bell's vireo will be completed.

Area searches will be conducted during the breeding season of FY09 following the double sampling intensive/rapid area search protocol used in previous years. A new set of rapid area search plots will be randomly chosen using the same stratified random sampling design as in previous years. Two rapid surveys will be conducted per plot, one in May and one in June.

Twenty use and non-use habitat assessments for each of the six focal species will be completed in FY09, this includes those already conducted in FY08. A complete analysis of habitat assessments including multivariate statistical modeling will be conducted.

The great basin bird observatory will write a final 3-year report (FY07, FY08, FY09) for the avian systemwide study and habitat creation project monitoring. Information obtained from these studies will also be used in C24 to refine habitat requirements for riparian obligate covered species.

Elf owl surveys using the same protocol as in FY08 will be conducted at the same 21 sites and 45 single call stations as in FY08. Worktask C36 is testing this protocol to make it more efficient and effective.

**Proposed FY10 Activities:** The existing protocols will be evaluated and a new scope of work will be developed.

**Pertinent Reports:** The study design is available upon request: *Draft Study Plan for Monitoring of Riparian Land birds*. The following reports will be posted on the Web site: *Lower Colorado River Riparian Bird Surveys; Annual Report on the Lower Colorado River Riparian Bird Surveys, 2008; System Monitoring for Riparian Obligate Avian Species (Work Task D6) and Avian Use of Restoration Sites (Work Task F2); and System Wide Surveys of the Elf Owl (Micrathene whitneyi) along the Lower Colorado River, 2008*. The final report "*System monitoring for riparian obligate avian species (work task D6) and avian use of restoration sites (work task F2)-Lower Colorado River Multi-Species Conservation Program*" will be posted on the LCR MSCP Web site.

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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$500,000	\$526,687.60	\$1,431,627.60	\$540,000	\$540,000	\$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):** Information obtained from C21 and C22 in FY05 was used to develop the monitoring protocol currently being utilized in D7. Data collected in this work task will be utilized in the YBCU modeling being conducted under C24.

**Project Description:** Yellow-billed cuckoo utilize cottonwood-willow habitat and may act as an umbrella species for other covered avian species that use these mature habitats. Existing YBCU populations and habitat are being determined along the LCR as systematic surveys are conducted over the project area. This work task assesses existing YBCU populations and evaluates required habitat characteristics. Data collected on vegetation characteristics of occupied sites are used to design habitat creation sites for YBCU and recommend future demographic studies necessary to understand more about the YBCU populations along the LCR.

**Previous Activities:** The YBCU life history and monitoring studies began in FY06.

**FY08 Accomplishments:** Five surveys each were conducted at 40 sites between southern Nevada and the U.S.-Mexico border. Cuckoos were detected at least once during the season at all LCR MSCP restoration sites. Approximately 58 birds were observed during the 2008 field season. Habitat, vegetation, and insect (prey) data was also collected.

Cuckoos were detected at Havasu NWR, Bill Williams River NWR, Cibola NWR, Cibola Valley Conservation Area, Palo Verde Ecological Reserve, Colorado River Indian Tribe's 'Ahahkav

Tribal Preserve, Gila River Confluence, Imperial NWR, Limnotroph Division, Mittry Lake/Pratt Restoration Site, Picacho State Recreation Area, and Yuma West Wetlands City Park.

Three nests were found on the Bill Williams River NWR and two nests were found at Cibola Valley Conservation Area. The two confirmed nests on CVCA were believed to be from the same pair of birds, one being a second nesting attempt at a different nest site, but located about 70 feet from the first nest. This first nest fledged three young; the second nest failed due to probable nest predation by a raptor. At a nearby area, nearly ½ mile from the first nesting pair at CVCA, cuckoos were persistently present and a fledgling was observed, but no nest was found. This indicates a third nest at CVCA. Nesting was also suspected, but not confirmed, at CRIT's 'Ahahkav Tribal Preserve, based on the continued presence of cuckoos.

**FY09 Activities:** In FY09, monitoring and research activities will be continued including presence/absence surveys, vegetation monitoring, and microclimate data collection. Attempts will be made to capture cuckoos to gather additional information on reproductive behavior, nesting, diet, and habitat use.

**Proposed FY10 Activities:** Activities in 2010 will include presence/absence surveys, habitat data collection such as vegetation measurements, and micro-habitat analysis for areas along the LCR and at habitat creation projects targeting YBCU.

**Pertinent Reports:** The 2007 annual report by USGS is posted to the LCR MSCP Web site. The 2008 annual report will be posted to the Web site after it is finalized in April 2009.

## Work Task D8: Razorback Sucker and Bonytail Stock Assessment

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$300,000	\$339,719.60	\$1,144,964.60	\$350,000	\$400,000	\$450,000	\$450,000

**Contact:** Tom Burke, (702) 293-8310, tburke@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 are accomplished by one of two strategies: 1) gleaned 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 hired via contract, grant, or agreement. 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 by Reclamation 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 conducts 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 other specialized equipment and techniques (e.g., aerial and underwater photography and video recordings).

Costs described under this work task are for salary, travel, and materials necessary for Reclamation staff to accomplish this work. In cases where Reclamation staff assist contractors or researchers, or conduct work in similar areas or at similar times, Reclamation's presence allows for improved quantity and quality of observations (i.e., additional effort, additional spatial coverage, additional temporal coverage). 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.

**FY08 Accomplishments:** Accomplishments for this work task have been summarized by river reach.

**Reach 1 (Lake Mead).** Reclamation, in cooperation with AGFD and NDOW, participated in annual fall surveys of Lake Mead. Techniques employed in this lakewide effort included gill netting (145.3 net nights) and electro-fishing (12,802 seconds), and resulted in the capture of three RASU. Collections of larval RASU took place at all major spawning sites over the course of the spawning season and yielded a total of 2,027 larvae. Larvae were subsequently delivered

to Lake Mead SFH for rearing (B6). Species research on the Lake Mead RASU population (C13) also continued. A total of 72 RASU including 27 subadult fish were contacted through this effort via trammel netting. Capture data, in concert with aging and growth data, have once again indicated continued, successful recruitment in Lake Mead.

**Reach 2 (Lake Mohave).** Reclamation repatriated 771 RASU and 57 BONY into Lake Mohave in 2008. The relatively low numbers of RASU stocked is indicative of availability of the largest RASU obtainable (overall average of 456mm TL) from all sources.

Lake-wide surveys for native fish were conducted, including trammel netting (75 net nights, 64 RASU contacted), electro-fishing (6568 secs, 40 RASU contacted), and remote sensing (for a more detailed overview see work task C23), which resulted in 1731 total PIT tag (RASU) contacts from 1400 hrs of deployment time representing 167 RASU contacted. All native fish contact data were provided to Marsh & Associates LLC (formerly ASU Native Fish Lab) for analysis and used to derive the current population estimate of 1279 adult RASU (C12). Reclamation also assisted with stocking and tracking sonic-tagged RASU for the third year of a Marsh & Associates LLC telemetry study.

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 29,768 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, 9,536 RASU and 4,594 BONY were stocked into Reach 3 during calendar year 2008. This exceeds the annual targets for both species, (6,000 RASU and 4,000 BONY).

Reclamation participated in the ongoing multi-agency native fish round-up, and collected data from spring and fall electrofishing surveys by LCR MSCP partners. A fall netting/electrofishing survey was conducted by Reclamation through Topock Gorge to look for young-of-year native fishes. During this last survey, 51 adult RASU were contacted, this is an increase over the 33 from the previous years fall survey. The majority of the RASU catch was comprised of young PIT tagged fish which originated from multiple years of stocking as part of the LCR MSCP fish augmentation program.

A population estimate was generated as a result of the RASU aging work which was initiated in 2008 under work task G3. The current estimate is 1659 fish. This was based on 299 marked fish from our 2007 effort, 93 unique fish caught during the 2008 census, and 16 recaptured fish also contacted in 2007. This was the first noticeable increase for this population. This can be attributed to the MSCP fish augmentation program. Only a few smaller adult males were collected during this effort; this estimate should continue to increase as stocked fish mature and enter the spawning population.



Reclamation conducted 10 trips to monitor movements of sonic tagged razorback suckers between Davis and Parker dams in 2008. BLM and USFWS searched Lake Havasu on three additional occasions. No mortality was observed in the 2006 sonic tagged fish that were alive at the beginning of 2008. All of these fish had return to the spawning sites where they were originally captured by December, 2007. They remained at the spawning sites until late March. After March these fish returned to the same locations that they utilized outside the spawning season in 2007 where they remained throughout the summer. By the end of August some had returned to their spawning sites and all had returned by December, 2008.

Reclamation also released five sonic tagged male razorback suckers at Cattail Cove in January, 2008. The purpose of this release was to look for spawning sites being used by razorback suckers in Lake Havasu. One of these fish had joined the spawning group at Needles by February. This fish appeared to spend the summer and fall in the river or backwaters between Topock Gorge and the Lake Havasu delta, although there were no manual contacts with this fish during the summer. Another fish spent most of the spawning season near the Mesquite Bays at the upper end of Lake Havasu. After the spawning season, this fish worked its way downstream to the Bill Williams River. This fish appears to have died during the summer of 2008. Two other fish appear to have died within 2 months of their release. These fish had moved downstream from Cattail Cove to the Bill Williams River delta.

The third field season of FLSU surveys associated with C15 was completed. Data were collected using snorkel surveys, seines, trammel nets, hoop nets, electrofishing and dipnets/light trapping. The 2008 field season was focused on the distribution and abundance of young-of-year FLSU. No population estimate was calculated due to the limited number of adult contacts in 2008.

The limited number of BONY contacts for the year were recently stocked fish, thus not allowing for the generation of a population estimate. The nonnative fish community did not show any significant changes and was represented by 15 different species.

**Reaches 4 and 5 (Parker Dam to Imperial Dam).** Reclamation and ASU conducted fish surveys from Parker Dam to Imperial Dam, with the exception of CRIT Reservation (C8). Surveys included a suite of standard fishery techniques. Approximately 24,000 seconds of electro-fishing resulted in capture of 179 RASU and 3 BONY. Trammel netting effort of 1,088 net-hours resulted in 462 RASU and 13 BONY captured. Studies were conducted to determine possible effects of RASU that imprint on surface feeding and remain near the surface after stocking. Quantification of fish depth at capture indicated a shift from pelagic to demersal swimming within 100 days post-release, a behavioral change that may reduce avian predation. Despite this, estimated annual survivorship was less than 30% for stocked RASU and long-term survival is non-existent. The stocking program for the lower Colorado River below Parker Dam has not resulted in establishment of persistent populations of RASU or BONY.

During calendar year 2008, Reclamation stocked 9,067 RASU and 535 BONY into Reach 4 and 60 RASU were stocked into Imperial Ponds (C25) Reach 5. Field sampling of fish with the confines of the Colorado River Indian Tribes Reservation on Reach 4 was not initiated as had been planned due to permitting issues. However, an aerial survey was conducted using Reclamation's helicopter during March. No spawning aggregations of fish were observed.

**FY09 Activities:** Monitoring will be expanded in FY09 to include reaches 4 and 5.

**Reach 1.** Reclamation, in cooperation with AGFD and NDOW, will participate in annual fall surveys of Lake Mead. RASU larval collections will be conducted at all major spawning sites. Species research will continue on the Lake Mead RASU population (C13).

**Reach 2.** Monitoring will continue with effort similar to 2008. Lake-wide surveys for native fish will continue to include trammel netting, electro-fishing, and remote sensing. A RASU larval collection goal of 25,000 with an additional goal of 2,500 for Lake Mead has been established.

**Reach 3.** Monitoring will continue with effort similar to 2008. There will be an increase in effort relative to the RASU spawning site near Needles as a result of work task C29.

Reclamation will continue to track sonic tagged fish on a monthly basis until mid summer and begin assembling a final report of findings. Reclamation will release five additional sonic tagged male razorback suckers into the lower end of Reach 3 (Standard Wash) to continue looking for spawning sites in Lake Havasu.

**Reach 4/5.** Monitoring will continue with effort similar to 2008. Field surveys will be conducted below Parker Dam.

**Proposed FY10 Activities:** Monitoring data will be collected for reaches 1 through 5. Sonic tracking of native fishes in Reach 3 will continue. Use of remote sensing equipment for PIT 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, 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:** A status report for RASU and BONY in the LCR MSCP area through the end of calendar year 2008 is in preparation and will be presented to the LCR MSCP Steering Committee and made available for viewing on the LCR MSCP Web site.

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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$100,000	\$101,177.29	\$345,896.29	\$130,000	\$150,000	\$150,000	\$150,000

**Contact:** Theresa Olson, (702) 293-8127, [tolson@usbr.gov](mailto:tolson@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 Sonabat 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.

**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.

**FY08 Accomplishments:** The AGFD is coordinating the collection and analysis of acoustic bat data for system-wide monitoring of the LCR.

Since March of 2008, AGFD has conducted a system-wide acoustic bat survey. AZGF has been deploying acoustical bat detectors at 72 sampling locations throughout the LCR, each of which is active for 2-night periods during each of four seasons. Placement of these detectors was stratified in 3 reaches of the LCR across four vegetation types likely to be affected by restoration activities. To date, we have detected all four LCR MSCP species and additionally the hoary bat (*Lasiurus cinereus*) in each of the three reaches. Detection rates for California leaf-nosed and western red bat were high in all habitat types, slightly lower for western yellow bat and hoary bat, and lowest for Townsend's big-eared bat. Four permanent acoustic detector stations were placed along the river and are providing data that will be useful for analyzing migration movements along the river as well as correlating bat activity with environmental variables. Data collected thus far from permanent stations suggests that bat activity was low during the winter but increased dramatically in early February, remaining high through March. During this time period, call minutes were highly correlated to nightly mean temperatures. Activity declined during April and remained steady in May. Throughout all months sampled, there was a negative correlation between call minutes and humidity and no relationship with moon phase or mean wind speed.

Out-flight counts were conducted in May 2008 on several mines including Stonehouse, Mountaineer, Californian, Islander, Pilot Rock, Jackpot, Gold Dome, Eureka, Golden Dream, 3C, and Heart mines. At the Mountaineer Mine fewer bats emerged, and there is evidence of recent human entry.

**FY09 Activities:** Acoustic surveys will continue for covered bat species along the LCR. Seventy-two non-permanent sites will be sampled to provide information on distribution and habitat use. Sampling areas will be selected to cover the broadest geographical area. Within these areas, sampling sites will be selected on a stratified basis to cover all major available habitats (cottonwood-willow, saltcedar, mesquite, and marsh). Four permanent Anabat monitoring stations will continue to operate to give year-round data.

In addition to acoustic surveys, habitat characteristics will be measured at each site, including vegetation composition and structure, and correlated with bat use. To assure comparability of data between sites and through time, coordination with cooperators will take place to develop standardized protocols for data collection. A centralized database where acoustic bat files can be stored and accessed is being developed. This database is intended to allow access by the external cooperators for input, storage, and analysis and is a logical place to centralize the acoustic data gathered under the LCR MSCP. These data will be linked to the LCR MSCP database.

Outflight counts will be conducted at various mines and bridges along the LCR in the spring and fall. These counts will be used to determine trends in California leaf-nosed bat and Townsends big-eared bat populations.

**Proposed FY10 Activities:** Acoustic surveys will continue for covered bat species as listed above. Mist netting, in conjunction with post-development monitoring (F4), will take place at least twice at both mature cottonwood-willow stands and in more mature restoration areas. Bat

populations will continue to be monitored at maternity sites and mines to determine abundance and distribution of covered and evaluation bat species.

**Pertinent Reports:** *Monitoring of Covered and evaluation bat species for the Lower Colorado River Multi-Species Conservation Program, Annual Report, 2008* will be posted to the Web site. A final mine survey summary report for years 2004-2008 will be prepared in April, 2009 and posted to the Web site.

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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$0	\$20,000	\$150,000	\$150,000

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

**Start Date:** FY10

**Expected Duration:** FY12

**Long-term Goal:** Determine the extant populations of the lowland leopard frog and Colorado River toad along the LCR, and understand their habitat requirements.

**Conservation Measures:** LLFR1, CRT01

**Location:** Within 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):** None

**Project Description:** A system-wide survey for these two species will be conducted along the LCR as well as 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 population would be the most likely source. Habitat characteristics will also be gathered in conjunction with surveys where presence of either species is confirmed. In areas where habitat appears suitable, but no populations are found, a determination will be made as to the most probable reasons why the species is not present.

**Previous Activities:** This is a new start in FY10

**FY08 Accomplishments:** This is a new start in FY10

**FY09 Activities:** This is a new start in FY10

**Proposed FY10 Activities:** A scope of work will be created and survey areas will be identified.

**Pertinent Reports:** None

## **WORK TASKS SECTION E**

### **CONSERVATION AREA DEVELOPMENT AND MANAGEMENT**

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## Work Task E1: Beal Lake Riparian Restoration

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate*	FY12 Proposed Estimate*
\$150,000	\$120,026.35	\$2,216,561.35	\$180,000	\$130,000	\$180,000	\$180,000

These estimates will be revised to reflect decisions made in FY09.

**Contact:** Ashlee Rudolph, (702) 293-8178, arudolph@usbr.gov

**Start Date:** FY04

**Expected Duration:** FY10 decision point

**Long-term Goal:** Restoration research.

**Conservation Measures:** WIFL1, WRBA2, WYBA3, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, MNSW2, CLNB2, PTBB2, MNSW2

**Location:** Reach 3, Havasu NWR, AZ, 0.5 miles east of river miles 238 and 239.

**Purpose:** Backwater habitat creation along the Colorado River typically involves excavation or dredging of large quantities of material. Placement and reuse of the excavated material is often a limiting factor when estimating the total cost of creating a backwater. This research project addresses that issue by tracking the process and costs associated with clearing, blending dredge material with existing soils, leveling, and planting various native plants. In addition, the reclaimed area has been divided into cells or small fields with independent flood irrigation capabilities, which allows testing of various planting and seeding methods while potentially creating habitat. Results of this project are expected to be used elsewhere on the LCR in the creation and management of backwater and riparian habitats.

**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 FY09, 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. Planning 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 provides 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. Trees are planted around the perimeter of the field to block wind-borne weed seeds, and to naturally seed the center of the field when 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 vegetation and irrigation will provide guidance on future riparian establishment and management procedures.

**Previous Activities:** Restoration began in 2001. Site preparation and planting for Phase 1 (57 acres) and site preparation for Phase 2 (50 acres) are completed. Phase 3 (80 acres) was cleared and has 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 possible 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.

#### **FY08 Accomplishments:**

**Maintenance/Restoration/Management.** During FY08, 107 acres were irrigated using an average of 10.2 acre-feet/acre of water. An irrigation schedule and further details on management will be available in the *Beal Riparian and Marsh Restoration Annual Report, 2008*.

Management included extensive irrigation (once per week) at the center of the site (cells K, L, P) to encourage growth of recently planted vegetation and utilization by SWFL. Water retention features installed to maintain wet or moist soils are still in place in Field K and areas with these features are observationally holding moisture post-irrigation longer than surrounding soils.

Approximately 140 Goodding's willow poles were cut from cell JJ and replanted in cell K to increase the amount of willow in that cell. No other plantings occurred this year.

During FY 2008, a decline in the general health of cottonwood and willows was observed. Soil samples were taken and analyzed revealing extreme deficiencies in nitrogen, potassium, phosphorus and zinc. An aerial application of 400 lbs. of 16-20-0 plus 0.60 lbs/acre of zinc was applied on 45 acres. Observations revealed positive results within a few weeks after the application.

**Monitoring.** Ground water depth was monitored monthly at 14 piezometers at the project. Temperature and relative humidity were measured using 10 HOBO<sup>®</sup> H8 data loggers. For the months of May, April, and June, the only variable that fell within the range of known SWFL habitat was mean nocturnal vapor pressure. However, this variable is 1 of the 2 that is known to be significantly different in occupied habitat than unoccupied habitat. Vegetation measurements were collected in September and October of 2008. Fifteen permanent plots were established and monitored for density, ground cover, total vegetation volume, average tree diameter at breast height (DBH) and average tree height. There were 37 Fremont cottonwood trees per acre and 28 screwbean mesquite trees per acre that were over two inches in DBH present in the overstory. There were 9,015 shrubs and stems per acre present in the shrub and intermediate tree layer.

Species present in the shrub and intermediate layer included *Baccharis*, arrowweed, Fremont cottonwood, screwbean mesquite, velvet mesquite, coyote willow, saltcedar, and desert broom. Ground cover comprised 6% of the total land surface; species present included Bermudagrass, purple deadnettle, Mexican sprangletop, horseweed, and witchgrass. Canopy cover at the site was 48.8%.

Single species surveys were conducted for the southwestern willow flycatcher and western yellow-billed cuckoo during the breeding season. No individuals of these species were detected breeding at the project. Three migratory willow flycatchers and 4 incidental observations of the western yellow-billed cuckoo were detected. General avian surveys were conducted at the project from 1 May to 30 June. Three pairs of the Arizona Bell's vireo and 2 pairs of the Sonoran yellow warbler were detected breeding at the project. The following were other species of breeding birds detected: blue grosbeak, Abert's towhee, song sparrow, verdin, yellow-breasted chat, Gambel's quail, black-tailed gnatcatcher, black chinned hummingbird, Bullock's oriole, crissal thrasher, white-winged dove, Lucy's warbler, greater roadrunner and western kingbird.

Small mammal surveys were conducted at the project in the spring of 2007 and the fall of 2008. No cotton rats were detected. Other small mammal species detected were the deer mouse, cactus mouse, western pocket mouse, Merriam's kangaroo rat and southern grasshopper mouse. A permanent bat monitoring station was established in April 2008. Acoustic bat surveys utilizing 6 Anabats placed across the project was conducted quarterly. Mist-netting for bat species was conducted monthly from April to July 2008. There were no covered species detected during mist-netting.

#### **FY09 Activities:**

**Maintenance/Management.** A permanent fertilizer valve and a 24-inch check valve will be installed in-line the main irrigation pipe. This will allow fertilizer to be introduced in the irrigation water. Fertilizer than can be applied any time of the season without interfering with species breeding season, nesting, etc. Soil samples will be taken twice a season to determine fertilizer needs and where applicable, the prescribed amount of fertilizers will be applied. Reclamation's Yuma Area Office is providing personnel for the 2009 irrigation season; other maintenance duties will be assigned as needed. This project will be evaluated in 2009 for inclusion as a conservation area in the LCR MSCP.

**Monitoring.** Ground water depth measurements will be monitored monthly at the 14 piezometers. Temperature 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. Avian surveys utilizing intensive area searches/spot mapping, the same protocol used in 2008, will be conducted from 15 April till 15 June 2008. Single species surveys for the southwestern willow flycatcher and yellow-billed cuckoo will be conducted during the breeding season. Small mammal monitoring will be conducted in the spring and the fall of 2008. Data will be collected at the permanent acoustic bat monitoring station installed in 2008. Acoustic bat surveys will be conducted at the entire project quarterly.

**Proposed FY10 Activities:** A report detailing 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 SC with the FY11 Workplan in April of 2010. The report will also discuss commitments of the land use agreement and the process for suggesting and implementing adaptive management actions.

**Management/Maintenance.** Management through irrigation, weed control, and cover crop maintenance will continue as in FY09. If perimeter trees are mature and seeding, the inner portions of those areas will be managed to encourage germination. The site will be evaluated to determine whether structural management or replanting is needed.

**Monitoring.** Abiotic and biotic habitat monitoring will be conducted. Surveys for all covered species that are associated with cottonwood/willow/mesquite habitat will be conducted. General avian, small mammal and bat surveys will be conducted. Data from the permanent bat acoustic station will continue to be collected.

**Pertinent Reports:** *Beal Lake Habitat Restoration, April 2005*, and *Beal Riparian Restoration, Annual Report 2005* are posted on the LCR MSCP Web site. *Beal Lake Riparian Restoration Development and Monitoring Plan*, and *2006 Beal Lake Riparian Annual Report* are posted and *2007 Beal Lake Riparian Annual Report* is in review prior to posting on the Web site.

## Work Task E2: Beal Lake Native Fish

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$50,000	\$26,446.69	\$603,183.69	\$70,000	\$50,000	\$50,000	\$50,000

**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 intends to maintain the backwater created for native fishes under the 1997 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.

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. After the filtration system performed poorly for several months (the system was unable to let enough water 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 Beal Lake and effectively exclude all life stages of nonnative fishes. A cylindrical wedge-wire screen system was selected because of ease of 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 will provide a clearer picture of the appropriateness of this technology in this situation and for future applications.

To increase efficiency, a number of the existing water control structures at Beal Lake were replaced during the screen system installation. The existing features performed poorly and 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 was installed. The system consists of a permanent platform, ramp, and discharge pipe that allows for the intermittent deployment of various pumps, depending on the specific management need. The water management system has been 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 will be used as a regular management tool to circulate water from the south end of Beal Lake and induce freshening flows into Beal Lake from Topock Marsh to maintain adequate levels of water quality to support native fish.

**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.

**FY08 Accomplishments:** Restoration activities at Beal Lake were limited to coordination with partnering resource agencies to determine future management and maintenance of the existing features at Beal Lake. No construction activities were pursued during FY08.

Other expenditures included regular cleaning and maintenance of the screen system and control structures. Part of the FY08 funding also supported the ongoing research component for this work task. This included continued long-term evaluation of the screen system's hydraulic performance and maintenance requirements. Regular maintenance and calibration was also performed on the system and continuous, real-time data on the water levels at Beal Lake were made available throughout the year. Preliminary data suggests that the screen system may have restricted flow, potentially from sediment accumulation in the pipes, screen clogging, or a combination of these factors. The water level sensors also detected elevated water levels in Beal Lake immediately following irrigation cycles at the adjacent riparian fields. This suggests a subsurface recharge of water into Beal Lake and may lend insight into the hydrology of the site and potentially, future management implications. A final report is expected to be completed in January 2009. In addition, a submitted research paper was accepted by the American Fisheries Society (AFS) and is in queue for review and publication in the proceedings of the AFS's Bioengineering Symposium.

An additional in-situ evaluation of the screen system at Imperial National Wildlife was scheduled for FY08 (partially funded under work task G3). This was part of the evaluations of

the application of these types of screen systems in terms of effectiveness for excluding non-native fish from backwaters. However, there were delays in the completion of infrastructure necessary to complete these tests within the seasonal window when larval fishes were present. These evaluations have been rescheduled for Spring FY09.

The budget expenditures for FY08 reflect the limited activities for work tasks associated with Beal Lake. Of the \$50,000 approved estimate, only about \$25,000 was spent.

Fish and water quality monitoring specific to Beal Lake are covered in Work Task F5. Future management actions at Beal Lake will continue to be guided by information acquired through monitoring activities.

**FY09 Activities:** As projected and based on feedback from monitoring information, maintenance activities, and observations, an intensive inspection, cleaning, and evaluation of the screen system at Beal Lake are planned for FY09 if resources and scheduling permit. This will entail complete removal of the screens, inspection of the pipes, valves, screens and the rock structure. The screens, pipes and valves will be thoroughly cleaned and evaluated to determine if they are functioning properly. If appropriate, parts may be replaced, or portions of the system may be upgraded to allow for more efficient maintenance and/or function of the system. The integrity of the rock structure will also be evaluated and projections will be made for the continued long-term functionality of the system, which may also include recommendations for improvements in features or design.

Other expenditures in FY09 will include continuation of the restoration research component at Beal Lake. Funding for restoration research in FY09 will be supported by G3 (Adaptive Management Research Projects). This includes the final evaluation of long-term effectiveness and maintenance requirements of the screen system at Beal Lake as discussed above. In addition, an in-situ evaluation of this technology's effectiveness will be conducted to determine exclusion potential and entrainment rates in a real-world application. These entrainment tests will occur in spring of FY09 at the Imperial Ponds on Imperial NWR.

**Proposed FY10 Activities:** A report detailing 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 SC with the FY11 Workplan in April of 2010. The report will also discuss commitments of the land use agreement and the process for suggesting and implementing adaptive management actions.

If resources or scheduling do not allow for the physical inspection and evaluation of the screen system and rock structure in FY09 (as discussed above), these activities may be delayed till FY10. Should this be necessary, the FY10 estimate may not be adequate to cover these activities, however, substantially less would be spent in the FY09 budget. The proposed FY10 funding estimate does not reflect these additional tasks.

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 regular flushing and 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. 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 improved design features if the current system is deemed inadequate. These major construction activities would not be anticipated until FY12 and would require comprehensive designs and appropriate permitting before an estimated 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* is posted on the LCR MSCP Web site.



## Work Task E3: 'Ahakhav Tribal Preserve

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$145,000	\$65,565.30	\$1,295,295.30	\$145,000	\$241,000	\$250,000	\$250,000

Estimates may be modified in conjunction with the terms and conditions of a Land and Water Resolution

**Contact:** Jed Blake, (702) 293-8165, jblake@usbr.gov

**Start Date:** FY04

**Expected Duration:** FY10 decision point

**Long-term Goal:** 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, AZ.

**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 (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 150 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. Work is being completed between the Preserve and the LCR MSCP to finalize a land use agreement. When completed, the long-term roles and responsibility for existing habitat maintenance and future habitat creation will be finalized.

Maintenance and management of approximately 150 acres of riparian land cover types created since 2003 is ongoing. Activities include irrigation infrastructure improvements, road and site improvements and irrigation frequency and quantity analysis.

**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.

## **FY08 Accomplishments:**

**Maintenance/Restoration/Management.** Previously established cottonwood-willow and mesquite land cover types totaling 154 acres (CRIT 9) were irrigated with an average of 13 acre-feet/acre of water. Water retention features were installed and additional cottonwood, Goodding's willow, and coyote willow were planted around them. Planting also occurred adjacent to irrigation valves within gaps of previously planted areas. General maintenance of CRIT 9 included clearing canals of debris, repairing ditches and gates, and re-establishing berms between irrigated sections.

CRIT 10 (58 ac) was planted with a cover crop of Sudan grass. The cover crop is scheduled to remain for two years until fields are stabilized and ready for future planting.

A land use agreement was drafted and routed among parties, and comments were addressed. A finalized land use agreement will be routed for signatures in 2009.

**Monitoring.** The mature cottonwood-willow and mesquite habitat in CRIT 9 was surveyed three times for elf owls. No elf owls responded to taped recordings, but two barn owls, one screech owl, and one great horned owl were detected.

Southwestern willow flycatchers were surveyed at Deer Island and Willow Beach. At the Deer Island area, one unpaired, resident flycatcher was observed, and another flycatcher, for which residency was not confirmed, was observed from 21 May through 6 June. The resident flycatcher was banded, but pairing or nesting was not confirmed. Cowbirds were detected on all visits. Five yellow-billed cuckoos were detected at the Preserve with four individuals responding to taped recordings on 1 July and one individual responding on 22 July. Although no definitive breeding activity was observed, the length of time that birds were present (a minimum of 22 days) during the height of the breeding season suggests possible breeding activity at this site by one or more breeding pairs.

Two types of bat monitoring, acoustic surveys and capture surveys were conducted at the CRIT 9. Results of capture surveys include a total of 65 bats of 6 species (western yellow bat, California leaf-nosed bat, California *Myotis*, Yuma *Myotis*, pallid bat, and big brown bat) captured. The pallid bat had the highest capture rate. Two LCR MSCP covered species were captured: the western yellow bat and California leaf-nosed bat. One of the leaf-nosed bats captured in July was a reproductive female and the yellow bat captured in September was a reproductive male. Acoustic surveys resulted in the detection of the western red bat, yellow bat, pale Townsend's big-eared bat and the California leaf-nosed bat. A total of 69 western yellow bat minutes were recorded at the Preserve in both mature and young cottonwood habitat. This is the largest number of western yellow bat minutes recorded at any of the habitat creation areas. Of the 4 focal bat species recorded at the Preserve, the California leaf-nosed bat had the highest total bat minutes at 269.

Avian species were surveyed using an intensive area search method to document all breeding birds within predetermined plots of established cottonwood-willow and mesquite habitat in CRIT 9. There were 40 pairs of birds comprising 18 species detected breeding at CRIT 9. Two LCR MSCP covered species, the vermilion flycatcher (*Pyrocephalus rubinus*) and the summer tanager

(*Piranga rubra*) were confirmed breeding. The mourning dove (*Zenaida macroura*) and Abert's towhee (*Pipilo aberti*) were the most abundant species detected.

In 2008, revised vegetation/habitat monitoring protocols were implemented. Plots were monitored at CRIT 9 to characterize the overstory, shrub and intermediate trees, ground cover, crown closure and total vegetation volume. Analysis of the data is in progress.

#### **FY09 Activities:**

**Maintenance/Restoration/Management.** A restoration development plan will be drafted and posted to the LCR MSCP website when completed. The plan will document the planting activities for CRIT 9, maintenance activities to be conducted on CRIT 10 or 11, plant species to be planted, and irrigation frequency.

The Preserve management and LCR MSCP staff will determine a revised irrigation schedule and types of fertilizer to be used on the site. Past irrigation efforts have resulted in disproportionate amounts of water reaching the portions of the fields farthest from the irrigation canal gates. Irrigation alternatives for reaching these drier areas will be discussed. Minimal funding has been budgeted for irrigation improvements for the dry areas.

Funding has been budgeted to make improvements to the irrigation canal roads. Due to extremely sandy soils at the site, vehicle traffic and maintenance activities continually degrade the canal roads.

Originally planned for research and development, CRIT 10 and 11 have been excluded from the cooperative agreement. CRIT 10 and 11 may be developed for LCR MSCP covered species habitat development in the future.

**Monitoring.** Pre-development monitoring will be implemented in CRIT 11. Post-development monitoring of abiotic and biotic habitat characteristics will continue in CRIT 9.

**Proposed FY10 Activities:** A report detailing 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 SC with the FY11 Workplan in April of 2010. The report will also discuss commitments of the land use agreement and the process for suggesting and implementing adaptive management actions.

**Maintenance/Restoration/Management.** If CRIT 9 is included in the program, it will be continually maintained as LCR MSCP covered species habitat throughout the life of the program. Maintenance will be limited to infrastructure repair, irrigation scheduling and frequency, and general site maintenance. Commencing in FY10, a farm consultant will be utilized on the site.

CRIT 10, a 58 acre parcel adjacent to CRIT 9, is scheduled to remain in Sudan grass throughout FY10. Pending signing of a Land Use Agreement, as documented in the Restoration and Development Plan CRIT 10 will be planted with dry upland native plant species in spring 2011.

Planting material may be ordered through existing contracts and operations and maintenance activities will be coordinated by the preserve staff.

Also in FY10, a site selection assessment may be conducted on CRIT 11, a 30-60 acre site. The site maintains a terraced landscape consisting of marsh, riparian, and dry upland. Originally planned as a research and design site, the Preserve has chosen to have the site evaluated for habitat creation. The site consists of sandy soils and has been cleared in past years. No irrigation and electrical infrastructure are available on the site. However, two adjacent fields have irrigation canals that are fed via gravity diversion. Further site analysis will evaluate extending the highest capacity canal from adjacent fields, expanding the existing 30 acres proposed to optimize cost per acre of habitat developed, and field contouring to utilize flooded management cells.

**Monitoring.** Post-development monitoring of habitat characteristics and avian use will continue for CRIT 9 and 10. Data will be obtained, analyzed, and utilized to make on-site management decisions.

**Pertinent Reports:** *'Ahakhav Tribal Preserve, CRIT 9 Restoration, June 2006; 'Ahakhav Tribal Preserve Restoration Development and Monitoring Plan, 2006; and 'Ahakhav Tribal Preserve Re-vegetation Research and Development Project: Annual Report, 2006 and 2007* will be posted to the LCR MSCP Web site.

## Work Task E4: Palo Verde Ecological Reserve

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$1,185,000	\$828,982.19	\$2,268,701.19	\$1,250,000	\$1,683,000	\$1,800,000	\$2,174,000

**Contact:** Gail Iglitz, (702) 293-8138, [giglitz@usbr.gov](mailto: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, CA

**Purpose:** Create and manage a mosaic of native land cover types for LCR MSCP covered species.

**Connections with Other Work Tasks (past and future):** Vegetation and species monitoring are being addressed under F1-F4. Insect populations are being evaluated under C5 and C7.

**Project Description:** The Palo Verde Ecological Reserve (PVER) encompasses more than 1,300 acres. This property (formerly known as the Travis Ranch) has been made available to the LCR MSCP for habitat restoration activities by CDFG.

The eastern boundary of the property (more than 4 miles) is adjacent to the Colorado River; the western boundary is adjacent to active agricultural fields. The PVER has an extensive infrastructure consisting of miles of lined irrigation ditches, roads, and a pump. Currently, the acreage is leased to a contract farmer and is planted with crops of alfalfa and wheat. Each year a portion of the active crop acreage will be taken out of production to develop the next phase of native habitat. The intent is to create as much riparian habitat as practical. Generally, all phases at PVER are targeted for SWFL, YBCU, and other covered species.

To date, standard farming practices are an efficient and effective way to convert agricultural cropland to habitat. Costs for development and maintenance of the habitat include such farming methods as land leveling, disking, irrigation of crops, repair and maintenance of the irrigation system, and the application of fertilizer and herbicide. Palo Verde Irrigation District provides water to PVER. The costs associated with irrigation, electricity, and water is proportional to the amount of acreage that has been converted to habitat.

The mass transplanting demonstration (E7) has proven to be a cost-effective method for planting riparian trees and shrubs. This method includes the collection of plant material, propagation, and planting of native species.

It is essential to have a mosaic of habitats that contain areas of riparian species (including mesquite), and ground covers or open areas. Ground cover is an effective method of controlling nonnative species and provides another layer of vegetation for habitat. Ground covers are planted with transplants or by seed; costs vary with the methods of planting used. Mesquite trees are generally planted by a tree planter or auger. Typically, mesquite costs are based on a 1-gallon planted tree.

Agricultural areas have irrigation systems in place that are conducive for water management of riparian species. Checks, which are small borders placed within a given field, allow for flooding of only a portion of a field. This provides additional flexibility to create and maintain standing water or saturated soil areas for covered species.

**Previous Activities:** To date, 223 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.

#### **FY08 Accomplishments:**

**Maintenance/Restoration/Management.** *The Palo Verde Ecological Reserve Development Plan: Phase 4* document was reviewed and approved by CDFG. According to the design, 57 acres of cottonwood-willow were scheduled to be planted; however, some of the trees' quality and health were compromised by heat prior to planting. As a result it was decided not to plant the stressed trees at that time. Approximately 45 acres of cottonwood-willow land cover type were planted during Phase 3. Approximately 12 acres of cottonwood-willow land cover type will be planted in the spring of 2009, as well as 22 acres of mesquite on the 84 acres of managed land in Phase 3.

Soil samples were taken by the contract crop consultant in Phase 1 and Phase 2 and prior to planting in Phase 3. The samples in Phase 1 and 2 indicated deficiencies of NO<sub>3</sub>-N (nitrogen), and PO<sub>3</sub>-P (phosphorus). An application of 10-34-0 was added in an irrigation cycle to these phases. In Phase 3 additional deficiencies of K (potassium) and Zn (zinc) were also found. Prior to planting Phase 3 an application of urea 11-52-0 muriate and zinc sulfate were applied.

In March, 2008, trees and shrubs were planted in Checks 1-8, utilizing mass transplanting. Over 101,000 trees and shrubs were planted within a 3-day period. The checks were planted according to the design (*Palo Verde Ecological Reserve: Restoration Development Plan Phase 3, 2007*), with exception of check 9 and 10 which were left in a cover crop until the spring of 2009. The 2008 planting contained the following percentages of plants and trees: 13% *Atriplex*, 29% cottonwood, 3% *Baccharis*, 2% Goodding's willow, and 53% coyote willow. The average number was 2,800 plants per acre.

Checks 1-3 were planted with *Atriplex*; the mid-section of each of these checks were left with the cover crop until spring of 2009, and at that time 1,800 mesquite trees will be planted. The field

was kept in a cover crop so that the integrity of ground preparation remains, while discouraging the growth of invasive weeds. The expenditures at PVER were reduced due to efficiency of farming services, and fewer trees planted.

**Monitoring.** In 2008, revised vegetation/habitat monitoring protocols were implemented. Vegetation plots were established and monitored at PVER to characterize the overstory, shrub and intermediate trees, ground cover, crown closure and total vegetation volume. Analysis of the data is in progress.

Small mammals were surveyed at PVER, both in pre-developed, agricultural fields, planted mesquite habitat and in an adjacent undeveloped area of suitable habitat along the river. No cotton rats were found within the plantings at PVER, nor in any of the pre-developed areas. However, at the strip of land adjacent to PVER, 14 cotton rats were captured. Laboratory analysis of blood samples to examine DNA has confirmed they are *Sigmodon arizonae plenus*.

There was 169 total minutes of bat activity for the four covered species, of which the California leaf-nosed bat was the most numerous. This species was recorded mostly over agriculture and saltcedar habitat. Yellow bats and Townsend's big eared bats were also detected over agriculture and saltcedar habitats adjacent to the plantings. Western red bats were detected in young cottonwood habitat.

Avian species were monitored at PVER using an intensive area search method. In the pre-development phases (Phases 4, 7, 8, and 9), an average of 302 birds per survey and 31 species were detected between the two survey periods. In Phase 3, where the habitat was in its first year of growth, an average of 39 birds per survey were detected. There were 17 pairs of birds comprising 8 species detected breeding in Phase 2, which was in its second year of growth, including one LCR MSCP covered species, the Arizona bell's vireo (*Vireo bellii arizonae*). An average of 56 non-breeding birds per survey were also found in Phase 2.

Specific surveys were conducted at PVER for yellow-billed cuckoos. During five surveys and two follow-up visits, one individual was detected on 26 June, and one on 17 July. Both detections were auditory only. Due to the small size of the site and the limited number of detections, it is unlikely that breeding occurred at this site.

**FY09 Activities:** The development of Phase 4 (100 acres) is the focus in FY09. The ground will be prepped for Phase 4 planting, which includes disking, laser leveling, and plowing as needed for mass transplanting the trees and shrubs. Soil samples will be taken, analyzed for fertilizer needs and applied prior to planting. Since the dense matting of cover crop was successful with reducing weed infestations in Phase 2 & 3, this method will be utilized in Phase 4. 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 100 acres of riparian species (approximately 225,000 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. The planting will integrate a random mixing of Goodding's willow and coyote willow with edges of 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. Approximately 12 acres in Phase 3 that were not planted in 2008 will be planted this year with cottonwood, willow, and *Baccharis*, along with 22 acres of mesquite.

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 becomes available that indicates adjustments are needed.

The plan and design for Phase 5, development of approximately 117 acres, will be drafted and is expected to establish this phase with cottonwood-willow land cover type.

**Proposed FY10 Activities:** Field preparation and planting of Phase 5 will be conducted to create as much riparian habitat as practical with the intent to target habitat for SWFL, YBCU, and other covered species. Previous phases will be monitored and adaptively managed for the targeted species. Site preparation for mass transplanting of riparian trees and shrubs on approximately 117 acres will be conducted. The plan and design for continued expansion of riparian habitat will be included in Phase 6.

**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*, and the *Palo Verde Ecological Reserve Restoration Development Plan: Phase 4*, which described the restoration activities planned for FY09 are posted on the LCR MSCP Web site. *Acoustic Bat Surveys Lower Colorado River Pilot Study: April 2006*, and *Palo Verde Ecological Reserve Annual Report, 2006* will be posted when available.



## Work Task E5: Cibola Valley Conservation Area

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$1,703,000	\$3,611,928.60	\$8,419,959.60	\$1,000,000	\$1,300,000	\$1,100,000	\$1,300,000

\*\$2,590,630 was obligated to secure 1,419 acre-feet of water from the Hopi Tribe.

**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, river miles 99-104, AZ

**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 1,309.1 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 standing water or saturated soil areas for covered species.

**Previous Activities:** To date, 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.

#### **FY08 Accomplishments:**

**Maintenance/Restoration/Management.** The *Cibola Valley Conservation Area Restoration Development Plan: Overview, Phase 1, Phase 2, Phase 3, and Phase 4* were completed and posted on the LCR MSCP Web site. 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. Planning for development and creation of habitat on CVCA continued in conjunction with Reclamation's partner, AGFD. In addition, 1,419 acre-feet of water was purchased from the Hopi Tribe for the site.

Phase 2, a 71-acre parcel was planted in March 2008, in accordance with its restoration development plan, which established approximately 197,000 of cottonwood, willows, and *Atriplex* for future SWFL habitat. Phase 2 had been left fallow during FY07 and disked four times throughout the growing season in an attempt to reduce the morning glory and volunteer cotton seed bank in the soil. A cover crop was not initially planted in this phase. Instead, 40-inch wide furrows were created for planting. A pre-emergent herbicide, Treflan, was applied prior to planting, to control annual grasses and broadleaf weeds. The irrigation infrastructure between Phases 1 and 2 was repaired. Main access roads were graveled with Type-II base to control dust, in accordance with local regulations.

Phase 2 native plants were planted on the tops of furrows with a plant in-line spacing of 5 feet and a furrow row spacing of 40 inches wide. The phase was divided into 10 fields or checks. Nine of the checks were planted with cottonwood-willow land cover types, and one check was planted with *Atriplex*. Invasive weeds were controlled by mechanically cultivating the furrows and with the application of pre-emergents during their first year of growth. Utilizing a cultivator kept the furrows weed free until the trees were too tall for the tractor and cultivator to clear. A cover crop of alfalfa was applied in June in order to create a dense ground mat, which hinders the growth of invasive plants.

In May, Ivyleaf morning glory was present in the fields of both Phases 1, 2, and, to a smaller degree, in Phase 3. The incursion was not as widespread as in the previous year. Several herbicides, such as Caparol and Roundup, were tried unsuccessfully in prior years to control this invasive plant. Mechanical cultivation and manual labor were used to remove morning glory in Phase 2. This proved to be a labor-intensive and expensive procedure.

A farm advisory board was formed to address farming issues, tap into local resources, and provide information to the local communities. Acting on advice from the local farm advisory board and the contract farmer, Phase 4 was left fallow during FY08 in an attempt to reduce the

morning glory and volunteer cotton seed bank in the soil. Phase 4 acreage was irrigated three times during the year to encourage morning glory and volunteer cotton growth, and then was disked each time to remove any germinating plants.

A 200-acre ground stabilization project, located west of Phases 1 and 2, was initiated in the fall of 2008. In an effort to eliminate blowing dust, approximately 80 acres will be planted with a mix of native seeds and sprinkler irrigated. The remaining 120 acres will be planted in furrows in the spring of 2009 with a mesquite/*Atriplex* combination.

A local crop consultant was contracted to take soil samples, and recommend irrigation schedules and fertilizer applications. As a certified agronomist, the consultant conducted inspections focusing on general plant health, evidence of disease, over-irrigation, under-irrigation, water drainage, general nutrition, and insect problems. The consultant's irrigation recommendations were sent directly to the contract farmer with specific irrigation regime instructions. During the growing season, the consultant also tracked plant vigor by sampling and analyzing plant tissue for nitrogen levels and other nutrients as necessary. All reports were forwarded to Reclamation with recommendations for treatment.

Volunteer cotton growth at these sites has become an increasing problem. All phases to date have been planted on fields which have previously been planted with cotton for years. These volunteer cotton plants, as mandated by Arizona state law, must be destroyed/removed by the required cotton mow-down date, yearly, in late January in an attempt to minimize the spread of pink bollworm larvae. Reclamation is working in conjunction with the Arizona Cotton Research and Protection Council (ACRPC) in reference to the ongoing International Pink Bollworm Eradication Program. The ACRPC's mission is to protect and maintain the viability of the Arizona cotton industry by conducting and sponsoring activities that provide growers with practical, economically sustainable technologies relating to cotton production or its protection. This includes programs of cotton pest control and/or eradication. ACRPC activities are funded through an annual assessment on each bale of cotton produced in Arizona.

The University of Arizona had been conducting a 3-year field experiment to evaluate the response of three native tree species to a variety of surface irrigation regimes and fertilization. As part of this activity, Phase 1 fields were thoroughly mapped using electromagnetic induction, which allows for spatial mapping of soil texture and salinity. Whole plant measurements were made, including plant height, diameter, and leaf area index. During the growing season, leaf water potential and leaf gas exchange was to be measured monthly.

Unfortunately, during the internal review of the research agreement it was determined that the project encountered certain field conditions (morning glory infestation, which caused localized mortality of trees around sensors and difficulties in accurately estimating water delivery) that would not deliver the results as originally contemplated under the agreement as awarded. The principal investigator from the University has concurred, and as a result, the continuation of the research agreement was not in the best interest of either party and was therefore terminated.

A document titled, *Cibola Valley Conservation Area Restoration Development Plan: Phase 4*, was drafted that includes design and planting plan of Phase 4 that would be established in FY09. Approximately 58 acres of honey mesquite will be planted.

**Monitoring.** Pre- and post-development monitoring was conducted at Phase 1, Phase 2, Phase 3, and at the control site on CVCA. Soil samples were obtained and most nutrients and salinity levels were within normal parameters. Vegetation data was collected at Phase 1, 2, and 3. Eight plots were established in Phase 1, 20 plots in Phase 2, and 14 in Phase 3. Vegetation types included cottonwood, willow, and mesquite. The structural types differed, as related to stand age. Average density for Phase 1 after 3 year's growth ranges from 775 to 7665 trees/acre, average height is 8.1 m, and average diameter at breast height (dbh) is 23.7 cm. Average density for Phase 2 after 1 year's growth ranges from 450 to 1813 trees/acre, average height is 4.29 m, and average dbh is 9.56 cm. Average density for Phase 3 after 3 year's growth ranges from 1200 to 9350 trees/acre, average height is 6.9 m, and average dbh 14.8 cm.

Avian species were monitored at CVCA during the breeding season of 2008 using rapid and intensive avian area search surveys on phases 1-3 for post development, and on phases 5-6 for pre-development. There was an average of 399 birds per survey detected at phases 1 and 3. There were 57 pairs of birds comprising 12 species detected breeding. One LCR MSCP covered species; the Sonoran yellow warbler (*Dendroica petechia sonorana*) was detected breeding at these phases.

Southwestern willow flycatcher surveys were conducted on Phase 1. Two willow flycatchers were detected on 18 June, and assumed to be migrants. The site was surveyed five times, and large flocks of cowbirds were detected on all visits.

Yellow-billed cuckoo surveys were conducted in Phase 1, which was planted in 2007. Nesting was documented at three locations within CVCA. One nest with three eggs was found on 15 July. All three eggs hatched and all three hatchlings fledged successfully. A second nest with 2 eggs was found on 6 August in very close proximity to first nest, and was believed to belong to the same nesting pair of cuckoos. One egg hatched, but the nest was depredated shortly after, resulting in no successful fledglings. A second pair of adult cuckoos was repeatedly seen throughout the breeding season in the southeast corner of Phase 1, approximately 700 meters from the other nesting pair. These birds were observed at the same time by separate observers, confirming it was indeed a separate pair. Although no nest was found, nesting was confirmed by the observance of an approximately 2 week old fledgling and an adult on July 8.

Small mammal trapping was conducted on Phases 1, 2, and 3 and the Control site. A total of 1155 trap nights (a trap night is defined as one *trap* opened for one *night* = 1 *trap night*) were conducted during 2008. A total of four species were captured including cactus mouse (*Peromyscus eremicus*), deer mouse (*Peromyscus maniculatus*), desert pocket mouse (*Chaetodipus penicillatus*), and house mouse (*Mus musculus*). Phase 2 had the most captures with 47 individuals, and the control had the least captures with 0 individuals. Total number of individuals captured was 85 with the deer mouse being most abundant (n = 31) and the desert pocket mouse being least abundant (n = 3). No Colorado River cotton rats were captured at CVCA.

Acoustic bat surveys were conducted using Anabat II bat detectors coupled to zero-crossing analysis interface modules (ZCAIMs) and SD1 detectors (ZCAIM and detector combined in a single unit). No minutes of bat activity were recorded for either the western red bat or the western yellow bat during any season or in any habitat during FY 2008. A total of 16 Pale Townsend's big-eared bat minutes were recorded in young cottonwood-willow habitats during fall, spring, and summer. The California leaf-nosed bat is the most numerous of the covered and evaluation bat species with 45 bat minutes recorded in restored habitats during the fall sample period and 31 minutes during the summer period.

**FY09 Activities:** Planting and field preparation of Phase 4 is intended to create approximately 58 acres of honey mesquite land cover that in coordination with earlier and later planting phases is designed to create a native vegetation mosaic. Phase 4 consists of seven 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 (9,200). Smaller *Atriplex* (6,200) plants 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 18 feet wide. This wide furrow spacing saves irrigation water and allows for a tractor to disk invasive salt cedar and volunteer cotton that grow between the planted furrows.

Soil samples will be taken prior to planting, soil samples will be taken to provide nutrient availability information. A 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 5*, will be drafted which includes design and planting plan of Phase 5 that would be established in FY10. Approximately 72 acres of honey mesquite and *Atriplex* will be planted.

The remaining 120 acres of a 200-acre ground stabilization project will be planted in the spring of 2009 with a mesquite/*Atriplex* combination. Similar to Phase 4, these plants will be planted in furrows with a plant in-line spacing of 15 feet and a furrow row spacing of 18 feet wide. This wide furrow spacing saves irrigation water and allows for a tractor to disk invasive salt cedar and volunteer cotton that grow between the planted furrows. Habitat, avian, small mammal, and bat monitoring will continue.

**Proposed FY10 Activities:** The planting and field preparation of Phase 5, located east of Phase 4, is designed to create 71 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 6*, will be drafted and include design and planting plans for Phase 6, which will be established in FY11. Approximately 89 acres of honey mesquite will be planted.

**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; Cibola Valley Conservation Area Draft Report for Phase 4; Cibola Valley Conservation Area Annual Report, 2006; Cibola Valley Conservation Area Annual Report, 2007*, will be posted when available on the LCR MSCP Web site.

## Work Task E8: Seed Feasibility Study

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$65,000	\$163,444.58	\$727,436.58	\$210,000	\$0	\$0	\$0

**Contact:** Gregg Garnett, (702) 293-8644, ggarnett@usbr.gov

**Start Date:** FY05

**Expected Duration:** FY11

**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, AZ.

**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:** Through FY07, which was the second year of the 3-year contract, seed collection and testing was completed.

**FY08 Accomplishments:** A large portion of the financial modifications made to this agreement were justified for FY07; however, because of a delay in budgetary management, these approved obligations were not applied until the FY08 budget. The obligations are reflected in the FY08 actual expenditure column at the top of this work plan. Because the funds called for in the FY07

modification were not made available in FY07, the work accomplished in FY07 based on those modifications actually used funds reserved for research in FY08. To compensate for this, the FY08 proposed work was modified to work within the remaining obligated funds of approximately \$165, 000.

Based on results from the 2007 annual report, a contract modification was required to adjust the focus of research in FY08. The modification maximized the benefit of the data from this study and allowed researchers to make a more informed decision before proceeding to the large-plot phase of the project. Dominance of cottonwood and poor establishment of willows in the small-plot studies suggested that willow may not compete well against cottonwood and other plants. To determine the feasibility of willow establishment using seed, an additional small plot study was conducted using only Goodding's willow seed and using more timely applications of weed herbicides. These small-plot studies were conducted in the same field, adjacent to the 2007 small-plot study. The 2007 small-plot studies where cottonwood dominated the vegetation structure were irrigated and monitored through 2008 to determine second year survivorship and overall vegetative composition of the plots (i.e., whether cottonwood will continue to dominate and shade out saltcedar (particularly) and other weeds. Additional tasks for FY08 included greenhouse pot studies to determine the best protocols for *Baccharis* establishment and the continuation of seed storage viability testing up to the 2-year-frozen mark. A summary of results are as follows:

**Germination Trials.** 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. Therefore, it appears that long-term seed viability under freezer storage conditions should not be considered a limitation for the use of native seed for direct seeding and revegetation on the LCR.

**Monitoring of 2007 Cottonwood/Willow Test Plots.** Vegetation and water content monitoring continued for cottonwood/willow study plots seeded at Cibola National Wildlife Refuge in May 2007. Additionally, two distinct irrigation regimes were implemented. Half of the study plots received approximately 7 cm of water once per week, whereas the other plots received approximately 21 cm of water once per 3 weeks. In addition to large-scale monitoring of plant cover and establishment, individual cottonwood, willow, and saltcedar trees were tagged and monitored for the 2008 growing season, allowing survival and growth rate to be calculated for these species. Finally, trenches were excavated in the plots during October 2008, to monitor root growth through the soil profile.

Results from 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. Mortality was observed for both cottonwood and saltcedar at 6.4% and 4.2%, respectively. However, the average cottonwood growth rate was significantly greater than that of saltcedar. Finally, root systems were observed at depths greater than 1.5 meters below ground surface, indicating that seeded cottonwood likely utilized groundwater for at least a portion of the 2008 growing season (the approximate depth to groundwater is 2 meters). Water content data to further evaluate this question are currently being processed.



**2008 Goodding's Willow Test Plots.** 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<sup>2</sup> (approximately 1400 PLS/m<sup>2</sup>). 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. This is approximately equal to the ratio of saltcedar to cottonwood in the 2007 plots after the first growing season.

Results to date indicate continued monitoring may be warranted to evaluate future competitive effects between salt-cedar and Fremont cottonwood (2007 plots) and Goodding's willow (2008 plots).

**FY09 Activities:** Based on the preliminary results from the small plots, limited expenditures associated with additional research on this work task are expected for FY09. Although establishment and survival for seeded cottonwoods showed promise, results were somewhat variable with respect to co-establishment of weedy species (saltcedar, primarily). The small plot studies with willow had even more variable results and overall indicated relatively poor establishment and survival in this setting. We expect that the continuation of these trials to the large-scale would only introduce more variability in results; as variables, such as soils, water delivery, and weed seed bed would tend increase, control over these variables would likely decrease. Some of the willow treatments did show promise and additional monitoring of the small scale plots is needed to determine longer-term competition and survival trends. Without more confidence in establishment and survival rates and overall species composition for seeded willows, expected levels of success at the larger scale are difficult if not impossible to determine. Therefore, additional monitoring of the small scale plots is planned for FY09. Some additional small plots may be added to replicate the most successful treatment to give a better representative sample for making assessments regarding establishment and competition rates.

The study was extremely successful in determining some important techniques and the general extent of using seed as a restoration technique. We feel at this point that there are at least some limited applications for these seeding techniques in restoration. There are likely some smaller scale applications where these techniques and approaches might prove appropriate and relatively effective. However, informed expectations for seed in large-scale restoration (in an agricultural conversion setting) cannot be made at this time. There may also be a great deal of additional information to be gained in the use of seed in other limited applications, however we do not feel that the information to date in this particular study merits the continuation of this exploration into the next phase (large scale tests) of this experiment without additional information.

An annual report is expected in March of 2009 and will be posted to the LCR MSCP website. Additional assessments need to be made in terms of overall cost-effectiveness compared to the expected outcomes when using these techniques. The benefits of continuing to monitoring the small plot experiments include the ability to evaluate long-term competitive effects of seeded native (cottonwood and willow) versus nonnative (saltcedar) species. These results will be used to make an informed decision on whether or not to go on with the large scale tests and ultimately, the applicability of seed for large-scale restoration as it applies to the LCR MSCP. General field and site maintenance would be completed in-house and costs for these activities would be covered under work task E24.

**Proposed FY10 Activities:** Additional research activities associated with this work task for FY10 will be dependent upon results from monitoring the replicates in the small plot studies. If these monitoring efforts show promise in terms of replicated establishment rates and long-term survival expectations, then the research will continue to the large-scale test of these seeding techniques. The budget projections for FY10 and FY11 reflect the estimated cost for collection, seeding and monitoring the large-scale test. Maintenance of this site will be covered under conservation area maintenance for Cibola NWR Unit 1 (work task E24).

**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 2006 Annual Report, *Feasibility Study using Native Seeds in Restoration*, are posted on the LCR MSCP Web site.

## Work Task E9: Hart Mine Marsh

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate*	FY11 Proposed Estimate	FY12 Proposed Estimate
\$250,000	\$182,393.19	\$438,337.19	\$3,125,000	\$2,380,000	\$500,000	\$300,000

\*see update in FY09 activities

**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, AZ.

**Purpose:** Create and manage marsh habitat for Yuma clapper rail, least bittern, and Colorado River cotton rat.

**Connections with Other Work Tasks (past and future):** Vegetation and species monitoring are being addressed under F1-F4.

**Project Description:** Hart Mine Marsh is a decadent marsh located on Cibola NWR. Currently, drainage water from the Refuge's agricultural fields enters Hart Mine Marsh through gated structures in the Arnett Ditch. Previous management practices have not allowed any outflow from the marsh; therefore, the drain water terminates in the marsh to evaporate and stagnate. The result is poor water quality, limited marsh habitat, and saline upland areas, some completely devoid of vegetation or dominated by saltcedar.

Habitat requirements for marsh-covered species include areas of permanent open water and larger areas of adjacent emergent marsh vegetation with water depths ranging from 1 to 12 inches. At least 80 acres adjacent to deep areas will be re-graded to provide more suitable marsh areas, adjacent permanent open water, and controllable water levels. This would provide permanent open water adjacent to emergent vegetation. By managing water levels and providing appropriate vegetation, suitable habitat for covered marsh species can be created. Water, diverted by gravity from the Arnett Ditch, would be used to flood leveled fields and create marsh habitat conditions. Water levels would be managed by a series of small water control structures such as culverts or stop logs.

**Previous Activities:** Through FY07, NEPA compliance activities, cultural surveys, topographic surveys, and pre-development surveys for marsh birds and riparian obligate birds have been conducted.

**FY08 Accomplishments:** Engineering designs were finalized during FY08. A Restoration Development Plan for this conservation area has also been drafted. In addition, an exhibit to the Land Use Agreement with Cibola NWR has been signed. A section 401 permit was obtained and an application package for a section 404 permit was submitted to the Corps during FY08.

The section 404 permit was not issued until early in FY09. The entire impact area for the Hart Mine Marsh Conservation Area was delineated as a Corps jurisdictional wetland meaning that work could not commence until the project was permitted. As a consequence, some of the capital expenditures (construction of a staging area) planned for late FY08 were not able to be completed. These unspent funds for FY08 are reflected in the “FY08 Actual” column.

**FY09 Activities:** The first phase of construction is intended to be completed in FY09. This includes the removal of over 100 acres of saltcedar, the installation of new outlet works and control structures for the marsh, and the dredging and contouring of the cells in the southern portions of the conservation area. When these cells are complete, native vegetation will be planted according to its particular requirements. Plants and planting services will be obtained through commercial sources.

Based on information from construction during FY09, the FY10 budget may be able to be reduced by as much as 1,000,000 dollars. This revised projection is based on having similar site conditions for FY10 work in phase II, as well as similar equipment, materials and fuel costs, and continued production rates by Reclamation construction crews. Difficult or variable site conditions (due to weather or high water table) or changes in other costs may result in a reduction of these projected savings.

**Proposed FY10 Activities:** The second phase of construction a Hart Mine Marsh will be completed in FY10. This includes the removal of 100-150 acres of saltcedar, dredging and contouring, and installation of control structures in the northern cell of the conservation area. When water control is established in this phase, native vegetation will be planted.

**Pertinent Reports:** *Hart Mine Marsh, Existing Conditions Report; Comprehensive Conceptual Restoration Plan, Hart Mine Marsh Conservation Area Development Plan*

## Work Task E14: Imperial Ponds Conservation Area

FY08 Approved Estimate	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$974,000	\$965,430.09	\$6,374,862.09	\$483,000	\$651,840	\$465,840	\$453,840

**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, AZ.

**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, neotropical migratory birds, and migratory waterfowl. By partnering with Imperial NWR to implement this project within an area already so rich in biodiversity, the LCR MSCP is creating a unique native landscape like no other found on the LCR.

Six ponds have been constructed to provide approximately 80 surface acres of backwater habitat for endangered razorback sucker and bonytail, as well as provide marsh habitat for western least bittern and Yuma clapper rail. The ponds provide a diversity of depths and habitat features, including rip-rap for fish cover and hummocks on which to place native wetlands plants.

Colorado River water is supplied to the ponds and other habitat areas by a new 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 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 occur in FY10.

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.

**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. Extensive details regarding this development will be made available in the *Imperial Ponds Conservation Area, 2008 Annual Report* (In Press), which will be posted to the Web site once complete.

#### **FY08 Accomplishments:**

**Maintenance/Restoration/Management.** Over 700 native cottonwood, Goodding's willow, and coyote willow poles were harvested, soaked, and planted in the ponds' drainage ditch in February 2008. Thirteen hummocks, which were previously constructed within five of the six ponds, were planted with approximately 5,500 hardstem bulrush in June, 2008. In addition, approximately 150 cattail clumps were transplanted from nearby wetland areas, to establish emergent vegetation in Pond 1.

During FY08, the fill area of excavated earthen materials from the construction of the ponds was disked, contoured, and laser leveled. A new concrete irrigation canal was constructed, which now allows for enhanced water management of the new (future cottonwood-willow) fields. Additional turnout structures were constructed, which also enhance the adjacent cottonwood nursery, which hosts several LCR MSCP covered species, including yellow billed cuckoo, migratory willow flycatcher, and numerous bat and small mammal species. The new fields are now being managed by rotating between water grass (planted summer 2008), and rye grass (planted winter 2008) to enhance soil conditions for planting in 2010.

In FY08, clearing, surveying, final design, contouring and leveling of Field 18 were completed. Between spring and summer of 2008, the site was flooded to prevent establishment of invasive salt cedar. In June 2008, approximately 38,000 wetland plugs were established, which are now developing into a marsh habitat.

**Monitoring.** An interagency fishery coordination team was convened in October 2008 to oversee native fish research and monitoring actions. Four ponds were selected to receive native fish, and two ponds were set aside for water management testing. Two of the ponds received

razorback suckers from Willow Beach Hatchery in November (576 fish total), and two ponds received bonytail in December (1,600 fish total). Fishery monitoring and research was conducted mainly under contract to Dr. Paul Marsh of Arizona State University. A summary report has been posted to the LCR MSCP Web site under work task C25. More information on fishery and water quality monitoring and research for Imperial Ponds can be found under work tasks C25 and F5.

#### **FY09 Activities:**

**Maintenance/Restoration/Management.** During FY09, Reclamation plans to enter into a funding arrangement to assist with onsite management activities. Additionally, Reclamation will pay for electrical use associated with pumping water to program lands and backwaters. Several maintenance activities will be performed for long-term site management, including installation of a shade structure for the electrical control panels, several repairs to the concrete irrigation canal, and pond delivery pipe systems, as well as several upgrades to the system to prevent introduction of non-native fish via the drainage ditch.

Cottonwoods and willows will be procured to establish approximately 34 acres of new fields. Throughout this year, irrigation, soil, and crop management activities will be continued to enhance soil conditions for planting next year.

As part of the adaptive management focus of the program, several upgrades are proposed for one of the ponds. Available funding, budgeted for maintenance will be used to dewater one pond, inspect the conditions of hummocks, boat ramps, and perform any required maintenance. Additionally, a series of graveled spawning beds may be installed to assist with ongoing fisheries investigations. Finally, tests will be performed to evaluate the effectiveness of the drainage ditch, and the minimum pool, a pond, will be dewatered. This pond will be renovated to remove all exotic fish and will establish one native-only pond for future fish management activities to utilize.

**Monitoring.** Fish and water quality monitoring and research will continue as outlined in the approved research and monitoring plan (available on website). One pond will be drawn down during FY09: 1) to assess capabilities for fish reclamation/restoration, 2) to assess water management capabilities, 3) to determine needs for habitat improvements, and 4) to evaluate physical pond features. Additional information on native fish activities are discussed in Work Task F5.

**FY10 Activities:** For budgeting purposes, Reclamation is assuming that one additional pond will require dewatering, evaluations, maintenance, additional spawning materials, and renovations, similar to what was previously discussed under FY09 activities. It is also assumed that Reclamation will continue to fund electrical consumption, as well as ongoing fuel and labor requirements associated with management of the site.

Additional long-term maintenance needs will be undertaken at the site. Currently, this includes the installation of an electronic water monitoring system, which will collect data remotely, and transmit it to an Internet server. This kind of upgrade will allow project managers to reduce travel requirements for ongoing maintenance and free up staff resources for new projects.

Additionally, expansions of several 90-degree concrete canal turns were identified as a method to improve irrigation efficiency and are planned for FY10.

During FY10, cottonwoods and willows (which are to be purchased the prior year) will be planted according to a final planting design, based on information collected during FY09. Fish and water quality monitoring and research will continue as outlined in the approved research and monitoring plan (available on Web site). Additional information on native fish activities are discussed in Work Task F5.

**Pertinent Reports:** *Imperial Ponds Conservation Area, 2008 Annual Report* will be posted to the LCR MSCP Web site.



## Work Task E15: Backwater Site Selection

FY08 Approved Estimate	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$387,000	\$433,665.01	\$1,120,797.01	\$209,000	\$640,750	\$849,750	\$497,500

**Contact:** Nathan Lenon, (702) 293-8015

**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, AZ, CA, and NV

**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. The first sites which have gone through all of the Backwater Site Selection steps, and are available to be implemented are Headquarters Lake (E26) and Secret Lake (currently no work task created).

**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, between reaches 3-6, ultimately resulting 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 (work task 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 (as of the 2004 mapping effort) 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 3-6 will represent the second.

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 is collected an input to a biological suitability model, established specifically for this effort. The model generates a “biological suitability rating”, such as poor, moderate, good, or excellent, to provide decision makers 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 4-5 sites are chosen for further evaluation, of 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 4-5 candidate backwater sites which 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.

**FY08 Accomplishments:** During FY08, Reclamation completed the initial site visits and biological suitability ratings (steps 2-3) for 25 candidate sites in reaches 5 and 6. The draft final report of this effort was posted to the Web site for a 30-day public comment period, during which time no comments were received. The document was subsequently finalized and published as *Backwater Inventory: Reaches 5 & 6, Steps 2-3: Screening and Evaluation (March 2008)*. Reclamation staff spent the remainder of FY08 engaged in discussions with land managers and resource agencies to solicit comments from agencies and the public, to guide decisions regarding which backwaters should enter (Step 4).

During FY08, Reclamation initiated Step 4 backwater habitat site assessments and conceptual planning for two sites on Imperial NWR: Secret Lake (A62.3) and Headquarters Lake (A59.7). At the time of this publication, it is anticipated that the final reports from this effort will have been posted to the Web site, following a 30-day comment period. This effort has involved coordination and participation between Reclamation, the USFWS, and AZGFD, with input from the general public.

During FY08, Reclamation also awarded a contract for the Step 4 backwater habitat site assessments and conceptual planning for three additional sites in LCR MSCP reaches 5 and 6, although the selection of these sites has not been finalized at this time. Reclamation has worked extensively with the USFWS, AZGFD, CAFGD, BLM, and the general public to solicit input

toward the selection of these sites. This work will begin during FY09, and will be complete in FY10.

**FY09 Activities:** Reclamation intends to continue working towards completion of the assessment for the three additional backwater sites in reaches 5 and 6. Reclamation intends to solicit additional resource agency, land manager, and general public involvement in this process, as the site selection efforts proceed. Finally, Reclamation is in the process of constructing project management templates for initiating and planning backwater habitat creation projects, which will result in improved consistency and effectiveness of future planning efforts. Extensive interagency coordination and public outreach is being planned.

**Proposed FY10 Activities:** In conjunction with work task E- 16, the *Draft Final Guidelines for the Screening and Evaluation of Potential Conservation Areas* will be revised. Through these revisions, a strategy will be developed for selecting acreage targets for backwaters, by program reach and state, to assist with prioritization of potential backwater sites. The costs of a contract to complete this work have been included in the budgeting assumptions for E-15.

Backwater Site Assessments (Step 4) for three sites, beginning in FY09, will be completed. Once completed, five fully planned and scoped-out backwater projects will be available for selection and implementation. Backwater site selection will commence in reaches 3 and 4. Step 1 will be completed in FY10, with the final report posted to the web.

**Pertinent Reports:** *Backwater Inventory: Reaches 5 & 6, Steps 2-3: Screening and Evaluation (March 2008); Backwater Site Selection for Reaches 5 & 6, Backwater Site Assessments and Conceptual Habitat Creation Plan for Secret Lake (A62.3) and Headquarters Lake (A59.7) [In Press]*

## Work Task E16: Conservation Area Site Selection

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$200,000	\$234,994.34	\$631,021.34	\$200,000	\$360,000	\$360,000	\$360,000

**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 CR2, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, FLSU1, MNSW2, CLMB2, PTBB2

**Location:** Reaches 1-7, AZ, CA, and NV.

**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 land owners 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 Work Task E16 budget.

As new sites are evaluated and prioritized, each new site will be presented to the Steering Committee either through the site selection process or, if acquisition is required, through a Land and Water Resolution. 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. Existing backwaters proposed for management of native fish are reviewed under E15 Backwater Site Selection. However, beginning in FY10 the creation of backwaters from scratch on existing or new Conservation Areas is being implemented to allow for comparison with backwaters identified under E15.

**FY08 Accomplishments:** FY08 accomplishments consisted of four main work categories:

1. Desert tortoise habitat acquisition was investigated. In 2007, the Coachella Valley Mountains Conservancy (Conservancy) proposed the acquisition of 230 acres of desert tortoise habitat within the Chuckwalla Bench Area of Critical Environmental Concern (ACEC). The Chuckwalla Bench ACEC is managed by the Bureau of Land Management (BLM). With the help of the Conservancy individual land owners within the ACEC were identified using county records and tax assessor information. Twelve individual land owners 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.
2. Flat-tailed horned lizard habitat acquisition was investigated. In 2007, the Coachella Valley Mountains Conservancy (Conservancy) proposed the acquisition of 230 acres of flat-tailed horned lizard habitat within the Dos Palmas Preserve. The Dos Palmas Preserve and adjacent Salt Creek ACEC are managed by the BLM. With the help of the Conservancy, individual land owners within the Preserve were identified using county records and tax assessor information. The LCR MSCP also investigated a potential flat-tailed habitat acquisition of 230 acres located in the Anza-Borrego Desert State Park managed by the State of California. San Diego County Water Authority, a LCR MSCP stakeholder recently acquired flat-tailed horned lizard habitat in the Park and suggested the LCR MSCP approach the Park for additional acquisition opportunities. LCR MSCP staff met with the Park's superintendent regarding the habitat acquisition potential. The State Park confirmed that as the San Diego acquisition is finalized in late 2008, the Park would be willing to work with the LCR MSCP to investigate additional habitat available.
3. Two appraisals were conducted in FY08. The first appraisal was conducted for Planet Ranch, located near Parker, AZ. The second appraisal was for the Boy Scout Camp located in Laughlin, NV.
4. The LCR MSCP administered its second annual Request for Projects (RFP). The RFP was posted to the Program's website in September 2008 for 30 days and all Program stakeholders were notified by email. The RFP requested that projects be limited to marsh, cottonwood-willow and mesquite development within the LCR MSCP Planning Area. Backwaters were excluded from the RFP and are currently beginning inventoried for potential development under "Work Task E15: Backwater Site Selection."

**FY09 Activities:** FY09 activities will be conducted within two main work categories:

1. Two opportunities for acquisition of flat-tailed horned lizard habitat were identified in the FY08 RFP. A biological determination of the most suitable property for habitat protection is anticipated this spring. An inter-agency agreement between Reclamation, Boulder City, and the BLM South Coast Field Office will be completed. BLM biologists with prior flat-tailed horned lizard monitoring experience will survey both the Dos Palmas and Anza-Borrego properties for habitat potential. After the two sites are surveyed, one geographic area will be selected and brought to the steering committee as a land a water resolution.
2. In October 2008, trip reports documenting and analyzing the projects submitted under the 2008 RFP were completed. Applicants were evaluated on their relevance based on Step 1 of the *Draft Final Guidelines for the Screening and Evaluation of Potential Conservation Areas* and specific RFP criteria. An interdisciplinary team made up of Reclamation professionals visited nine individual sites. The sites are located on the 'Ahakhav Tribal Preserve, Palo Verde Irrigation District lands, Imperial National Wildlife Refuge, Reclamation withdrawn lands, Bureau of Land Management lands, State of Arizona lands and Quechan Tribal lands. Specific information on each site was documented in the *October 2008 Trip Reports*, posted to the LCR MSCP web site. Preliminary findings and site recommendations were discussed during the February 2009 Work Group meeting.

The Steering Committee approved a Land and Water Resolution to commence desert tortoise habitat acquisition. In FY09 all costs associated with the acquisition of the inhabited lands will be accounted for within the newly created Desert Tortoise Work Plan (E29). Using \$50,000 from E16, land owners within the Chuckwalla Bench ACEC will be contacted to initiate the appraisals.

**Proposed FY10 Activities:** FY10 activities will be conducted within three work categories:

1. After the flat-tailed horned lizard habitat areas have been surveyed for habitat value and one geographic areas is selected, the Steering Committee will receive a Flat-tailed Horned Lizard Land and Water Resolution. Once approved for acquisition, land owners will be contacted and federal appraisals conducted.
2. Further analysis will be conducted on the sites identified under the 2008 RFP. Steps 2-6 of the *Draft Final Guidelines for the Screening and Evaluation of Potential Conservation Area* will be conducted if appropriate.
3. Backwaters created on existing ground at existing or potential Conservation Areas will be identified and evaluated. This effort is being initiated to bring additional backwaters, created from scratch, to parity with existing backwaters identified under Work Task E15 Backwater Site Selection.

**Pertinent Reports:** *Draft Guidelines for the Screening and Evaluation of Potential Conservation Areas* and the *November 2006 Trip Reports* are posted on the LCR MSCP Web site.

## Work Task E17: Topock Marsh Pumping

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$5,000	\$10,480.66	\$16,364.66	\$5,000	\$10,000	\$70,000	\$70,000

**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, AZ.

**Purpose:** To avoid flow-related covered impacts on covered species habitats at Topock Marsh. One option identified includes the design, permitting, and construction of a reliable and manageable water delivery system for Topock Marsh.

**Connections with Other Work Tasks (past and future):** None.

**Project Description:** Topock Marsh has been identified as an important area for LCR MSCP covered species such as Yuma clapper rail and the SWFL. At times, flow-related activities could lower river elevations to levels that could disrupt existing gravity diversions of water from the river to the marsh. The option identified in the LCR MSCP HCP assumed two pumps would be purchased and installed at the existing inlet canal for Topock Marsh. The cost of the purchase, installation, and operation of the pumps throughout the life of the 50-year program would be funded by the LCR MSCP. It is anticipated that the gravity diversion of water, along with supplemental pumping to maintain the water surface elevation, would avoid negative effects on the groundwater elevation.

**Previous Activities:** The *Draft Havasu National Wildlife Refuge Water Management Plan* has been drafted by the USFWS and is posted on the LCR MSCP Web site.

**FY08 Accomplishments:** The specific actions required to satisfy AMM2 have not been determined at this time. However, expenditures were slightly higher than anticipated to allow for a thorough discussion of possible alternatives. The internal rating and preparation of a cost estimate to implement water management alternatives for Havasu NWR was initiated in FY08 by the USFWS and is expected to be available for review late in FY09 or early FY10.



**FY09 Activities:** Review of a document discussing alternatives and preliminary costs for management of Havasu refuge is anticipated late in FY09 or FY10. The document will be used to support the ongoing technical reviews, discussion of water accounting issues, and to determine the feasibility of implementation. After a decision is reached, the commitments or obligations of the LCR MSCP will be determined.

The USFWS has 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) are underway. A report detailing the responsibility of each party will be distributed to the Steering Committee in late FY09 or early FY10.

**Proposed FY10 Activities:** Funding continues at a reduced level until a strategy for completing AMM2 is finalized.

**Pertinent Reports:** *Final Havasu National Wildlife Refuge Water Management Plan.*

## Work Task E18: Law Enforcement and Fire Suppression

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$25,000	\$25,218.68	\$27,594.68	\$200,000	\$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 (CLRA, WIFL, WRBA, WYBA, CRCR, YHCR, LEBI, BLRA, YBCU, ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, SUTA, MNSW, CLNB, PTBB)

**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:** Fund 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:** Reclamation has initiated discussions with various agencies to allow for the preparation and implementation of site specific law enforcement and fire suppression strategies.

**FY08 Accomplishments:** Throughout FY08 Reclamation staff met with all conservation area land owners and associated law enforcement and fire suppression personnel. Depending on which state the conservation area is located in and the land owner, law enforcement agencies and fire personnel vary. Fire management agencies along the river use Cooperative Fire Protection Agreements, which allow multiple fire agencies to respond to the same event when severe wildland fire occurs. Law enforcement agencies are regulated to jurisdictional boundaries within state or federal lands.

**FY09 Activities:** Activities include the solicitation and award of the LCR MSCP Law Enforcement and Fire Management contract. The contract scope is two fold. First, a comprehensive LCR MSCP law and fire management strategy will be created: the comprehensive document will outline wildland fire techniques, proactive measures, rehabilitation techniques, and identify all law and fire agencies working throughout the Lower Colorado River. Second, LCR MSCP Conservation Area Specific Law and Fire Strategies will be composed. These documents will be created with the help of the conservation area land managers and the existing law enforcement and fire personnel. Each conservation area's specific law and fire strategy will be consistent with the existing law enforcement regulations and fire management practices on-site.

**Proposed FY10 Activities:** FY10 activities include Federal, State, or Tribal law and fire personnel becoming actively engaged on the conservation areas. Wardens and officers will be utilized to enforce trespassing, vandalism, hunting and fire restrictions. Federal grants providing resources to the fire management and law enforcement agencies to ensure the safety of LCR MSCP conservation areas will be necessary.

**Pertinent Reports:** N/A

## Work Task E21: Planet Ranch, Bill Williams River

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	-\$802.38	\$19,197.62	\$50,000*	\$100,000	\$9,300,000**	\$1,500,000

\*Approved by Steering Committee at the 4-22-09 meeting.

\*\*Pending land and water approval.

**Contact:** Terry Murphy, (702) 293-8140, tmurphy@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, AZ.

**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). Work Task 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 William 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 our website 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.

**FY08 Accomplishments:** No obligations were made in this fiscal year.

**FY09 Activities:** Include the negotiations to secure the land and water resources as well as drafting of the documents required. On-site activities include discussing the transition of property ownership from the City of Scottsdale to the Arizona Game and Fish Commission, the proposed land owner. A boundary survey, consistent with the standards of the Arizona Boundary Survey Minimum Standards, will be performed on the 3,418 acres of land. Survey content and monumentation will define the proposed LCR MSCP lease boundary. The survey will also result in the legal description of the parcel.

**Proposed FY10 Activities:** A transition plan will be drafted to address the need for on-site staff and appurtenances such as vehicles and farming equipment. The city currently employs a caretaker, living year-round on the property, for maintenance and security purposes, given the property's remote location. A similar arrangement is anticipated for the future. 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. The land use agreements will address the roles and commitments of all parties. Additional documents, to secure water resources, are also anticipated. 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.

**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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$1,213,000	\$1,075,422.08	\$1,131,379.08	\$1,072,000	\$1,236,000	\$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, AZ.

**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, 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, USFWS and Reclamation planted another approximately 18 acres of cottonwood/willow in Unit #1 north of the Nature Trail. Four additional approximately 20-acre fields in Unit #1 are occupied by three projects that have been fully or partially funded by the LCR MSCP. These include E6 (Cottonwood Genetics Study), E7 (Mass Transplanting Demonstration), and E8 (Seed Feasibility Study). To the east of these projects are an additional two agricultural fields. A 50-year land use agreement with 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. Research projects that are currently ongoing will retain their individual work task designation until the termination of research or in FY08. 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.

#### **FY08 Accomplishments:**

**Maintenance/Restoration/Management.** Regular water delivery, invasive plant mitigation, cover crop establishment, and site maintenance continued through FY08 through the use of contracted farming services. In preparation for planting CW land cover in the Crane Roost, over 200,000 trees were purchased under contract. Additional major expenditures associated with this work task in FY08 include drainage and infrastructure improvements to allow efficient water delivery and drainage and adequate access. Approximately 6,000 linear feet of drain ditch improvement was accomplished in FY08. Approximately 8,000 linear feet of roads were constructed/upgraded. This included a large section of road surrounding the Crane Roost that was impassible with other than 4-wheel drive vehicles. An additional 10,000 linear feet of existing roads we're also maintained (resurfaced) on the Cibola NWR Unit #1 Conservation Area. Remaining compliance documentation was also completed in FY08.

The costs for infrastructure improvements in FY08 were lower than anticipated; however, more of these improvements than originally projected were actually accomplished. Part of these savings can be attributed to better-than-expected conditions of a number of the roads that were upgraded; however, efficient execution of these improvement tasks by operators and partner support in these efforts also played a role.

Research and demonstration projects "Cottonwood Genetics" and "Mass Transplanting" were previously covered under specific work tasks E6 and E7, respectively. The costs for these projects are limited to those associated with continued maintenance and monitoring and is now covered under this work task, E24. Any additional research updates associated with these projects will be detailed in the annual report for Cibola NWR Unit 1 Conservation Area.

**Monitoring.** Fourteen vegetation plots were established at the Nature Trail and Mass Transplanting areas. Avian monitoring was conducted at the Nature Trail and Mass Transplanting areas. Multi-species monitoring methods included a mist-netting/bird banding station at the Nature Trail, rapid area searches at the Crane Roost area and intensive area searches at the Nature Trail and Mass Transplanting areas. Single species surveys were conducted for the southwestern willow flycatcher and western yellow-billed cuckoo. The Sonoran yellow warbler was the only LCR MSCP covered avian species found breeding within the conservation area. There is evidence of a Bell's vireo wintering within the Nature Trail area.

Small mammal trapping was conducted as part of a population genetic study being performed by UNLV. They confirmed the continued presence of the Colorado River cotton rat within the Nature Trail area. Acoustic bat surveys were conducted using Anabat II bat detectors coupled to zero-crossing analysis interface modules (ZCAIMs). A new study design implemented this year included adding more Anabat survey areas. Specifically, Anabat surveys were conducted two nights per quarter at four locations within the conservation area. These locations include two areas of cottonwood-willow cover type, one area of mesquite cover type, and one area of agricultural cover type. A capture survey was also conducted at the Nature Trail area. Five survey nights were performed between April and September. The western yellow bat and California leaf-nosed bat were both captured.

**FY09 Activities:** Mechanized mass transplanting in the Crane roost is planned for FY09 and will result in 154 acres of land managed for LCR MSCP covered species. Ground preparation and post-planting maintenance of the established trees will be covered under a farming services contract.

Ongoing infrastructure improvements, including additional drain construction and repair and road-building will also occur during this fiscal year. Assuming that program funding is available and the projected FY10 phase of this conservation area has had an adequate duration for proper soil conditioning, an additional tree order will be made to procure planting stock for approximately 100 acres in the Hippy Fire area.

Pre- and post-development monitoring will continue at Cibola NWR Unit #1 Conservation Area. Habitat, avian, small mammal, and bat monitoring will continue.

**Proposed FY10 Activities:** Approximately 100 acres of CW will be planted in the Hippy Fire area of the Cibola NWR Unit #1 Conservation Area. Additional infrastructure upgrades will continue in FY10, as necessary. These improvements may also include assistance in repair or upgrades to the water measuring device(s) and delivery infrastructure on the irrigation canal that supplies Unit #1. 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 Trip Report, November 2006* and *Cibola NWR Unit Conservation Area Development and Monitoring Plan Overview, 2007*, *Cibola NWR Unit Conservation Area Phase 1 Plan, 2008* and *Cibola NWR Unit Conservation Area Annual Report, 2008* will be posted to the LCR MSCP Web site.



## Work Task E25: Big Bend Conservation Area

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$80,000	\$500,000*	\$500,000*	\$75,000

\*On April 22, 2009, the Steering Committee approved an in-kind credit for land of \$872,000 in lieu of payment to SNWA

**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, NV, River Mile 266.5.

**Purpose:** Protection of an existing backwater from development which would result in 15 acres of backwater credit.

**Connections with Other Work Tasks (past and future):** This project was identified under Work Task E16 Conservation Area Site Selection 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 section C and D.

**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 no 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 make 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 land owners, and controls future development in the surrounding areas. Long-term security of the property would also provide protection to the backwater and allow for future restoration activities.

A long-term lease with the option to renew has been drafted to compensate SNWA for the acquisition cost of the 15 acres of upland. The value was established by a federal appraisal was conducted which set the appraisal price and compensation at \$872,000. The compensation will be split equally over 2 fiscal years beginning in FY10. 10 ac-ft of water attached to the Boy Scout Camp property acquired by SNWA was excluded from the federal appraisal. Compensation was approved by the Steering Committee in October of 2008.

A land use agreement between Reclamation, NDOW, SNWA and Nevada Division of State Parks is being drafted. The land use agreement will document the roles and responsibility of each party pertaining to continual management of the Big Bend Conservation Area.

**Previous Activities:** N/A.

**FY08 Accomplishments:** This work plan was a new start for FY09.

**FY09 Activities:**

**Maintenance/Restoration/Management.** A land and water resolution was presented to and approved by the Steering Committee in October 2008. The program intends to secure the land and water resources through a long term lease agreement with SNWA.

A land use agreement between Reclamation, NDOW, SNWA and Nevada Division of State Parks is scheduled to be finalized in FY09. The land use agreement will document the roles and responsibility of each party pertaining to continual management of the Big Bend Conservation Area.

SNWA has assumed the responsibility of restoring the upland portion of Conservation Area at no cost to the program. Reclamation has reviewed the site improvement plans to ensure compatibility with LCR MSCP. A Restoration Development and Monitoring Plan will be drafted by Reclamation and posted to the LCR MSCP website for the backwater portion of the Conservation Area. The Plan will document the operations, maintenance, and monitoring activities associated with the backwater.

NDOW is coordinating with the Nevada Wildlife Commission for the installation of a buoy at the entrance of the backwater. The buoy will restrict access to the backwater to only wakeless speed in order to decrease disturbance to wildlife.

All land use agreement parties have indicated their support of creating a native habitat demonstration area throughout the upland area of the site. SNWA's intent is to draft a site improvement plan for the upland portion of the property in support of education and outreach activities. SNWA is currently removing salt cedar from the site in anticipating of future habitat creation efforts. SNWA anticipates establishment of native trees consisting of honey mesquite, cottonwood-willow and other upland drought tolerant species will be planted throughout the

property. The LCR MSCP supports SNWA's effort to establish native plants on the upland property and by providing review and comment on the site improvement plan will ensure compatibility with the goals of backwater protection

Several structures (i.e. laundry room, bathroom, septic tank and meeting area) were installed by the Boy Scouts many years ago. In order to develop the site into a native habitat area, SNWA has agreed to coordinate and fund the removal of the structures.

**Monitoring.** Presence/absence marsh bird surveys will be conducted in March, April and May under D1. Three survey points will be established in the marsh habitat, the Standardized North American Marsh Bird Monitoring Protocol will be used. At each survey point, a vegetation survey will be conducted once per year, during the same time as the marsh bird surveys are conducted (April-May). The general methodology will follow what is outlined under *habitat measurements* in the North American Marsh Bird Survey Protocol. Native fish surveys are conducted using existing C and D Work Tasks.

**Proposed FY10 Activities:**

**Maintenance/Restoration/Management.** The SNWA will be reimbursed for approximately ½ of the funding used to secure the Boy Scout Camp property. The balance will be reimbursed in FY11. 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. The LCR MSCP will continue to support SNWA's effort to establish native plants on the upland property and ensure compatibility with the goals of backwater protection.

**Monitoring.** Presence/absence marsh bird surveys will be conducted in March, April and May in the marsh habitat at the three survey points (D1). At each survey point a vegetation survey will be conducted once per year, during the same time as the marsh bird surveys are conducted (April-May).

**Pertinent Reports:** The *November 2006 Trip Report* is posted on the LCR MSCP Web site.

## Work Task E26: Headquarters Lake

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$265,000	\$0	\$0	\$0

**Contact:** Nathan Lenon, (702) 293-8015, nlenon@usbr.gov

**Start Date:** FY09

**Expected Duration:** FY55

**Long-term Goal:** Habitat Creation.

**Conservation Measures:** CLRA1, BONY2, RASU2, and LEBI1.

**Location:** Reach 5, Imperial NWR, AZ, River Mile 59.7.

**Purpose:** Headquarters Lake is one of the first two backwater sites to have gone through interdisciplinary, interagency conceptual planning (Step 4 of Backwater Site Selection, E-15), resulting in a planned and scoped backwater project, in fulfillment of the LCR MSCP's backwater habitat creation objectives. Backwater Site Selection is expected to output 3 additional sites in Reaches 5 & 6, for a total of 5 planned and scoped potential backwater projects, which can be sequenced into the program based on program objectives, budgets, and other factors.

Headquarters Lake was tentatively chosen in FY 2007 for implementation because of its current designation as "closed to the public", which makes the project more compatible with current public uses in the area, and would eliminate the requirement to close off the backwater to public use. Additionally, the site can be accessed easily by land-based equipment, which is anticipated to decrease construction costs. Closing a site to public use is an uncertain process, requiring additional procedural requirements, and extending the planning period for a site, during which time program funds would be expended with little assurance of project implementation. The land and water resources would be provided by Imperial NWR under their existing entitlement.

At this time, no work will be performed, pending the completion of Step 4 of the backwater site selection process (E15) for three additional sites in reaches 5 and 6, so that selections can be made on the basis of equal information for all five sites. These analyses are scheduled to run through the end of FY10.

**Connections with Other Work Tasks (past and future):** This work task addresses development of Headquarters Lake, which was identified under Backwater Site Selection (E15). All funding, to date, for backwater site assessments and conceptual planning, has been accounted for under Backwater Site Selection (E15).

**Project Description:** This project is currently on-hold until additional backwaters throughout the entire LCR MSCP planning area are identified and adequate site specific information is gathered to achieve parity with Headquarters Lake. Headquarters Lake (A59.7) is located in Reach 5 within Imperial National Wildlife Refuge on the Arizona side of the Colorado River, at river mile 59, and was evaluated as one of the initial 25 candidate site evaluations performed in 2007. Headquarters Lake consists of a 7.5-acre backwater connected to the river by a 4,800-foot-long dredged inflow channel. Headquarters Lake received a biological suitability criteria score of 55 during the initial evaluations (LCR MSCP 2008a), giving it a high habitat creation opportunity rating.

Headquarters Lake was included, with Secret Lake (also on INWR, Arizona side) in a one-year backwater site assessment process, to gain a pre-development environmental baseline, and guide conceptual planning efforts towards establishing backwater and marsh habitat, primarily for razorback sucker, bonytail, and Yuma clapper rail. Conceptual planning has involved an interdisciplinary, interagency review group, including representatives from Reclamation, USFWS, and AZGFD.

The proposed conceptual design for Headquarters Lake involves expanding the backwater acreage from its current 7.5 acres, to an integrated mosaic including up to 55 acres of backwater/marsh habitat and 57 acres of mesquite and *Atriplex*.

**Previous Activities:** This work task is a new start in FY09.

**FY09 Activities:** At this time, no work will be performed, pending the completion of Step 4 of the backwater site selection process (E15) for all potential backwaters located throughout the entire LCR MSCP planning area. This delay will allow for collection of backwater specific data, agency review, and public participation. It is anticipated that no backwaters will be selected for implementation until FY12.

**FY10 Activities:** None.

**Pertinent Reports:** The draft backwater site assessment and conceptual design report is currently under review. The draft final report will be sent to the steering committee for comments.

## Work Task E27: Laguna Division Conservation Area

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$0	\$150,000	\$300,000	\$5,000,000

**Contact:** Bill Singleton, (702) 293-8159, wsingleton@usbr.gov

**Start Date:** FY10

**Expected Duration:** FY55

**Long-term Goal:** Habitat Creation.

**Conservation Measures:** CLRA1, WIFL1, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, PTBB2

**Location:** Reach 6, Federal Lands, River Mile 43-49, CA & AZ.

**Purpose:** Create and manage a mosaic of native land cover types for LCR MSCP covered species.

**Connections with Other Work Tasks (past and future):** This is a new start for the LCR MSCP in FY10.

**Project Description:** The Laguna Division, river miles 43-49, has been identified as having potential for large scale riparian and marsh restoration and enhancement (approximately 700 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:

1. Arizona Game and Fish Department
2. California Department of Fish and Game
3. Pacific Institute
4. U.S. Fish and Wildlife Service
5. Bureau of Land Management
6. Bureau of Reclamation, LCR MSCP

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 east of lands identified as future stockpiling areas for dredged silt removed from the river (Laguna settling basin). To minimize earthwork, cuts and fills would follow the existing topography where feasible. Adjacent terraces would be graded to allow flooding and promote the establishment of native riparian species. Water control structures would be created to manage water levels. Upland vegetation would receive water by either by flooding or drip irrigation.

To support the concept described above, modifications to the point of diversion and/or concrete lined Mittry Lake inlet canal, would be made to allow for up to 100 cfs capacity, would be required. This diversion ditch/pipe systems would be engineered to allow for maximum management flexibility including diverting the entire flow to Mittry Lake, the Laguna Division Conservation Area, or the old river channel.

**Previous Activities:** In coordination with the Laguna Planning team, several conceptual designs were created with the intent of determining the technical feasibility of implementing a large scale restoration project. In addition, a team was established to determine the availability of water to create and support the new habitat. The combination of technical feasibility, water availability, as well as cost effectiveness will ultimately determine the project's implementation.

**FY08 Accomplishments:** The project is a new start for the LCR MSCP in FY10.

**FY09 Activities:** The project is a new start for the LCR MSCP in FY10. However, using non-LCR MSCP funds three alternative designs for the Laguna Division are being prepared. These alternatives will be presented and discussed within the Laguna Planning team with the intent of having a preferred alternative to present to the LCR MSCP steering committee in October of 2009.

**Proposed FY10 Activities:** Restoration activities will continue forward assuming the Steering Committee has concurred with the restoration design. Further analysis/design refinement will occur between the Laguna Planning team, local stakeholders, state and federal agencies, and Reclamation. Permitting (Section 404) and NEPA compliance actions will be initiated for the overall restoration plan in support of the creation of riparian and marsh land cover types.

A general planning schedule of future activities is listed below:

1. **FY11.** Finalize permitting, rights of way, land use agreements, river. operational requirements, operation and maintenance requirements.
2. **FY12+.** Phased approach to construction: roads, water control structures, inlet canal modifications; contouring and earthmoving; removal of existing non-native tamarisk.

**Pertinent Reports:** N/A.

## Work Task E28: Yuma East Wetlands

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$0	\$250,000	\$250,000*	\$250,000*

\*To be revised based on April 2010 interim review.

**Contact:** Jed Blake, (702) 293-8165, jblake@usbr.gov

**Start Date:** FY10

**Expected Duration:** FY10 Interim Review, and FY12 decision point

**Long-term Goal:** Habitat Maintenance.

**Conservation Measures:** CLRA1, WIFL1, CRCR2, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, PTBB2

**Location:** Reach 6, AZ, 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 partial funding through FY12 to maintain land cover types, primarily marsh, established at Yuma East Wetlands (YEW). The funding will allow for invasive plant removal and management during this initial establishment period. An interim report summarizing past, present, and future actions including the responsibilities of all parties is anticipated to be presented to the SC with the FY11 Work Plan at the April 2010 meeting. By FY12 it is anticipated the review of monitoring data including LCR MSCP covered species usage, delineation of areas to be maintained by the LCR MSCP as habitat, identification and concurrence on any habitat modifications identified, and finalization of a land use agreement defining the roles and responsibilities of all parties would be completed. With the concurrence of the land owners and the SC, funding would be increased to match both the acreage identified for maintenance and 70% cost sharing arrangement described below.

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. A wildlife and wetlands delineations were conducted prior to clearing. Maintenance and replanting the wetland with native plant species is a continual process.

YEW is developing into an integrated mosaic of land cover types, including cottonwood-willow, honey mesquite and marsh. The project is located in Yuma, AZ on City of Yuma, Quechan



Tribal, and Arizona Game and Fish Commission lands. Existing habitat created by past revegetation efforts have created land cover types of the 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 site improvements benefiting the Program's covered species.

To date, approximately 350 acres have been targeted to create a mosaic of marsh, mesquite and cottonwood-willow for which funding for management and maintenance of 260 acres has expired or will expire at the end of FY09. The 350 acres is made up of 11 individual projects. YEW has adopted wildlife monitoring standards consistent with the LCR MSCP and has observed numerous LCR MSCP covered species on-site..

Funding amounts and potential contributors have been identified to maintain land cover types being established and managed for habitat, as well as, recreational aspects of the projects such as parks and trails. The City of Yuma and Quechan Tribe are responsible for 100% of the cost for operation and maintenance of all parks and trails on their respective lands. Funding for operation and maintenance of land cover types to be managed for LCR MSCP covered species as habitat would be jointly funded, with 70% being funded by the LCR MSCP, 10% by the City of Yuma, 10% by the Yuma Crossing National Heritage Area, and 10% by the Quechan Tribe.

Previous expenditures to secure, establish, or maintain land cover types are not eligible for reimbursement by the LCR MSCP. Compensation for the use of land or water would require the approval of the SC through passage of a land and water resolution and possibly a cadastral survey.

**Previous Activities:** Since 2000, the LCR MSCP has been informally involved in the development of the Yuma East Wetlands. Past activities included: attendance at workshops and planning meetings, scheduling the use of Reclamation heavy equipment, an irrigation system inventory analysis and the 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.

**Proposed FY10 Activities:** The YCNHA, as the lead agency for the YEW, will assist with coordinating meetings, tracking costs, and financial reporting. Discussions intended on defining the roles, responsibilities, and procedure for identifying and implementing any on-site changes will be defined and integrated in a Land Use Agreement.

Maintenance and management activities to be administered by the YCNHA will allow for onsite project management, coordination and funding of labor crews and 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, providing irrigation services, herbicide and fertilizer purchase and application, and replanting as necessary. and management during this initial establishment period.

A report detailing 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 SC with the FY11 Workplan in April of 2010. The report will also discuss commitments of the land use agreement and the process for suggesting and implementing adaptive management actions.

Reclamation staff will attend planning meetings, habitat and species monitoring activities, and maintenance activity meetings. Additionally, LCR MSCP staff will attend the annual bi-national re-vegetation workshops held in the Yuma area with a focus on the YEW.

**Pertinent Reports:** A report detailing the review of existing development and monitoring data and FY10 findings is anticipated to be presented to the SC with the FY11 Workplan in April of 2010.

## Work Task E29: Desert Tortoise

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$0	\$195,000	\$50,000	\$50,000

**Contact:** Jed Blake, (702) 293-8165, jblake@usbr.gov

**Start Date:** FY09

**Expected Duration:** FY2012

**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, CA 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 Work Task E16 Conservation Area Site Selection.

**Project Description:** The LCR MSCP contains a specific conservation measure: DET01-Aquire and protect 230 acres of existing unprotected occupied habitat, (LCR MSCP Habitat Conservation Plan, 2004).

In response to the Programs FY07 Request for Projects, the Coachella Valley Mountains Conservancy (the Conservancy) proposed the acquisition of 230 acres of desert tortoise habitat 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 purchases. It is anticipated that private parcels acquired by the Program 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. Funding for coordination meetings and administrative costs were previously charged to "Work Task: E16 Conservation Area Site Selection."

With the help of the Conservancy individual land owners within the ACEC were identified using county records and tax assessor information. Twelve individual land owners 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.

**FY08 Accomplishments:** This is a new start in FY09.

**FY09 Activities:** At the October 2008 Steering Committee a Land and Water Resolution was presented and approved. Rather than delay the appraisal process, \$50,000 has been transferred from E16 to initiate the process in FY09. Private in-holding land owners have been contacted by the LCR MSCP and the Conservancy. With the land owners' permission a federal appraisal will be conducted to establish fair market value. Due to the increase in appraisal costs, additional funding, not described in the land and water resolution, has been budgeted to capture the overhead and contract administration costs. Commencing in FY09 all desert tortoise acquisition costs will be captured under Work Task E29 Desert Tortoise for transparency to stakeholders and accurate accounting.

**Proposed FY10 Activities:** Activities during FY10 will include the continuation of acquiring targeted parcels and transferring them to the BLM. Work will continue until the target of 230 acres of desert tortoise habitat are acquired and transferred.

**Pertinent Reports:** N/A.

## **WORK TASKS SECTION F**

### **POST-DEVELOPMENT MONITORING**

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## Work Task F1: Habitat Monitoring

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$325,000	\$305,647.09	\$967,301.09	\$350,000	\$350,000	\$425,000	\$425,000

**Contact:** Chris Dodge, (702) 293-8115, cdodge@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, AZ; 'Ahakhav Tribal Preserve, AZ; PVER, CA; CVCA, AZ; Cibola Unit #1, Cibola NWR, Cibola, AZ; Imperial Ponds, Imperial NWR, AZ.

**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., 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 if habitat acreage goals are met. To evaluate habitat, a monitoring plan will be written prior to project implementation, 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. Monitoring plans were written for habitat creation projects including CVCA, PVER, Imperial Ponds, Beal Lake, and 'Ahakhav Tribal Preserve. Post development vegetation monitoring was conducted at Beal Lake, Cibola Nature Trail, CVCA, and PVER in 2007.

**FY08 Accomplishments:** Vegetation monitoring protocols have been tested through the first 2 years of the LCR MSCP implementation. A final protocol was developed and implemented in 2008 and was conducted at Beal Lake, 'Ahakhav Tribal Preserve, Cibola NWR Unit #1, CVCA, and PVER. The protocol includes measurements for overstory trees, shrub and intermediate trees, ground cover, crown closure, and total vegetation volume. In 2008, 196 vegetation monitoring plots were established and measured. The plots were randomly stratified by habitat type including cottonwood, willow, cottonwood/willow mix, and mesquite. Data were compiled by habitat type and by phase. A vegetation report was generated and will be placed on the LCR MSCP website.

**FY09 Activities:** Pre-development monitoring will be conducted at habitat creation sites identified in Section E, when necessary. Post-development monitoring will be conducted at existing restoration sites, including Beal Lake, Cibola Nature Trail, Imperial Ponds, CVCA, 'Ahakhav, and PVER. Monitoring plans will be created for new habitat creation sites.

**Proposed FY10 Activities:** Pre-development monitoring will be conducted at habitat creation sites identified in Section E, when necessary. Post-development monitoring will be conducted at existing restoration sites. Monitoring plans will be created for new projects.

**Pertinent Reports:** The monitoring plans 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 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 Creation Sites

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$ 150,000	\$157,021.22	\$406,609.22	\$150,000	\$170,000	\$170,000	\$170,000

**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 (CLRA, WIFL, LEBI, BLRA, YBCU, ELOW, GIFL, GIWO, VEFL, BEVI, YWAR, SUTA)

**Location:** Beal Lake, Havasu NWR, AZ; ‘Ahakhav Tribal Preserve, AZ; PVER, CA; CVCA, Cibola Unit #1, Hart Mine Marsh, Cibola NWR, Cibola, AZ; Imperial Ponds, Imperial NWR, AZ.

**Purpose:** Monitor avifauna use of habitat creation sites to provide data for the adaptive management process and develop management guidelines for created habitat sites.

**Connections with Other Work Tasks (past and future):** Post-development avian 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 avian system monitoring by using the same protocols established in the system monitoring program (D1, D2, D5, D6, and D7).

**Project Description:** Riparian habitat creation will benefit nine LCR MSCP covered avian species, including SWFL and YBCU. Habitat creation and restoration demonstration sites will be monitored for bird activity, using a variety of techniques including point counts, area searches, and species-specific survey protocols. Data gathered will be used to guide the design of future riparian habitat creation projects to provide covered species habitat.

**Previous Activities:** During FY07, post-development monitoring for avian covered species occurred at five restoration demonstration or habitat creation sites: Cibola NWR Unit #1, ‘Ahakhav Tribal Preserve, PVER, Beal Lake, and CVCA. Avian pre-development monitoring was conducted at two habitat creation sites: CVCA and PVER. Surveys for the SWFL was conducted under D2 at ‘Ahakhav Tribal Preserve, Cibola Unit #1 and Beal Lake. Surveys for the YBCU was conducted under D7 at Beal Lake and ‘Ahakhav Tribal Preserve. Presence/absence marsh bird surveys were conducted under D1 at Hart Mine Marsh, Butler Lake, McAllister Lake and Imperial Ponds. Avian use was summarized and evaluated for each site and compared

between sites. Pre and post-development monitoring for avian covered species has been conducted at habitat creation projects since FY05.

**FY08 Accomplishments:** Pre-development monitoring was conducted at habitat creation sites identified in Section E, including CVCA, PVER, Imperial Ponds and Cibola Unit #1. Post-development monitoring was conducted at existing restoration demonstration and habitat creation sites, including Beal Lake, Cibola NWR Unit #1, CVCA, PVER, and 'Ahakhav Tribal Preserve. Surveys for SWFL were conducted under D2 at Beal Lake, CVCA and Cibola NWR Unit #1. Surveys for YBCU were conducted under D7 at 'Ahakhav Tribal Preserve, CVCA, Cibola NWR Unit #1, PVER and Beal Lake. Marsh bird presence/absence surveys were conducted at Imperial Ponds and Hart Mine Marsh. Presence/absence surveys for the elf owl were conducted at 'Ahakhav Tribal Preserve.

Post-development surveys conducted at Beal Lake detected two pairs of Sonoran yellow warblers and two pair of Arizona Bell's vireos breeding at the site, both LCR MSCP covered species. Three willow flycatchers were detected during surveys conducted in June; however, subsequent surveys did not detect these birds. Four incidental observations of yellow-billed cuckoos were detected during surveys conducted in June; however, subsequent surveys did not detect these birds. Neither the yellow-billed cuckoos or the willow flycatchers detected were breeding at the site.

Post-development surveys conducted at 'Ahakhav Tribal Perserve detected one summer tanager pair and two pairs of vermilion flycatchers breeding at the site, both LCR MSCP species. Five YBCUs were observed during surveys from June to September, breeding was suspected but not confirmed. No willow flycatchers were observed at the site.

Post-development surveys conducted at Cibola Unit #1 detected 4 pairs of Sonoran yellow warblers, a LCR MSCP covered species, breeding at the site. One willow flycatcher and one yellow-billed cuckoo were detected during surveys conducted in June; however, subsequent surveys did not detect these birds. Neither the yellow-billed cuckoos or the willow flycatchers detected were breeding at the site.

Post-development surveys conducted at CVCA detected 3 pairs of Sonoran yellow warblers, a LCR MSCP covered species, breeding at the site. Two willow flycatchers were detected during surveys conducted in June; however, subsequent surveys did not detect these birds. The willow flycatchers detected were not breeding at the site. Two YBCU pairs were observed breeding at CVCA, one nest was detected for one pair and two nests were detected for the other pair.

Post-development surveys conducted at PVER detected 1 Arizona Bell's vireo pair, a LCR MSCP covered species, breeding at the site. Two detections of yellow-billed cuckoos were reported, one in June and one in July. The yellow-billed cuckoos detected were not breeding at the site.

During marsh bird surveys presence/absence least bitterns and Yuma clapper rails were detected at Hart Mine Marsh and least bitterns were detected at Imperial ponds.

**FY09 Activities:** Post-development monitoring will be conducted at existing restoration demonstration and habitat creation sites, including Beal Lake, Cibola NWR Unit #1, CVCA, PVER and 'Ahakhav Tribal Preserve. Surveys for SWFL will be conducted under D2 at 'Ahakhav Tribal Preserve, Beal Lake, CVCA, PVER and Cibola NWR Unit #1. Surveys for YBCU will be conducted under D7 at 'Ahakhav Tribal Preserve, CVCA, PVER, Cibola Unit #1 and Beal Lake. Marsh bird presence/absence surveys under D1 will be conducted for Imperial Ponds, Headquarters Lake, Secret lake and Big Bend Conservation Area. Presence/absence surveys for the elf will be conducted at the 'Ahakhav Tribal Preserve.

Data from general bird surveys in pre-development agricultural areas and areas in their first year of growth conducted in previous years will be assessed to see if enough data has been gathered to created habitat suitability models for these areas.

**Proposed FY10 Activities:** Post-development monitoring will be conducted at existing restoration demonstration and habitat creation sites, including Beal Lake, Cibola NWR Unit #1, CVCA, PVER, and 'Ahakhav Tribal Preserve. Surveys for SWFL will be conducted under D2 at 'Ahakhav Tribal Preserve, Beal Lake, PVER, CVCA and Cibola NWR Unit #1. Surveys for YBCU will be conducted under D7 at 'Ahakhav Tribal Preserve, Cibola Unit #1, CVCA, PVER and Beal Lake. Marsh bird presence/absence surveys will be conducted for Imperial Ponds, Big Bend Conservation Area, Headquarters Lake, Secret Lake and Hart Mine Marsh

**Pertinent Reports:** The following reports will be posted on the LCR MSCP Web site: *Beal Lake Riparian and Marsh 2008 Annual Report; Palo Verde Ecological Reserve 2008 Annual Report; Cibola Valley Conservation Area 2008 Annual Report; Hart Mine Marsh 2008 Annual Report; 'Ahakhav Preserve 2008 Annual Report; Cibola Unit #1 2008 Annual Report; Monitoring Avian Productivity and Survivorship 2008 Annual Report; Imperial Ponds 2008 Annual Report; Marsh bird 2008 Annual Report; Southwestern Willow Flycatcher Surveys, Demography, and Ecology Along the Lower Colorado River and Tributaries 2008; Yellow-Billed Cuckoo Distribution, Abundance, and Habitat Use Along The Lower Colorado and Gila Rivers 2008 Annual Report and System Monitoring for Riparian Obligate Avian Species (Work Task D6) and Avian Use of Restoration Sites (Work Task F2) 2008.* The monitoring plans are included in the restoration development plans and have been drafted for each habitat creation project listed in Section E.

### Work Task F3: Small Mammal Colonization of Restoration Sites

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$55,000	\$33,109.48	\$100,908.48	\$55,000	\$55,000	\$55,000	\$55,000

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

**Start Date:** FY05

**Expected Duration:** FY55

**Long-term Goal:** Conduct pre- and post-development monitoring for small mammal species.

**Conservation Measures:** YHCR1, CRCR1, DPMO1, MRM2 (DPMO, CRCR, YHCR)

**Location:** Beal Lake, Havasu NWR; PVER, CA; 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.

**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 (*Sigmodon hispidus eremicus*) rats and Colorado River cotton rats (*Sigmodon arizonae plenus*) at these sites. These data will be used to guide the design of habitat restoration for covered small mammal species.

**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 *Sigmodon* spp. has been captured at Pratt Agricultural since 2005. Presence/absence live trapping surveys were conducted at several habitat creation sites during FY06, but only one *Sigmodon* spp. was captured at the Beal Lake Riparian Restoration site.

**FY08 Accomplishments:** Trapping was conducted in the fall and spring at several habitat creation sites, including PVER, CVCA, Cibola Nature Trail, and Imperial NWR. Efforts were focused on areas most likely to have *Sigmodon* spp. *Sigmodon* spp. were captured at two sites: 2

individuals were captured at Imperial NWR (E14) and 3 individuals were captured at the Cibola Nature Trail site (E24). Captured *Sigmodon* spp. had small tissue samples collected and genetically analyzed to determine species and subspecies.

**FY09 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 we will conduct trapping in arrays designed to determine density, as presence at the site has already been established. Any *Sigmodon* spp. captured will have small tissue samples collected and these samples will be analyzed to determine the species and subspecies of the animal from which the sample was collected.

**Proposed FY10 Activities:** Continue post-development monitoring activities for small mammals at habitat creation sites.

**Pertinent Reports:** A summary of mammal trapping results at LCR MSCP restoration sites 2008 will be posted on the LCR MSCP Web site.

## Work Task F4: Post-Development Monitoring of Covered Bat Species

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$70,000	\$93,145.13	\$163,043.13	\$90,000	\$110,000	\$110,000	\$110,000

**Contact:** Theresa Olson, (702) 293-8127, [tolson@usbr.gov](mailto:tolson@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, CA; CVCA, Cibola NWR Unit 1, Cibola, AZ; Imperial Ponds, Imperial NWR, AZ.

**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 5 habitat types (agricultural fields, salt cedar 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 4 of the above mention 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. Reclamation staff will conduct bat surveys 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. The report *Post-Development Bat Monitoring of Habitat Creation Areas along the*

*Lower Colorado River – 2007 Acoustic Surveys* is posted on the LCR MSCP website. The report *2007 Preliminary Results for the Capture of Bats at Riparian Habitat Creation Sites along the Lower Colorado River* will be posted on the LCR MSCP website.

**FY08 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), the two evaluation species (pale Townsend's big-eared bat and California leaf-nosed bat), and an indicator species (hoary bat) that may be more common than the other two tree bats (red and yellow). The hoary bat may be a good indicator for native riparian tree habitat along the LCR.

Additional funding was provided in FY08 in order to buy additional equipment and for labor for a more robust sampling design at habitat creation sites. A new acoustic sampling protocol was established in early 2008 which increased the number of samples in each major habitat type to allow statistical comparisons of bat activity by habitat type. The new protocol was implemented for the April 2008 and July 2008 sample periods. This data set also includes data that preceded the new sampling design (October 2007, and February 2008). A total of 76 detector nights were completed on 9 monitoring sites and 4 exploratory sites in the Beal Lake Habitat Restoration area. A total of 10,924 call files were collected and edited, and valid call files identified to species or species groups. A permanent Anabat station was established at the Beal Lake Restoration Area on April 8, 2008 and has continued uninterrupted for the most part throughout the rest of the year. Post development bat monitoring was initiated at the 'Ahakhav Tribal Preserve in April 2008. Nine sites were selected for monitoring. Thirty-six detector nights were completed with a total of 11,412 call files being collected and edited. Forty-four detector nights were completed at 9 monitoring sites in the Palo Verde Ecological Reserve. A total of 16,676 bat call files were collected and edited. Forty-one detector nights were completed at 8 monitoring sites in the Cibola Valley Conservation and Wildlife Area. A total of 19,722 call files were collected and edited. Thirty-two detector nights were completed for 7 monitoring sites at Cibola NWR Unit #1 Conservation Area. A total of 7,441 call files were obtained and edited. A total of 59 detector nights was completed for 18 sites at Imperial Ponds Conservation Area. A total of 100,247 call files were obtained and edited. All four covered species were found acoustically at all of the conservation areas. The California leaf-nosed bat was by far the most common covered species. The other 3 covered species were only picked up minimally.

A bat capture program utilizing mist nets and harp traps was conducted between April and September. Four habitat creation areas were sampled, including Beal Lake, 'Ahakhav, Cibola NWR Unit 1, and Pratt. An additional sample site was added at Havasu NWR in a more mature cottonwood restoration stand to determine if it would be a more productive site than Beal Lake. Together, these two sampling methods increase the odds of accurately detecting bats using a given habitat. Netting and trapping may allow a better understanding of how bats use habitat creation sites, which would aid the future design of these sites to better accommodate bat use. A total of 168 individual bats, from eight species, were captured among the five sites. Two LCR MSCP target species, the western yellow bat and the California leaf-nosed bat, were captured.

Two hoary bats were also captured. One yellow bat was captured at a site in which no acoustic data had been found, confirming the importance of using both acoustic and capture techniques to survey an area.

**FY09 Activities:** Bat capture techniques at the 'Ahakhav Tribal Preserve in February 2009 resulted in the first ever western red bat captured along the mainstem LCR. Conduct pre- and post-development bat surveys on habitat creation sites, including Beal Lake, 'Ahakhav, Cibola NWR Unit 1, CVCA, Imperial Ponds, and PVER. Anabat files will be analyzed to determine species richness and activity levels at habitat creation sites. A new type of bat detector and analyzing program will be tested for long-term monitoring. Capture techniques will be utilized to enhance acoustic surveys, identify hard to record (whispering bat) species, and obtain reference calls.

**Proposed FY10 Activities:** Pre- and post-development bat surveys will be conducted on habitat creation sites, including Beal Lake, Cibola Nature Trail, CVCA, Imperial Ponds, and PVER. Anabat and Sonobat files will be analyzed to determine species richness and activity levels at habitat creation sites. Capture techniques will be utilized to enhance acoustic surveys, identify hard to record (whispering bat) species, and obtain reference calls.

**Pertinent Reports:** *Post-Development Bat Monitoring of Restoration Sites along the Lower Colorado River – 2007* is posted on the LCR MSCP Web site. *Post-Development Bat Monitoring of Habitat Creation Areas along the Lower Colorado River –2008 Acoustic Surveys* will be posted on the LCR MSCP website. *Post-Development Bat Monitoring of Habitat Creation Areas along the Lower Colorado River –2008 Capture surveys* will be posted on the LCR MSCP website.



## Work Task F5: Post-Development Monitoring of Fish Restoration Sites

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$130,000	\$137,912.88	\$179,486.88	\$150,000	\$150,000	\$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, NV, AZ, and CA.

**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:** Renovation and stocking of Beal Lake, as well as the completion and stocking of Imperial Ponds.

**FY08 Accomplishments:** A draft water sampling protocol was developed to assess changes in water quality as ponds age. This protocol is intended to collect a suite of characteristics ranging from chemical composition, to the micro organisms that occupy this habitat.

Beal Lake was stocked with 6,415 RASU and 333 BONY in 2008. Two monitoring trips were conducted and sampling methods included electro-fishing, netting (hoops/trammels), and remote sensing. Twenty RASU and one BONY were contacted, seventeen of the natives were scanned using the remote sensors. All native fish were returned to the pond following processing. All non-natives were harvested and game species were released into Topock Marsh, non-natives included carp, largemouth bass, threadfin shad and black crappie.

RASU and BONY were stocked into two ponds each at the Imperial Ponds, and the first year of monitoring was completed through a research grant with Arizona State University (C25). The development of a remote sensing protocol proved effective in monitoring populations with out handling the fish. A fall monitoring of all the ponds showed BONY were able to successfully spawn in Pond 2, all native fish populations declined throughout the year, and numerous species of non-natives were identified in all ponds. Non-native species included carp, threadfin shad and multiple *Lepomis* species. An interagency coordination team has continued to meet quarterly.

**FY09 Activities:** Post-development monitoring of Beal Lake similar to FY08 monitoring will be continued. RASU and BONY will be stocked and monitored with 500 mm RASU being harvested and stocked into Reach 3 as research subjects for work task (C33). Roughfish biomass will be reduced through quarterly netting and shocking operations. Sportfish will be salvaged and stocked into Topock Marsh.

Increased monitoring of the Imperial Ponds will be continued to include physical and chemical conditions in the ponds and surveys of the fish populations. Netting and electrofishing will only be conducted in the fall to reduce stress related to high summer water temperatures. A minimum of one pond will be rennovated in preparation for restocking.

Staff will participate in fishery surveys of other native fish sanctuary habitats in the lower river floodplain to gather information on developing fisheries.

**Proposed FY10 Activities:** Native fish restoration sites will continue to be monitored for physical, chemical, and biological conditions.

**Pertinent Reports:** N/A.

## Work Task F6: Monitoring MacNeill's Sootywing in Habitat Creation Sites

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$0	\$0	\$0	\$10,000	\$50,000	\$50,000	\$50,000

**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:** MRM2 (MNSW), MNSW1

**Location:** Habitat-creation sites, initially Palo Verde Ecological Reserve 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 Work Task C7: Survey and Habitat Characterization for MacNeill's Sootywing. Work Task F6 will be phased-in as Work Task C7 is completed during FY09-10.

**Project Description:** Preliminary results from 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 (eg. *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 (ie. adaptive management) of habitat-needs if created habitat fails to become colonized.

**Previous Activities:** None. This is a FY09 new-start.

**FY08 Accomplishments:** None. This is a FY09 new-start.

**FY09 Activities:** Habitat requirements described above (host-plant size and water content and nectar sources) will be monitored throughout the period when sootywings fly (April 1 - Oct 1). Leaf nitrogen content will be measured if apparently-suitable habitat fails to be colonized.

Utilization of created habitat by sootywings also will be monitored by surveying adults, eggs, and larvae. Other factors not previously examined (i.e. sootywing dispersal or transplantation) may need to be examined if created habitat fails to become colonized. One restoration site will be surveyed at PVER and 1 site will be surveyed at CVCA during 2009.

**Proposed FY10 Activities:** Same as in FY09 as restoration sites become established. Numbers of restoration sites will increase during FY10 to 2 sites at PVER and 2 sites at CVCA.

**Pertinent Reports:** 1) 2006-2008 Annual Reports for LCR MSCP Work Task C7: Survey and Habitat Characterization for MacNeill's Sootywing; 2) Wiesenborn, W. D., and G. F. Pratt. 2008. Selection of *Atriplex lentiformis* host plants by *Hesperopsis graciellae* (Lepidoptera: Hesperidae). Florida Entomologist 91:192-197.

## **WORK TASKS SECTION G**

## **ADAPTIVE MANAGEMENT PROGRAM**

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## Work Task G1: Data Management

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$450,000	\$145,357.59	\$621,808.59	\$450,000	\$650,000	\$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 the 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 4 years. Reclamation accounted for these funds in its request for financial credit. The grant provides funds to support this work through FY07.

The LCR MSCP Database Management Framework Requirements Analysis was completed in FY06, which 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.

**FY08 Accomplishments:** Maintenance and modifications were made to document/calendar management system in tailoring it to the current needs of the LCR MSCP SharePoint architecture.

All tagging and stocking data for RASU and BONY was provided to ASU for inclusion into the Lower Colorado River Native Fishes database.

**FY09 Activities:** Database design and implementation of a centralized DBMS will continue in an annually phase approach for all project and species databases. A pilot project will be conducted to design and develop high priority wildlife, project management and administrative SharePoint interface modules. Additional hardware will be purchased to increase data storage for the implementation of the centralized database. The intranet/document/calendar management system will be maintained and modified, tailoring it to the future needs of the LCR MSCP. A centralized project management solution will be designed, developed and tested for LCR MSCP project management needs. Redesign new internet website to increase and development of a webmap interface will increase functionality and usability for public and partner access. Design and development of website architecture, webmap interface and template design will begin. Design and develop remote sensing data collection for integrity and security of data. The native fishes database will continue to be maintained by ASU until the LCR MSCP database is fully functional. Annual cost for management of the fishery database is estimated to be \$110,000 per year.

**Proposed FY10 Activities:** Database design and implementation of a centralized DBMS will continue in a annually phase approach for all project and species databases. The pilot project will be concluded and additional design and development will begin on high priority wildlife, project management and administrative SharePoint interface modules. The design and development of a geo-document webmap interface will begin. The geo-document interface will allow SharePoint users to view documents from a geospatial webmap. The intranet/document/calendar management system will be maintained and modified, tailoring it to the future needs of the LCR MSCP. The new internet website and webmap interface will be implemented, maintained and updated to increased functionality and usability for public and partner access. Updated geospatial imagery will be acquired and implemented for internet and intranet use. The pilot implementation of the remote sensing data collection unit will be begin.

**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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$230,000	\$414,505.30	\$1,039,049.30	\$230,000	\$300,000	\$380,000	\$380,000

**Contact:** Tom Burke, tburke@usbr.gov

**Start Date:** FY06

**Expected Duration:** FY55

**Long-term Goal:** Effective conservation of native species and their habitats.

**Conservation Measures:** MRM1, MRM2, MRM4, WIFL1, MRM5, BONY5, RASU6, CRCR1, YHCR1, MRM3, FLSU3, LLFR1, LLFR3

**Location:** System-wide

**Purpose:** Develop tools to effectively evaluate conservation actions.

**Connections with Other Work Tasks (past and future):** Research projects initiated under this work task may be continued as Species Research (Section C). Information obtained may be used for Fish Augmentation (Section B), System Monitoring (Section D), Habitat Creation (Section E), Post-Development Monitoring (Section F), or Habitat Maintenance (Section H).

**Project Description:** The Adaptive Management Program is an assurance that the conservation actions presented in the HCP are effectively accomplished. This work task develops and evaluates tools by which the conservation actions can be measured, and provides data to improve the efficacy of techniques to successfully create habitat.

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 so 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 10-15,000  $\mu\text{S}/\text{cm}$  for eggs and 23-26,000  $\mu\text{S}/\text{cm}$  for larvae. Remote sensing applications for PIT tagged fish were evaluated. This was continued as Work Task C23.

**FY08 Accomplishments:** A system-wide avian survey was initiated in 2008 under a cooperative agreement with Great Basin Bird Observatory. The work is reported under Work Task C24. An investigation to identify predators of open-cup nesting passerine birds was initiated. This work will be continued and reported in Work Task C28. A study was initiated to develop a conceptual design to provide habitat requirements for CLRA, LEBI, and BLRA, and is reported under Work Task C24. Research has been initiated to examine the use of soil amendments to improve water-retention capacity of sandy soils for habitat restoration.

The RASU telemetry study in Reach 3 continued with addition of more fish and sonic tags with longer battery life (this work will be reported in Work Task D8). The evaluation of monitoring techniques for RASU in river environments was completed. Final report was accepted and is available. A study was initiated to evaluate a technique to age native suckers by removing fin ray sections. The technique appeared to work well on fish from tail water areas. The research will be expanded and incorporated into Work Task C29 to do an age characterization of RASU in Reach 3. Refined values for upper salinity tolerances were observed to range from 11,000-12,000  $\mu\text{S}/\text{cm}$  for eggs and from 27,300-27,750  $\mu\text{S}/\text{cm}$  for larvae. This work continues under Work Task C32. A study was initiated to characterize zooplankton communities in backwater habitats and off-channel areas being used to grow RASU and BONY. A sampling design was developed, new microscope and lab materials were purchased, and zooplankton samples were collected and stockpiled. This work will continue as Work Task C34.

**FY09 Activities:** New avian research projects to effectively and efficiently create marsh habitat for covered bird species are being developed. The hydrology of existing willow flycatcher habitat will be further examined to determine the extent occupied sites are saturated and/or contain standing water. This study will be reported on under Work Task C37.

A study is being initiated to evaluate using stable isotope and micro-chemistry analyses of fish tissues to determine habitat use of RASU and BONY. This work will be continued in FY10 under Work Task C38. A study to assess post-stocking survival of BONY in Reach 3 is being developed. This work is proposed for FY10 as Work Task C39. A genetic study is being developed to assess population ecology of RASU and BONY. This work will quantify genetic and demographic parameters that are necessary for informed, long-term management of RASU and BONY in off-channel habitats. The research will be conducted under Work Task C40. A research investigation is being scoped in order to evaluate use of artificial habitat by native fishes. This is proposed for a new start in FY10 as Work Task C41.

Other expenditures in FY09 will include continuation of the restoration research component at Beal Lake. Funding for restoration research in FY09 will be supported by G3. This includes the final evaluation of long-term effectiveness and maintenance of the screen system at Beal Lake. In addition, an in-situ evaluation of this technology's effectiveness will be conducted to determine exclusion potential and entrainment rates in a real-world application. These entrainment tests will occur in the spring of FY09 at Imperial Ponds on Imperial NWR.

**Proposed FY10 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. A report on the egg and larval fish entrainment study will be finalized.

**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

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$20,000	\$8,485.07	\$151,904.07	\$50,000	\$50,000	\$50,000	\$50,000

**Contact:** Tom Burke, (702) 293-8310, [tburke@usbr.gov](mailto: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:** LCR MSCP planning area.

**Purpose:** Define the process for implementing the LCR MSCP using the best available science and adaptive management processes.

**Connections with Other Work Tasks (past and future):** All science-based work tasks.

**Project Description:** The HCP conservation measures were designed to meet the biological needs for 26 covered species and to benefit 5 evaluation species.

A science strategy, developed in FY06, defines processes for ensuring LCR MSCP implementation using the best available science. This strategy describes a two-tier planning process to ensure effective implementation of research and monitoring actions: first, a 5-year planning cycle, and second, annual work plans covering a 3-year cycle.

**Five-year Monitoring and Research Priority:** Every 5 years, a plan will be developed that describes the current knowledge for covered species; establishes the monitoring and research priorities for that five-year period; and describes potential challenges that may inhibit successful implementation of the conservation measures. During each 5-year cycle, the accumulated data from ongoing research and monitoring will be reviewed, along with existing “species accounts”. Highest priority for the next 5-year period will go to completion of any “ongoing” research and monitoring activities. Second priority will be given to new research and monitoring needs identified by ongoing work, and third priority goes to refine and update life history data sets. Additional work may be generated from evaluations of various research through Work Task G3.

LCR MSCP staff will participate in interagency meetings and workshops held to discuss natural resource conservation along the LCR. These meetings bring together scientists, managers, and resource users interested in the 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 current year ongoing activities, and outlines the proposed activities for the coming fiscal year will be developed and presented to the Steering Committee each year. Recently completed, ongoing, and proposed research and monitoring activities will be reviewed as they relate to the current 5-year monitoring and research priority plan.

**Previous Activities:** The Science Strategy was developed in FY06/FY07. The first Colorado River Terrestrial and Riparian Ecosystem (CRITER) meeting was held in January 2006. (Staff also attended the 2007 CRITER meeting.) LCR MSCP fishery staff participated in the 2006 and 2007 annual Colorado River Aquatic Biologists (CRAB) meetings. The first “Five-year Monitoring and Research Priority” was drafted in FY07. A “Fish Culture Workshop” was held in Mesa, Arizona and hosted by LCR MSCP.

**FY08 Accomplishments:** The *Five-year Monitoring and Research Priorities for FY08-12* was finalized and placed on the website. CRITER and CRAB meetings were attended. Ongoing research and monitoring actions were reviewed through the annual work plan report. A bat monitoring workshop was held discussing the use of Anabats. The Lake Mohave Native Fish Work Group meeting was hosted by LCR MSCP fishery staff.

**FY09 Activities:** Research activities are being reviewed in accordance with the priorities established in the current 5-year plan. Annual CRITER and CRAB meetings will be hosted, as well as the Lake Mohave Native Fish Work Group. A new “LCR MSCP Fishery Coordination Team” will convene to discuss status of RASU and BONY and to identify focus areas for future research and monitoring for these fishes. A new “Lake Mead Native Fish Work Group is being formed to review ongoing research and monitoring of RASU in Lake Mead and provide guidance for future work.

**Proposed FY10 Activities:** Research activities are being reviewed in accordance with the priorities established in the current 5-year plan. LCR MSCP staff will participate in the annual CRITER and CRAB meetings, as well as the various native fish work group meetings. Fishery research proposals, ideas, and suggestions from the “LCR MSCP Fishery Coordination Team” will be developed into study plans to effect research on RASU and BONY to be released in FY11-15 under the accelerated phase of the Fish Augmentation Program. Species Accounts will be reviewed and updated as ongoing research is completed. Annual work plan reported will be developed.

**Pertinent Reports:** *Final Science Strategy*, and *Five Year Research and Monitoring Priorities—FY08-12*, posted on the LCR MSCP Web site.

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## **WORK TASKS SECTION H**

### **EXISTING HABITAT MAINTENANCE**

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## Work Task H1: Existing Habitat Maintenance

FY08 Estimates	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate*	FY12 Proposed Estimate*
\$593,500	\$593,500.00	\$1,696,000.00	\$605,000	\$647,000	\$5,823,000	\$5,823,000

\*Based on FY10 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, CRT02, LLFR2

**Location:** Lower Colorado River (reaches 1-7).

**Purpose:** Maintain existing habitat areas, excluding newly created habitat within Conservation Areas, by implementing actions that will prevent the further degradation or loss of habitat for LCR MSCP covered species.

**Connections with Other Work Tasks (past and future):** N/A

**Project Description:** A \$25 million fund is being established over a 10-year period to restore habitats suitable for LCR MSCP covered species in the planning areas that have become degraded since the LCR MSCP was initiated. Funding during the initial five years of the program was established at \$500,000 per year. Funding in years 6-10 of the program was established at \$5,000,000 per year. Both values are indexed to 2003 dollars and adjusted annually for inflation. The degraded habitat condition targeted by this fund is that which occurs because of past LCR operations and maintenance actions that continue into the future. The habitat maintenance fund will be administered by the Program Manager. The process for determining degradation in habitat value as well as how funds are requested, disbursed, and tracked will be defined and refined with the assistance of the SC.

**Previous Activities:** This was a new start in FY06.

**FY08 Accomplishments:** A total of \$593,500 was deposited into interest bearing accounts among the Arizona, California, and Nevada partners. The total dollar value of the fund at the end of FY08, with interest, was \$1,893,821.21.

**FY09 Activities:** A total of \$605,000 will be deposited into interest bearing accounts among Arizona, California, and Nevada partners.

**Proposed FY10 Activities:** A total of \$647,000 is expected to be deposited into the three non-Federal interest-bearing accounts. 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 SC.

**Pertinent Reports:** N/A

## **WORK TASKS SECTION I**

### **PUBLIC OUTREACH**

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## Work Task I1: Public Outreach

FY08 Estimate	FY08 Actual	Cumulative Accomplishment Through FY08	FY09 Approved Estimate	FY010 Proposed Estimate	FY11 Proposed Estimate	FY12 Proposed Estimate
\$35,000	\$16,759.13	\$61,059.13	\$40,000	\$50,000	\$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- and long-term outreach goals for LCR MSCP. To communicate, coordinate, and educate LCR MSCP Steering Committee members, internal and external stakeholders, and the general public about LCR MSCP implementation activities.

**Previous Activities:** An LCR MSCP Web site was established, and a Farmers Advisory Board was developed. The LCR MSCP logo was updated and a standardized program header was created along with a new tag line. A standard LCR MSCP report cover was developed to reflect the partnership aspect of the program. A new display unit for the LCR MSCP was created along with the acquisition of life-size cottonwood and willow trees, table runners, logo pens, and notepads. A revised general program fact sheet was also developed. A dedication was held for the Imperial Ponds Project and project specific field tours were conducted.

**FY08 Accomplishments:** The focus of FY08 outreach activities was on education. Two Steering Committee field trips were conducted; one to the Big Bend Conservation Area, the other to the PVER and CVCA projects. The LCR MSCP was part of a multi-agency effort to plan the Colorado River Science Symposium. The LCR MSCP was a sponsor and LCR MSCP staff presented papers, coordinated workshops, and gave keynote speeches. Reclamation staffed a booth at the Colorado River Water Users which highlighted research and monitoring activities.

**FY09 Activities:** In conjunction with Work Task G1, work will continue on updating the LCR MSCP Web site to include more information for specific targeted audiences. A dedication of the

Big Bend Conservation Area is planned, along with a tour of Planet Ranch in October 2009. A strategy for public outreach will be prepared and sent out for comment.

**Proposed FY10 Activities:** Public outreach actions identified in the outreach strategy will be implemented.

**Pertinent Reports:** N/A.

# APPENDICES

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# Appendix A. Letter from Central Arizona Water Conservation District



P.O. Box 43020 • Phoenix, AZ 85080-3020  
 23636 North Seventh Street • Phoenix, AZ 85024  
 623-869-2333 • www.cap-az.com

May 12, 2009

Joseph A. Vanderhorst  
 Deputy General Counsel  
 Metropolitan Water District of Southern California  
 P.O. Box 54153  
 Los Angeles, CA 90054-0153

Christopher S. Harris  
 Environmental Program Manager  
 Colorado River Board of California  
 770 Fairmont Avenue, Suite 100  
 Glendale, CA 91203-1035

Jason L. Thiriot  
 Natural Resource Analyst  
 Colorado River Commission of Nevada  
 555 E. Washington Ave., Suite 3100  
 Las Vegas, NV 89101

Gentlemen:

The Multi-Species Conservation Program (MSCP) Non-Federal share for the Federal Fiscal Year 2010, both annually and quarterly, are shown by state below. The inflation index used is 1.294.

FY 2010 Non-Federal Share (2003 \$)	\$5,607,000
FY 2010 Inflation Index	1.294
FY 2010 Non-Federal Share (Escalated \$)	\$7,255,458

<u>FY 2010 Non-Federal Payments</u>	Existing Habitat		<u>Total</u>
	<u>Maintenance</u>	<u>Balance</u>	
Arizona (15% of Non-Federal Share)	\$161,750.00	\$ 926,568.70	\$ 1,088,318.70
Nevada (30% of Non-Federal Share)	161,750.00	2,014,887.40	2,176,637.40
California (55% of Non-Federal Share)	<u>323,500.00</u>	<u>3,667,001.90</u>	<u>3,990,501.90</u>
Total	\$647,000.00	\$6,608,458.00	\$7,255,458.00

<u>FY 2010 Quarterly Payments</u>		<u>Existing Habitat Maintenance</u>	<u>Balance</u>	<u>Total</u>
Arizona	Q1	\$ 40,437.50	\$ 231,642.19	\$ 272,079.69
	Q2	40,437.50	231,642.17	272,079.67
	Q3	40,437.50	231,642.17	272,079.67
	Q4	40,437.50	231,642.17	272,079.67
Nevada	Q1	\$ 40,437.50	\$ 503,721.85	\$ 544,159.35
	Q2	40,437.50	503,721.85	544,159.35
	Q3	40,437.50	503,721.85	544,159.35
	Q4	40,437.50	503,721.85	544,159.35
California	Q1	\$ 80,875.00	\$ 916,750.49	\$ 997,625.49
	Q2	80,875.00	916,750.47	997,625.47
	Q3	80,875.00	916,750.47	997,625.47
	Q4	80,875.00	916,750.47	997,625.47

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 Medlock, 623-869-2148 ([dmedlock@cap-az.com](mailto:dmedlock@cap-az.com)) or myself, 623-869-2167 ([tcooke@cap-az.com](mailto:tcooke@cap-az.com)).

Sincerely,



Theodore Cooke  
 Central Arizona Project  
 Assistant General Manager  
 Finance and Information Technologies

Attachments

Cc Laura Vecerina, MSCP Special Assistant, Bureau of Reclamation  
 Douglas Dunlap, Financial Analysis and Planning Manager, CAP  
 Dana Medlock, Senior Financial Analyst, CAP

**MSCP  
Habitat Maintenance Account**

Per Table 7-1 of the HCP	
	Years 1-5
Existing Habitat Maintenance Cost	2,500,000
Total Cost	56,070,000
Percent of Existing Habitat Cost to Total Cost	4.458712323880860%

	FY 2006	FY 2007	FY 2008
Total Annual Funding Commitment	\$ 12,144,762.00	\$ 12,582,108.00	\$ 13,311,018.00
X Existing Habitat Percentage Above	4.458712323880860%	4.458712323880860%	4.458712323880860%
Existing Habitat Maintenance Cost	\$ 541,500.00	\$ 561,000.00	\$ 593,500.00
Arizona - 25%	\$ 135,375.00	\$ 140,250.00	\$ 148,375.00
Nevada - 25%	135,375.00	140,250.00	148,375.00
California - 50%	270,750.00	280,500.00	296,750.00
Total Existing Habitat Maintenance Cost	\$ 541,500.00	\$ 561,000.00	\$ 593,500.00

	FY 2009	FY 2010
Total Annual Funding Commitment	\$ 13,568,940.00	\$ 14,510,916.00
X Existing Habitat Percentage Above	4.458712323880860%	4.458712323880860%
Existing Habitat Maintenance Cost	\$ 605,000.00	\$ 647,000.00
Arizona - 25%	\$ 151,250.00	\$ 161,750.00
Nevada - 25%	151,250.00	161,750.00
California - 50%	302,500.00	323,500.00
Total Existing Habitat Maintenance Cost	\$ 605,000.00	\$ 647,000.00

**Section 8.1.1 - Fiscal Year 2010 Inflation Calculation for Lower Colorado River Multi-Species Conservation Program  
(Actual Indices through September 2008)**

Item	Description / Formula	Values	Result
FY	Federal Fiscal Year Being Adjusted for Inflation	2010	2010
FY-2	Federal Fiscal Year for 2 years prior to Federal Fiscal Year Being Adjusted for Inflation	2008	2008
PPI Inflation Index for FY	Producer Price Index for Materials and Components for Const Sept FY-3 Producer Price Index for Materials and Components for Const Sept 2002	= 214.0 / 152.1	= 1.4070
GDPIP Inflation Index for FY	Gross Domestic Product Implicit Price Deflator September 30, FY-3 Gross Domestic Product Implicit Price Deflator September 30, 2002	= 123.056 / 104.243	= 1.1800
Inflation Index for FY	(PPI Inflation Index for FY + GDPIP inflation Index for FY)/2	= (1.470+1.180)/2	= 1.294
Non-Federal Funding Obligation for FY	(5 - year Amount from Table 7-1 of HCP 2003 dollars adjusted to yearly amount)/2	= \$56,070 / 5 = \$11,214	= \$5,607
Federal Funding Obligation for FY	(5 - year Amount from Table 7-1 of HCP 2003 dollars adjusted to yearly amount)/2	= \$56,070 / 5 / 2	= \$5,607
Non-Federal Indexed Funding Obligation for FY	(Non-Federal Funding Obligation for FY) X (Inflation Index for FY)	= \$5,607 X 1.294	= \$7,255.458
Federal Indexed Funding Obligation for FY	(Federal Funding Obligation for FY) X (Inflation Index for FY)	= \$5,607 X 1.294	= \$7,255.458
All \$ are in thousands			
Individual State's share in \$			
	California Share - 50%	50.00%	\$3,627,729.00
	Arizona Share - 25%	25.00%	\$1,813,864.50
	Nevada Share - 25%	25.00%	\$1,813,864.50
	Total Non-Federal Share		\$7,255,458.00
Adjusted Split in Individual State Shares			
	California - 55%	55.0%	\$ 3,990,501.90
	Arizona - 15%	15%	1,088,318.70
	Nevada - 30%	30.0%	2,176,637.40
	Total Non-Federal Share	100%	\$ 7,255,458.00

**Fiscal Year 2010 Lower Colorado River Multi-Species Program Funding, Indexing and Inflation Adjusted Changes in Funding (Actual Indices through September 2008)**

row	Sept/FY col (a)	Estimated Annual Inflation GDP col (b)	Estimated Annual Inflation PPI col (c)	Gross Domestic Product Index col (d)	GDP Inflation Index col (e)	Producer Price Index col (f)	PPI Inflation Index col (g)	Composite Inflation Index col (h)	Program in 9/2002 \$ (Table 7-1 of HCP)			Program in Indexed \$		
									Total col (i)	Federal col (j)	Non-Federal col (k)	Indexed Total col (l)	Indexed Federal col (m)	Indexed Non- Federal 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	3.0%	3.5%	126.748	1.216	221.490	1.456	1.336	11.214	5.607	5.607	14.511	7.255	7.255
10	2010	3.0%	3.5%	130.650	1.252	229.242	1.507	1.380	11.214	5.607	5.607	15.770	7.897	7.897
11	2011	3.0%	3.5%	134.467	1.290	237.266	1.560	1.425	27.540	13.770	13.770	36.793	18.397	18.397
12	2012	3.0%	3.5%	138.501	1.329	245.570	1.615	1.472	27.540	13.770	13.770	38.005	19.003	19.003
13	2013	3.0%	3.5%	142.656	1.368	254.165	1.671	1.520	27.540	13.770	13.770	39.245	19.622	19.622
14	2014	3.0%	3.5%	146.935	1.410	263.061	1.730	1.570	27.540	13.770	13.770	40.589	20.269	20.269
15	2015	3.0%	3.5%	151.343	1.452	272.268	1.790	1.621	27.540	13.770	13.770	41.861	20.930	20.930
16	2016	3.0%	3.5%	155.884	1.495	281.797	1.853	1.674	22.164	11.082	11.082	34.797	17.399	17.399
17	2017	3.0%	3.5%	160.560	1.540	291.660	1.918	1.729	22.164	11.082	11.082	35.928	17.964	17.964
18	2018	3.0%	3.5%	165.377	1.586	301.868	1.985	1.786	22.164	11.082	11.082	37.103	18.551	18.551
19	2019	3.0%	3.5%	170.338	1.634	312.434	2.054	1.844	22.164	11.082	11.082	38.322	19.161	19.161
20	2020	3.0%	3.5%	175.448	1.683	323.369	2.126	1.905	22.164	11.082	11.082	39.585	19.792	19.792
21	2021	3.0%	3.5%	180.712	1.734	334.687	2.200	1.967	19.982	9.991	9.991	36.847	18.423	18.423
22	2022	3.0%	3.5%	186.133	1.786	346.401	2.277	2.032	19.982	9.991	9.991	38.066	19.033	19.033
23	2023	3.0%	3.5%	191.717	1.839	358.525	2.357	2.098	19.982	9.991	9.991	39.305	19.652	19.652
24	2024	3.0%	3.5%	197.469	1.894	371.073	2.440	2.167	19.982	9.991	9.991	40.603	20.302	20.302
25	2025	3.0%	3.5%	203.393	1.951	384.061	2.525	2.238	19.982	9.991	9.991	41.922	20.961	20.961
26	2026	3.0%	3.5%	209.495	2.010	397.503	2.613	2.312	8.144	4.072	4.072	17.648	8.824	8.824
27	2027	3.0%	3.5%	215.779	2.070	411.415	2.705	2.388	8.144	4.072	4.072	18.226	9.113	9.113
28	2028	3.0%	3.5%	222.253	2.132	425.815	2.800	2.466	8.144	4.072	4.072	18.829	9.414	9.414
29	2029	3.0%	3.5%	228.920	2.196	440.718	2.898	2.547	8.144	4.072	4.072	19.448	9.724	9.724
30	2030	3.0%	3.5%	235.788	2.262	456.143	2.999	2.631	8.144	4.072	4.072	20.083	10.042	10.042
31	2031	3.0%	3.5%	242.862	2.330	472.108	3.104	2.717	7.500	3.750	3.750	19.103	9.551	9.551
32	2032	3.0%	3.5%	250.148	2.400	488.632	3.213	2.807	7.500	3.750	3.750	19.733	9.866	9.866

33	2033	3.0%	3.0%	3.5%	257,652	2,472	505,734	3,325	2,899	7,500	3,750	3,750	20,378	10,189	10,189
34	2034	3.0%	3.0%	3.5%	265,381	2,546	523,435	3,441	2,994	7,500	3,750	3,750	21,053	10,526	10,526
35	2035	3.0%	3.0%	3.5%	273,343	2,622	541,755	3,562	3,092	7,500	3,750	3,750	21,743	10,871	10,871
36	2036	3.0%	3.0%	3.5%	281,543	2,701	560,717	3,687	3,194	7,173	3,587	3,587	21,476	10,738	10,738
37	2037	3.0%	3.0%	3.5%	289,990	2,782	580,342	3,816	3,299	7,173	3,587	3,587	22,179	11,089	11,089
38	2038	3.0%	3.0%	3.5%	298,689	2,865	600,654	3,949	3,407	7,173	3,587	3,587	22,911	11,455	11,455
39	2039	3.0%	3.0%	3.5%	307,650	2,951	621,677	4,087	3,519	7,173	3,587	3,587	23,664	11,832	11,832
40	2040	3.0%	3.0%	3.5%	316,879	3,040	643,435	4,230	3,635	7,173	3,587	3,587	24,438	12,219	12,219
41	2041	3.0%	3.0%	3.5%	326,386	3,131	665,956	4,378	3,755	7,173	3,587	3,587	25,242	12,621	12,621
42	2042	3.0%	3.0%	3.5%	336,177	3,225	689,264	4,532	3,879	7,173	3,587	3,587	26,074	13,037	13,037
43	2043	3.0%	3.0%	3.5%	346,263	3,322	713,388	4,690	4,006	7,173	3,587	3,587	26,935	13,467	13,467
44	2044	3.0%	3.0%	3.5%	356,651	3,421	738,357	4,854	4,138	7,173	3,587	3,587	27,824	13,912	13,912
45	2045	3.0%	3.0%	3.5%	367,350	3,524	764,199	5,024	4,274	7,173	3,587	3,587	28,735	14,368	14,368
46	2046	3.0%	3.0%	3.5%	378,371	3,630	790,946	5,200	4,415	7,173	3,587	3,587	29,682	14,841	14,841
47	2047	3.0%	3.0%	3.5%	389,722	3,739	818,630	5,382	4,561	7,173	3,587	3,587	30,657	15,329	15,329
48	2048	3.0%	3.0%	3.5%	401,413	3,851	847,282	5,571	4,711	7,173	3,587	3,587	31,669	15,834	15,834
49	2049	3.0%	3.0%	3.5%	413,456	3,966	876,936	5,766	4,866	7,173	3,587	3,587	32,716	16,358	16,358
50	2050	3.0%	3.0%	3.5%	425,859	4,085	907,629	5,967	5,026	7,173	3,587	3,587	33,792	16,896	16,896
51	2051	3.0%	3.0%	3.5%	438,635	4,208	939,396	6,176	5,192	7,173	3,587	3,587	34,904	17,452	17,452
52	2052	3.0%	3.0%	3.5%	451,794	4,334	972,275	6,392	5,363	7,173	3,587	3,587	36,051	18,026	18,026
53	2053	3.0%	3.0%	3.5%	465,348	4,464	1,006,305	6,616	5,540	7,173	3,587	3,587	37,242	18,621	18,621
54	2054	3.0%	3.0%	3.5%	479,308	4,598	1,041,525	6,848	5,723	7,173	3,587	3,587	38,469	19,234	19,234
55	2055	3.0%	3.0%	3.5%	493,688	4,736	1,077,979	7,087	5,912	7,173	3,587	3,587	39,738	19,869	19,869
<b>Total</b>										<b>626,180</b>	<b>313,090</b>	<b>313,090</b>	<b>1,436,677</b>	<b>717,839</b>	<b>717,839</b>

**APPENDIX B TABLE B-1  
Lower Colorado River Multi-Species Conservation Program  
Federal Flow-Related Covered Actions and Accomplishments  
Calendar Year 2008**

Federal Covered Actions <i>Biological Assessment Chapter 2</i>	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions <sup>1</sup>	2008 Accomplishments <sup>2, 3</sup>
<b>2.2 BUREAU OF RECLAMATION</b>				
2.2.1 Ongoing Flow-Related Actions				
2.2.1.1 Flood Control (page 2-3; Table 2-1, page 2-5)	<ul style="list-style-type: none"> <li>• Prescribed flood control releases per Field Working Agreement and <i>Water Control Manual for Lake Mead/Hoover Dam</i></li> </ul>	<ul style="list-style-type: none"> <li>• Timing of required releases may be varied within the month</li> <li>• Anticipatory flood control releases</li> <li>• 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</li> <li>• Management of target elevations for Lake Mohave (Davis Dam) and Lake Havasu (Parker Dam)</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<p>No flood control releases were made from Lake Mead.</p> <p>The hourly elevation of Lake Mead provided for flood control space which was well above that required. In 2008, the Lake Mead elevation varied between 1104.41 and 1117.96 feet mean sea level.</p> <p>Elevations at Lake Mohave and Lake Havasu were managed to target elevations.</p>
2.2.1.2 State Apportionment and Water Contracts (page 2-5; Table 2-2, page 2-6)	<ul style="list-style-type: none"> <li>• Delivery of water to water users in the United States pursuant to applicable Federal law, including the Boulder Canyon Project Act (BCPA); the Supreme Court Decree of March 9, 1964, 376 U.S. 340, as amended (Decree)</li> <li>• Delivery of a State's unused entitlement to a junior entitlement holder within that State on an annual basis</li> </ul>	<ul style="list-style-type: none"> <li>• Determinations and delivery of post-2016 unused apportionment water from one State to another within the Lower Basin on an annual basis</li> </ul>	<ul style="list-style-type: none"> <li>• Delivery of water to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree</li> </ul>	<p>Water deliveries were made to water users in Arizona, California, and Nevada to satisfy the basic entitlements for delivery of Colorado River water. Unused entitlement water within a state's apportionment was delivered to junior priority holders in that state.</p>
2.2.1.3 Annual Operations Normal, Surplus, Shortage, and Unused Apportionment (page 2-6; Table 2-3, page 2-9)	<ul style="list-style-type: none"> <li>• Issuance of an annual operating plan</li> <li>• Delivery of water to water users in the United States pursuant to applicable Federal law, including the Boulder Canyon Project Act (BCPA); the Supreme Court Decree of March 9, 1964, 376 U.S. 340, as amended (Decree)</li> <li>• Delivery of water to Mexico pursuant to the 1944 Water Treaty</li> </ul>	<ul style="list-style-type: none"> <li>• Determination of shortage conditions absent specific guidelines</li> <li>• Determination of surplus conditions absent specific guidelines</li> <li>• Revision of annual operations through the <i>Annual Operating Plan (AOP)</i>, pursuant to the long-range operating criteria within the year to reflect current hydrologic conditions</li> <li>• Determinations and delivery of post-2016 unused apportionment water from one State to another within the Lower Basin on an annual basis</li> <li>• Execution of agreements and the delivery of surplus water pursuant to the Reclamation Reform Act and the Reclamation States Emergency Drought Relief Act</li> <li>• Periodic review of the Long Range Operation of the Colorado (LROC)</li> </ul>	<ul style="list-style-type: none"> <li>• Delivery of water to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree</li> </ul>	<p>The Annual Operating Plan for 2008, which governed releases, was issued.</p> <p>Annual operations were revised through the Annual Operating Plan, pursuant to the long-range operating criteria, to reflect current hydrologic conditions.</p> <p>An intentionally Created Surplus (ICS) condition was declared for 2008. ICS water was both taken and created in 2008.</p> <p>Water was delivered to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree.</p> <p>Water was delivered to Mexico pursuant to the 1944 Water Treaty. Delivery to Mexico in excess of schedule was 90,569 acre-feet.</p> <p>There was a review of the Long-Range Operating Criteria of Colorado River reservoirs.</p> <p>In 2008, 819 acre-feet of unused apportionment is attributed to Nevada (provisional).</p>

Federal Covered Actions <i>Biological Assessment</i> Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions <sup>1</sup>	2008 Accomplishments <sup>2, 3</sup>
2.2.1.4 Daily Hoover Dam Operations (Table 2-4, page 2-10)	<ul style="list-style-type: none"> <li>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</li> </ul>	<ul style="list-style-type: none"> <li>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)</li> </ul>	<ul style="list-style-type: none"> <li>Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States and to generate hydropower with these water releases</li> </ul>	<p>Water releases from Hoover Dam were made to satisfy beneficial use requirements of entitlement holders in the United States, to deliver 1944 Water Treaty water, and to generate hydropower with these water releases. Energy targets were set monthly based on the best information available with respect to downstream water demands and lake elevation targets at Lakes Mohave and Havasu. Energy targets were revised during the month to meet changing water demands and other constraints.</p>
2.2.1.4 Daily Davis Dam Operations (Table 2-5, page 2-11)	<ul style="list-style-type: none"> <li>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</li> </ul>	<ul style="list-style-type: none"> <li>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</li> </ul>	<ul style="list-style-type: none"> <li>Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States and generate hydropower with these water releases</li> </ul>	<p>Water releases from Davis Dam were made to satisfy beneficial use requirements of entitlement holders in the United States, to deliver 1944 Water Treaty water, and to generate hydropower with these water releases.</p> <p>The timing of releases was varied based on available downstream storage, operational constraints for lakes Mohave and Havasu, downstream water requirements, and hydropower needs.</p>
2.2.1.4 Daily Parker Dam Operations (Table 2-6, page 2-11)	<ul style="list-style-type: none"> <li>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</li> </ul>	<ul style="list-style-type: none"> <li>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</li> </ul>	<ul style="list-style-type: none"> <li>Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States and generate hydropower with these water releases</li> </ul>	<p>Water releases from Parker Dam were made to satisfy beneficial use requirements of entitlement holders in the United States, to deliver 1944 Water Treaty water, and to generate hydropower with these water releases.</p> <p>The timing of releases was varied based on available downstream water requirements, hydropower needs, and other operational constraints immediately downstream of Parker Dam.</p>
2.2.1.4 Daily Senator Wash, Imperial Dam, and Laguna Dam Reservoir Operations (Table 2-7, page 2-11)	<ul style="list-style-type: none"> <li>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</li> </ul>	<ul style="list-style-type: none"> <li>Senator Wash, Imperial Dam, and Laguna Dam operations to prevent over deliveries, to release water to entitlement holders, for sluicing operations, to deliver a portion of the 1944 Water Treaty deliveries to Mexico, and for flood control purposes</li> </ul>	<ul style="list-style-type: none"> <li>Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States</li> </ul>	<p>Water releases from Senator Wash, Imperial, and Laguna dams 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.</p> <p>Water releases from Senator Wash, Imperial, and Laguna dams were made 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.</p>
2.2.1.5 Electric Power Generation (page 2-11)  43 CFR PART 431 (page 2-14)	<ul style="list-style-type: none"> <li>Operational requirements to satisfy 43 C.F.R. Part 431 requirements</li> </ul>	---	---	<p>Hydroelectric power generated:</p> <ul style="list-style-type: none"> <li>Hoover Dam: 3,785,028,222 kWh</li> <li>Davis Dam: 1,139,758,000 kWh</li> <li>Parker Dam: 453,530,407 kWh</li> </ul> <p>Operations met the requirements to satisfy 43 C.F.R. Part 431.</p>
2.2.1.6 Lower Colorado Water Supply Project - California (page 2-15; Table 2-8, page 2-16)	<ul style="list-style-type: none"> <li>Delivery of water under executed Water Supply Project contracts</li> </ul>	<ul style="list-style-type: none"> <li>Reclamation's execution and administration of individual Water Supply Project contracts</li> </ul>	<ul style="list-style-type: none"> <li>Participate in the development of and consult in the execution of individual contracts under the Water Supply Project</li> </ul>	<p>In 2008, 7,350 acre-feet of use was offset by the pumpage of the LCWSP wellfield. This amount was not diverted by IID at Imperial Dam and was made available to project contractors for delivery from the river. All LCWSP off-set except 181 acre-feet was taken from the river upstream of Parker Dam.</p>



Federal Covered Actions <i>Biological Assessment</i> Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions <sup>1</sup>	2008 Accomplishments <sup>2, 3</sup>
2.2.1.7 1944 Water Treaty Deliveries (page 2-17; Table 2-9, page 2-20)	<ul style="list-style-type: none"> <li>• Delivery of Mexico allotment (1.5 million acre-feet [maf]) pursuant to the 1944 Water Treaty and related Minutes</li> <li>• 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</li> <li>• Deliver of Mexico allotment pursuant to the 1944 Water Treaty and related Minutes under extraordinary drought conditions</li> <li>• Compliance with the salinity requirements of Minute No. 242 of the 1944 Water Treaty</li> <li>• Delivery of emergency water to Tijuana pursuant to Minute No. 310 of the 1944 Water Treaty and contract</li> </ul>	<ul style="list-style-type: none"> <li>• Routing of water through the Yuma Division for delivery to Northerly International Boundary (NIB)</li> <li>• Determination of quantity of water delivered at Southerly International Boundary (SIB) up to 140,000 afy</li> <li>• Drainage pumping and delivery of drainage return flows at NIB and SIB</li> <li>• Operation of variable-speed pumps and diversion canal at SIB to reduce salinity</li> <li>• Execution of contracts to deliver a portion of Mexico's allotment to Tijuana pursuant to Minute No. 310 of the 1944 Water Treaty</li> <li>• Routing of water through the Yuma Division during flood control conditions</li> </ul>	<ul style="list-style-type: none"> <li>• Delivery of emergency water to Tijuana pursuant to Minute No. 310 of the 1944 Water Treaty and contract</li> <li>• 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</li> </ul>	Water delivery met the Mexico allotment (1.5 maf) pursuant to the 1944 Water Treaty and related Minutes. A total of 1,591,272 acre-feet of water was delivered to Mexico. 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 5,482 acre-feet. Water was routed through the Yuma 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 130,381 acre-feet. Drainage pumping and delivery of drainage return flows were made at NIB and SIB. Variable-speed pumps and the diversion canal at SIB were used to reduce salinity. A total of 386 acre-feet was diverted through the diversion canal.
2.2.1.8 Decree Accounting (page 2-21; Table 2-10, page 2-22)	<ul style="list-style-type: none"> <li>• 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 Decree in <i>Arizona v. California</i></li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• Report data for Decree Accounting records</li> </ul>	<p>The <i>Colorado River Accounting and Water Use Report: Arizona, California, Nevada</i> for calendar year 2008 is currently being prepared. Publication will take place during Calendar Year 2009. Provisional data is available (see Appendix B, Attachment 1) and is summarized below.</p> <p>Provisional Data - Diversions from Mainstream Summary<sup>4</sup>:</p> <ul style="list-style-type: none"> <li>• Arizona: <ul style="list-style-type: none"> <li>Diversions = 3,566,265 acre-feet</li> <li>Measured Returns = 649,170 acre-feet</li> <li>Unmeasured Returns = 160,248 acre-feet</li> <li>Consumptive Use = 2,771,055 acre-feet</li> </ul> </li> <li>• California: <ul style="list-style-type: none"> <li>Diversions = 5,152,599 acre-feet</li> <li>Measured Returns = 594,529 acre-feet</li> <li>Unmeasured Returns = 83,017 acre-feet</li> <li>Consumptive Use = 4,475,297 acre-feet</li> </ul> </li> <li>• Nevada: <ul style="list-style-type: none"> <li>Diversions = 478,550 acre-feet</li> <li>Measured Returns = 208,869 acre-feet</li> <li>Unmeasured Returns = 1,858 acre-feet</li> <li>Consumptive Use = 267,283 acre-feet</li> </ul> </li> </ul>
2.2.2 Future Flow-Related Covered Actions				
2.2.2.1 Specific Surplus and Shortage Guidelines (page 2-22; Table 2-11, page 2-24)	<ul style="list-style-type: none"> <li>• Delivery of surplus water pursuant to the Article II(B)(2) of the Supreme Court Decree of March 9, 1964, 376 U.S. 340, as amended (Decree)</li> <li>• Delivery of water pursuant to the Article II(B)(3) of the Decree (shortage)</li> </ul>	<ul style="list-style-type: none"> <li>• Adoption of specific post-2016 surplus guidelines</li> <li>• Adoption of specific shortage guidelines</li> </ul>	<ul style="list-style-type: none"> <li>• Consult with States on development of specific post-2016 surplus guidelines or development of specific shortage guidelines</li> <li>• Delivery of water to water users in the United States pursuant to applicable Federal law, including the Boulder Canyon Project Act and the Decree</li> </ul>	<p>No surplus water was delivered pursuant to Article II(B)(2) of the Decree.</p> <p>No water was delivered pursuant to Article II(B)(3) of the Decree.</p> <p>No adoption of specific post-2017 surplus guidelines was made. There was no adoption of specific shortage guidelines.</p>
2.2.2.2 Flood Release Contracts (page 2-24; Table 2-12, page 2-25)	<ul style="list-style-type: none"> <li>• Delivery of water under executed flood release contracts</li> </ul>	<ul style="list-style-type: none"> <li>• Execution of contracts for water released during flood control operations</li> </ul>	<ul style="list-style-type: none"> <li>• Participate in the development of and consult in the execution of flood release contracts</li> </ul>	No water deliveries were made under flood release contracts.

Federal Covered Actions <i>Biological Assessment</i> Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions <sup>1</sup>	2008 Accomplishments <sup>2, 3</sup>
2.2.2.3 Changes in the Storage and Delivery of State Entitlement Waters through Various Administrative Actions (page 2-25; Table 2-13, page 2-26)	---	---	---	No administrative actions were taken to reduce the water deliveries as listed in Table 2-13 of the <i>Biological Assessment</i> .
Flow Changes Below Hoover Dam to Davis Dam (Table 2-14, after page 2-26)	---	---	---	45,000 acre-feet of banking was done by MWD for Nevada in 2008, resulting in this amount of water passing Hoover Dam that would otherwise have not. Repayment of CRWDA Exhibit C obligations resulted in 6,740 acre-feet of water remaining in storage in Lake Mead. Repayment of IOPP overruns resulted in reduced diversions of 423 af in AZ, and 15,656 af in CA remaining in storage. System conservation in Yuma Mesa Irrigation and Drainage District resulted in reduced diversions and increased storage of 3,500 af. MWD took delivery of 51,100 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 page 2-26)	---	---	---	45,000 acre-feet of banking was done by MWD for Nevada in 2008, resulting in this amount of water passing Hoover Dam that would otherwise have not. Repayment of CRWDA Exhibit C obligations resulted in 6,740 acre-feet of water remaining in storage in Lake Mead. Repayment of IOPP overruns resulted in reduced diversions of 423 af in AZ and 15,656 af in CA remaining in storage. System conservation in Yuma Mesa Irrigation and Drainage District resulted in reduced diversions and increased storage of 3,500 af. MWD took delivery of 51,100 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 page 2-26)	---	---	---	IID reduced diversions by 7,350 af to make water available to diverters above Parker Dam under the LCWSP. In addition IID reduced its diversion by 13,549 af for IOPP repayments, which remained in storage; IID conserved the following amounts which were diverted by MWD and SDCWA above Parker Dam: 85,000 af under the 1988 Conservation Agreement for MWD and 75,000 conservation under the CRWDA and 8,900 af for lining of the AAC for SDCWA. CVWD conserved 27,700 af by CC lining for diversion for SDCWA.
Water Conservation Field Services Program (page 2-27; Table 2-17, page 2-28)	<ul style="list-style-type: none"> <li>Develop water conservation program pursuant to Reclamation Reform Act section 210(a)</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of the Field Services Program</li> </ul>	<ul style="list-style-type: none"> <li>Consult in the development of conservation plans pursuant to RRA section 210(a)</li> </ul>	Two water conservation plans were updated. All water conservation plans for the Lower Colorado Region are complete.
Unauthorized Use (page 2-28; Table 2-18, page 2-30)	<ul style="list-style-type: none"> <li>Enforcement of provisions of the Boulder Canyon Project Act in <i>Arizona v. California</i> to limit the release and delivery of Colorado River water to authorized users</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of appropriate policy or rule to address four types of unauthorized use</li> <li>Execution of water delivery contracts with entities identified as non-contract users</li> </ul>	<ul style="list-style-type: none"> <li>Consult with states in the development of policies or rules to address four types of unauthorized use</li> <li>Consult with the states on the execution of water delivery contracts with entities identified as noncontract users</li> </ul>	Proposed rule was published July 16, 2008, in the <u>Federal register</u> (73 FR 40916).
Unallocated or Noncontract Water in Arizona, Exclusive of CAP (page 2-30; Table 2-19, page 2-31)	<ul style="list-style-type: none"> <li>Delivery of water pursuant to executed contracts for unallocated water in Arizona (non-CAP)</li> </ul>	<ul style="list-style-type: none"> <li>Execution of water delivery contracts for unallocated water in Arizona (non-CAP)</li> </ul>	<ul style="list-style-type: none"> <li>Review of water delivery contracts and consultation with Arizona on contract recommendations</li> </ul>	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 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 2009.
Central Arizona Project Contract Actions (page 2-31; Table 2-20, page 2-31)	<ul style="list-style-type: none"> <li>Delivery of water pursuant to executed contracts</li> </ul>	<ul style="list-style-type: none"> <li>Completion of allocation and execution of contracts for delivery of CAP subject to Congressional direction</li> </ul>	<ul style="list-style-type: none"> <li>Review of contracts and consultation on proposed allocation</li> </ul>	Water was delivered to the CAP for use by CAP subcontractors and Indian tribes in satisfaction of water delivery contracts.

Federal Covered Actions <i>Biological Assessment</i> Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions <sup>1</sup>	2008 Accomplishments <sup>2, 3</sup>
Changes in Delivery Related to Water Transfers (page 2-32; Table 2-21, page 2-32)	• Delivery of water pursuant to contracts that recognize temporary or permanent transfers of water entitlements	• Approval of new contracts or contract changes to recognize temporary or permanent transfers of water entitlements	• Review of contracts and consultation on new or amended contracts that recognize transfers of water entitlements	Three water transfers were executed. 1. The Hopi Tribe and the Mohave County Water Authority each assigned and transferred 300 acre-feet (250 acre-feet from each went to La Paz County and 50 acre-feet from each went to Springs Del Sol). La Paz County now has a contract for 500 acre-feet and Springs Del Sol now has a contract for 100 acre-feet. The documents were signed on June 9, 2008 and June 10, 2008. 2. The Hopi Tribe assigned and transferred to the Arizona Game and Fish Commission 1,419 acre-feet of fourth priority Colorado River water for use in AGFC's contract service area. The documents for this water transfer were executed on October 10, 2008, but not effective until January 1, 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 (page 2-32; Table 2-22, page 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	45,000 acre-feet of water was banked for Nevada in California by The Metropolitan Water District of southern California.
Changes in Amount of Delivery (page 2-33; Table 2-23, page 2-34)	• Delivery of water pursuant to executed contracts or amendments to recognize changes in amounts of delivery or changes in points of diversion	• Execution of contract amendments or amendments to recognize changes in amounts of delivery or changes in points of diversion	• Review of contracts and consultation on new or amended contracts	Hopi Tribe assigned 300 acre-feet of (4th) - 50 acre-feet to Springs Del Sol and 250 acre-feet to La Paz County - was 5,997 acre-feet of (4th) - now 5,697 af of (4th). Hopi Tribe then assigned 1,419 acre-feet of (4th) - now 2,838 acre-feet of (4th). MCWA assigned 300 acre-feet of (4th) - 50 acre-feet to Springs Del Sol and 250 to L Paz County - was 4,758 acre-feet of (4th) now 4,278 of (4th). CVIDD assigned 2,700 acre-feet of (4th) to Arizona Recreational facilities - was 12,066 acre-feet of (4th) - now 9,366 acre-feet of (4th).
Changes in Type of Water Use (page 2-34; Table 2-24, page 2-34)	• Delivery of water pursuant to executed contracts or contract amendments that recognize changed water use types	• Execution of contracts or contract amendments that recognize changed water use types	• Review of contracts and consultation with Reclamation on new or amended contracts	On October 6, 2008, Amendment No. 2 to Contract No. 1-07-30-W00021, dated July 17, 1981, was executed with WMIDD to increase WMIDD's domestic use allocation from 5,000 acre-feet to 12,000 acre-feet per year, within WMIDD's overall Colorado River water entitlement of 278,000 acre-feet of consumptive use to provide for current and future domestic use needs within WMIDD boundaries.
Inclusions and Exclusions to Service Areas (page 2-34; Table 2-25, page 2-35)	• Delivery of water pursuant to executed contract amendments or new contracts that includes or excludes lands in service areas	• Execution of contract amendments or new contracts that includes or excludes lands in service areas	• Review of contracts and consultation on new or amended contracts	One contract amendment was executed that excluded Springs Del Sol lands from the Hillcrest Water Company's contract service area. The amendment was executed October 6, 2008.
Contract Terminations (page 2-35; Table 2-26, page 2-36)	• None	• Termination of water contract due to abandonment  • Execution of contract amendments when entitlement holder has relinquished water	• Consultation on the disposition of any water allocated for use but not consumptively used within a state	No contracts were terminated.
2.3 WESTERN AREA POWER ADMINISTRATION <sup>5</sup>	---	---	---	See section 2.2.1.5 accomplishments in this table.
2.4 NATIONAL PARK SERVICE	---	---	• Water entitlement holder	See section 2.2.1.8 accomplishments in this table.
2.5 BUREAU OF INDIAN AFFAIRS	---	---	---	---
2.5.2.2 Ongoing Water Conservation Practices (page 2-77)	---	• Conduct conservation measures for efficient water use	---	Existing practices were continued.
2.5.2.6 Flow-Related Actions (page 2-82)	---	---	• Water entitlement holder	See section 2.2.1.8 accomplishments in this table.
2.5.3.2 Future Water Conservation Practices (page 2-77)	---	• Institute new conservation measures for efficient water use	---	No implementation in 2008.
2.5.3.5 Headgate Rock Dam Operation and Maintenance (page 2-88)	---	• Water releases and generate hydropower with these water releases	---	Existing practices were continued.

Federal Covered Actions <i>Biological Assessment</i> Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions <sup>1</sup>	2008 Accomplishments <sup>2, 3</sup>
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.
<p>NOTES:</p> <p>1. See <i>LCR MSCP Habitat Conservation Plan</i>, section 2.1.1, Relationship of Non-Federal Covered Activities to Federal Nondiscretionary Actions. This can be accessed at <a href="http://www.lcrmscp.gov/publications/Volumell.pdf">http://www.lcrmscp.gov/publications/Volumell.pdf</a>.</p> <p>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.</p> <p>3. Flow-Related Federal Covered Actions and Flow-Related Non-Federal Covered Activities are reported for Calendar Year 2008.</p> <p>4. Bureau of Reclamation. Provisional data from Draft <i>Colorado River Accounting and Water Use Report: Arizona, California, Nevada: Calendar Year 2008</i> (see Appendix B, Attachment 1). This can be accessed at <a href="http://www.usbr.gov/lc/region/g4000/hourly/use06.pdf">http://www.usbr.gov/lc/region/g4000/hourly/use06.pdf</a>.</p> <p>5. Actions associated with water releases, and associated power generation, are described in the <i>LCR MSCP Biological Assessment</i>, section 2.2, Bureau of Reclamation Covered Actions. This can be accessed at <a href="http://www.lcrmscp.gov/publications/Volumelll.pdf">http://www.lcrmscp.gov/publications/Volumelll.pdf</a>.</p>				

**APPENDIX B TABLE B-2**  
**Lower Colorado River Multi-Species Conservation Program**  
**Federal Non-Flow-Related Covered Actions and Incidental Take Summary**  
**Fiscal Year 2008**

Federal Covered Actions <i>Biological Assessment</i> Chapter 2	Covered Actions Summary			Covered Actions Implemented						Notes
	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions	Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.2 BUREAU OF RECLAMATION										
2.2.3 Ongoing Non-Flow-Related (Facilities and Channel Activities) (page 2-36; Table 2-27, page 2-37)	<ul style="list-style-type: none"> <li>• Operate, maintain, and control river in Arizona, California, and Nevada</li> <li>• Construct, maintain, and improve drainage works for water projects</li> <li>• Maintain floodway to accommodate flood flows for 100-year event or 40,000 cubic feet per second, whichever is greater</li> <li>• Measure diversions and return flows to and from the mainstem of the Colorado River</li> </ul>	---	<ul style="list-style-type: none"> <li>• Administration of contracts for water district operation and maintenance of Federally owned facilities</li> </ul>							See line items in this table.
2.2.3.1 Channel Maintenance (page 2-38)	---	---	---							
Wash Fans (page 2-40; Table 2-30, page 2-42)	---	• Wash fan removal	---	4		c166.0	None	0	1, 3, & 6	Vidal Wash Fan (Removed 3,000 cubic yards)
Protected Bankline Maintenance and Care of Unprotected Banklines (page 2-43)	---	• Protected bankline location and maintenance	---							No Implementation in FY08
Levee Maintenance (page 2-44)	---	• Levee location and maintenance	---							No implementation in FY08
Desilting Basins (page 2-46; Table 2-32, page 2-46)	---	<ul style="list-style-type: none"> <li>• Sediment dredging upstream of principal canal diversions and disposal sites</li> <li>• Maintenance of settling basins to remove sediment and maintain flows; four principal basins</li> </ul>	---		---					No implementation in FY08
Jetties and Training Structures (page 2-47; Tables 2-33 – 2-34, page 2-48)	---	• Jetty and training structure location and maintenance	---							No implementation in FY08.

Federal Covered Actions <i>Biological Assessment</i> Chapter 2	Covered Actions Summary			Covered Actions Implemented						Notes
	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions	Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
Stockpiles (page 2-49; Table 2-37, page 2-49)	---	• Location of three future stock piles	---	7		a23.1, a13.5, DPOC 1, YDP	None	None		Replenished 4 stockpile sites: a23.1, a13.5, @ DPOC #1 site, and @ YDP site.
Riprap Placement and Haul Roads (page 2-50)	---	• Haul roads and riprap storage location and maintenance	---	7	---	0-24	None	0	1, 3, and 6	Road Maintenance: Limitrophe Division Miles 31.2
				6	---	24-43	None	0	1, 3, and 6	Yuma Division - Miles 57.6
				6	---	0 - 0	None	0	1, 3, and 6	Gila River Area - Miles 22.2
				6	---	87-107	None	0	1, 3, and 6	Cibola Division - Miles 61.7
				4	---	107-134	None	0	1, 3, and 6	Palo Verde Division - Miles 37.4.
				4	---	134-178	None	0	1, 3, and 6	Parker Division - Miles 100.2
2.2.3.2 Major Federal Facilities and Miscellaneous Operation, Maintenance, and Replacement (page 2-50; Table 2-36, after page 2-50)	---	• Maintenance of Yuma area drainage wells and conveyance facilities including maintenance and access roads • Maintenance of open channel drains and outfall channels • Maintenance and replacement of gauging stations, survey line markers, and boat ramps	---	777	MODE I & II, River Gauging Station Yuma Mesa Conduit Yuma Mesa, Yuma Valley, & South Gila wells	31-3615227.031.0-34.0	NoneNoneNoneNone	0000	1, 3, and 6 1, 3, and 6 1, 3, and 6	Concrete lining repairs. Replace Gauging Station & repair associated components Repair work of associated components, Yuma Valley. Repair and replace monitoring wells, Pump, motors, and Valves
Maintenance Activities at the SIB (page 2-52)	---	• Maintenance of facilities to provide flood flow capacity	---	7	242 Well Field	---	None	0	1, 3, and 6	Concrete lining repairs.
2.2.3.3 Backwater Maintenance (page 2-53; Table 2-37, page 2-54)	---	• Backwater maintenance	---							No implementation in FY08.
Mohave Division (page 2-55; Table 2-38, page 2-56)	---	• Backwater maintenance	---							No implementation in FY08.
Parker Division (page 2-57; Table 2-39, page 2-57)	---	• Backwater maintenance	---	4	Aha Quin Backwater	c145	None	0	1, and 6	In order to improve flows along the Aha Quin west channel, removed sandbar and replaced culverts.
Palo Verde Division (page 2-58; Table 2-40, page 2-58)	---	• Backwater maintenance	---							No implementation in FY08.

Federal Covered Actions <i>Biological Assessment</i> Chapter 2	Covered Actions Summary			Covered Actions Implemented						Notes
	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions	Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
Cibola Division (page 2-58; Table 2-41, page 2-59)	---	• Backwater maintenance	---							No implementation in FY08.
Imperial Division (page 2-59; Table 2-42, page 2-59)	---	• Backwater maintenance	---							No implementation in FY08.
Laguna Division (page 2-60; Table 2-43, page 2-60)	---	• Backwater maintenance	---							No implementation in FY08.
Yuma Division (page 2-60; Table 2-44, page 2-61)	---	• Backwater maintenance	---							No Implementation in FY08.
Limitrophe Division Mitigation Obligations (page 2-61; Table 2-45, page 2-62)	---	---	---							No implementation in FY08.
2.2.3.4 Limitrophe Division Maintenance (page 2-62)	---	---	---							No implementation in FY08.
2.2.4 Future Non-Flow- Related Actions (page 2-63)	---	---	---							
2.2.4.1 Topock Marsh (page 2-63)	---	---	---							No implementation in FY08.
2.2.4.2 Laguna Reservoir (page 2-63)	---	---	---							No implementation in FY08.
2.2.4.3 Bankline Maintenance - Unprotected Banklines (page 2-65; Table 2-46, page 2-66)	---	---	---							No implementation in FY08.
2.2.4.4 Proposed Jetties (page 2-67; Table 2-48, page 2-67)	---	---	---							No implementation in FY08.
2.3 WESTERN AREA POWER ADMINISTRATION			Maintenance for Davis - Mead 230k Transmission line							No implementation in FY08
2.4 NATIONAL PARK SERVICE										
2.4.2 Riparian Habitat Restoration (page 2-70)		• Riparian habitat restoration on Lake Mead and Lake Mohave								No implementation in FY08
2.4.3 Fishery Management (page 2-71)		• Habitat modifications on Lake Mead and Lake Mohave, including development and enhancement of grow-out ponds, construction of docks, and creation of angler enhancement structures			Lake Mohave			.75 acres		No implementation in FY08

Federal Covered Actions <i>Biological Assessment</i> Chapter 2	Covered Actions Summary			Covered Actions Implemented						Notes
	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions	Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.4.4 Boating Access (page 2-72)		• Maintenance and enhancement of boating access on Lake Mead and Lake Mohave								No implementation in FY08.
2.5 BUREAU OF INDIAN AFFAIRS										
2.5.2.1 Ongoing Irrigation System Operation and Maintenance (page 2-74)		• Irrigation system operation and maintenance for existing Irrigation Projects		3 3 4 6 7	Fort Mohave Chemehuevi CRIT Fort Yuma Cocopah	--- --- --- --- ---	None None None None None	0 0 0 0 0	1 and 3 1 and 3 1 and 3 1 and 3 1 and 3	Continued existing practices. Continued existing practices. Continued existing practices. Continued existing practices. Continued existing practices.
2.5.2.2 Ongoing Water Conservation Practices (page 2-77)		• Operation and maintenance of existing equipment								Continued existing practices.
2.5.2.4 Ongoing Wildland Fire Management (page 2-88)		• Implementation of fuels management projects								No implementation in FY08.
2.5.2.5 Ongoing Woodland and Shoreline Maintenance (page 2-82)		• Maintenance on Chemehuevi Woodlands Project								Continued existing practices.
2.5.3.1 Future Canal Lining (page 2-84)		• Repair, reline, and line irrigation canals								No implementation in FY08.
2.5.3.2 Future Water Conservation Practices (page 2-85)		• Installation, operation, and maintenance of new equipment								No implementation in FY08.
2.5.3.3 Future Farmland Development (page 2-85)		• Develop additional agricultural acreage, including construction of irrigation systems								No implementation in FY08.
2.5.3.6 Future Wildland Fire Management (page 2-88)		• Implementation of new fuels management projects								No implementation in FY08.
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 TABLE B-3  
Lower Colorado River Multi-Species Conservation Program  
Non-Federal Covered Activities and Incidental Take Summary  
Fiscal Year 2008**

Non-Federal Covered Activities <i>Habitat Conservation Plan Chapter 2</i>	Covered Activities Summary	Covered Activities Implemented					Complied with Avoidance and Minimization Measures	Notes
		Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted		
2.2 ARIZONA								
2.2.1 Ongoing Flow-Related Covered Activities <sup>1</sup> (page 2-4)	<ul style="list-style-type: none"> <li>• 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</li> <li>• Generation and transmission of hydroelectric power</li> <li>• Power contracting</li> </ul>							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 <sup>1</sup> (page 2-6)	<p>Future Arizona water contract holder activities may include:</p> <ul style="list-style-type: none"> <li>• Diversions, discharges, and return flows through existing facilities</li> <li>• Changes to points of diversion</li> <li>• New points of diversion</li> <li>• Interstate water banking</li> <li>• Water marketing</li> <li>• Water transfers</li> </ul> <p>• Any other actions as made possible from any future agreements and/or measures taken by the Arizona Department of Water Resources or contract holder(s)</p> <p>Future Arizona hydroelectric power contract holder activities may include:</p> <ul style="list-style-type: none"> <li>• 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</li> </ul>							Non-Federal Flow-Related Covered Activities are included in the Federal Flow-Related Covered Actions and Accomplishments (see Appendix B, Table B-1).

Non-Federal Covered Activities <i>Habitat Conservation Plan Chapter 2</i>	Covered Activities Summary	Covered Activities Implemented						Notes
		Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.2.3 Ongoing Non-Flow-Related Covered Activities (page 2-7)	<p>Operation, maintenance, and replacement of:</p> <ul style="list-style-type: none"> <li>• The facilities and equipment through which water is diverted and conveyed</li> <li>• The facilities through which return flows are returned to the river</li> <li>• Drainage wells in the Yuma area</li> <li>• The facilities and equipment through which electric power is generated and transmitted</li> <li>• 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</li> </ul>	6	Yuma Valley	---	---	---	1 and 3	194 miles of canal maintenance and 57 miles of open drain maintenance.
2.2.3.1 Arizona Game and Fish Department Programs and Activities								
Vegetation and Habitat Management Programs (page 2-8)	• Aquatic, wetland, and riparian habitat maintenance and restoration activities							No implementation in FY08.
Fish Surveys (page 2-8)	• Surveys for Federally listed and nonnative fish species							10 nights and 8 days of electro-fishing, 4 nights of trammel netting, and 7 nights of hoop netting surveys.
Fish Stocking (page 2-9)	• Stocking of trout							1 stocking of Colorado River Cove at La Paz County Park with rainbow trout (2000 fish). Cove isolated with netting to retain fish after stocking to enhance catchability.
Maintenance of Aids to Navigation and Boating Access (page 2-9)	• Place and maintain aids to navigation							193 buoys inspected and maintained. One courtesy dock system inspected and maintained.
Law Enforcement Patrol Activities (page 2-9)	• Administer law enforcement and boating safety program using watercraft patrols							700 person-days of watercraft patrol.

Non-Federal Covered Activities <i>Habitat Conservation Plan Chapter 2</i>	Covered Activities Summary	Covered Activities Implemented						Notes
		Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.3 CALIFORNIA								
2.3.1 Ongoing Flow-Related Covered Activities <sup>1</sup> (page 2-11)	<ul style="list-style-type: none"> <li>• 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</li> <li>• Generation and transmission of hydroelectric power</li> <li>• Power contracting</li> </ul>							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 <sup>1</sup> (page 2-13)	<p>Future California water contract holder activities may include:</p> <ul style="list-style-type: none"> <li>• Diversions, discharges, and return flows through existing facilities</li> <li>• Changes to points of diversion</li> <li>• New points of diversion</li> <li>• Interstate water banking</li> <li>• Water marketing</li> <li>• Water transfers</li> <li>• 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)</li> </ul> <p>Future California hydroelectric power contract holder activities may include:</p> <ul style="list-style-type: none"> <li>• 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</li> </ul>							Non-Federal Flow-Related Covered Activities are included in the Federal Flow-Related Covered Actions and Accomplishments (see Appendix B, Table B-1).
2.3.3 Ongoing Non-Flow-Related Activities	<p>Operation, maintenance, and replacement of:</p> <ul style="list-style-type: none"> <li>• The facilities and equipment through which water is diverted and conveyed</li> <li>• The facilities through which return flows are returned to the river</li> <li>• The facilities and equipment through which electric power is generated and transmitted</li> <li>• 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</li> </ul>	4	Palo Verde Irrigation District	---	---	---	1 and 3	FY07 - 27.98 acres of drain maintenance. FY08 - 26.25 acres of drain maintenance.
		6	Bard Water District				1 and 3	FY07 4.8 acres of drain maintenance. FY08 5.3 acres of drain maintenance.

Non-Federal Covered Activities <i>Habitat Conservation Plan Chapter 2</i>	Covered Activities Summary	Covered Activities Implemented						Notes
		Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.4 NEVADA								
2.4.1 Ongoing Flow-Related Covered Activities <sup>1</sup> (page 2-15)	<ul style="list-style-type: none"> <li>• 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</li> <li>• Generation and transmission of hydroelectric power</li> <li>• Power contracting</li> </ul>							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 <sup>1</sup> (page 2-17)	<p>Future Nevada water contract holder activities may include:</p> <ul style="list-style-type: none"> <li>• Diversions, discharges, and return flows through existing facilities</li> <li>• Changes to points of diversion</li> <li>• New points of diversion</li> <li>• Interstate water banking</li> <li>• Water marketing</li> <li>• Water transfers</li> <li>• 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)</li> </ul> <p>Future Nevada hydroelectric power contract holder activities may include:</p> <ul style="list-style-type: none"> <li>• 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</li> </ul>							Non-Federal Flow-Related Covered Activities are included in the Federal Flow-Related Covered Actions and Accomplishments (see Appendix B, Table B-1).
2.4.3 Ongoing Non-Flow-Related Activities (page 2-18)	<p>Operation, maintenance, and replacement of:</p> <ul style="list-style-type: none"> <li>• The facilities and equipment through which water is diverted and conveyed</li> <li>• The facilities through which return flows are returned to the river</li> <li>• The facilities and equipment through which electric power is generated and transmitted</li> <li>• 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</li> </ul>							No implementation in FY07.
2.4.3.1 Nevada Department of Wildlife Programs and Activities (page 2-18)	<p>Implementation of select Federally funded:</p> <ul style="list-style-type: none"> <li>• Aquatic, wetland, and riparian habitat maintenance and restoration activities</li> <li>• Aquatic, wetland, and riparian revegetation enhancement activities</li> <li>• Place and maintain aids to navigation and boating access</li> <li>• Administer law enforcement and boating safety program using watercraft patrols</li> </ul>	<p>---</p> <p>---</p> <p>3</p> <p>1 and 2</p>	<p>---</p> <p>---</p> <p>Clark County, downstream of Davis Dam</p> <p>---</p>	<p>---</p> <p>---</p> <p>257.5-275.0</p> <p>Lake Mead-275.0</p>	<p>---</p> <p>---</p> <p>None</p> <p>None</p>	<p>---</p> <p>---</p> <p>0</p> <p>0</p>	<p>---</p> <p>---</p> <p>1 and 3</p> <p>1 and 3</p>	<p>A total of 220 habitat modules were placed on approximately 4.0 acres at Carp Cove and Box Cove on Lake Mohave. Cooperative project with NPS and AGFD.</p> <p>No implementation in FY08.</p> <p>Performed routine maintenance and inspection of aids to navigation.</p> <p>Conducted routine law enforcement patrols on Lake Mead, Lake Mohave, mainstem of LCR, and Laughlin Lagoon.</p>
<p><b>NOTE:</b>  1. See <i>LCR MSCP Habitat Conservation Plan</i>, section 2.1.1, Relationship of Non-Federal Covered Activities to Federal Nondiscretionary Actions. This can be accessed at <a href="http://www.lcrmscp.gov/publications/Volumell.pdf">http://www.lcrmscp.gov/publications/Volumell.pdf</a>.</p>								

## Appendix C. Recommendations from Resource Agencies



**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  
22410-2000-F-0273  
22410-2004-F-0161

May 26, 2009

5/29/09  
5/29/09 W. S. Wood

Memorandum

To: Program Manager, Lower Colorado River Multi-Species Conservation Program,  
Bureau of Reclamation, Boulder City, Nevada

From: Field Supervisor

Subject: Biological Opinion for the Interim Surplus Criteria, Secretarial Implementation Agreement, and Conservation Measures on the Lower Colorado River, Lake Mead to the Southerly International Boundary, Arizona, California, and Nevada

The Fish and Wildlife Service (FWS) issued a biological opinion to the Bureau of Reclamation (Reclamation) on the effects of implementing the Interim Surplus Criteria (ISC) and the Secretarial Implementation Agreement (SIA) on January 12, 2001. The biological opinion also contained a suite of Conservation Measures designed to reduce the significant of the effects of the ISC and SIA on listed species in the lower Colorado River. Reclamation, along with San Diego Water Authority (SDWA) and The Metropolitan Water District of Southern California (MWD, were responsible for funding the Conservation Measures for the SIA. In 2005, the responsibility for implementing all the Conservation Measures from the 2001 biological opinion was subsumed into the Lower Colorado River Multi-Species Conservation Program (LCR MSCP), with specific funding for the SIA implementation remaining with the three parties. Reclamation, in its role as manager of the LCR MSCP, provided updates on the implementation of the Conservation Measures in the annual reports provided to us on the LCR MSCP.

We received your letter of January 8, 2009 reporting that Conservation Measures 1, 2, 3, and 4, Tier 1-B for the SIA were completed, and that information would be included in the LCR MSCP Fiscal Year 2010 Work Plan and Fiscal Year 2008 Accomplishment Report. Maintenance of the 44 acres of backwaters created under Conservation Measure 2 and monitoring of 372 acres of southwestern willow flycatcher habitat under Conservation Measure 4, Tier 1-A would continue under the LCR MSCP. We were also advised that implementation of Conservation Measure 4, Tier 2, would be undertaken if conditions defined in the measure were met.

We have reviewed the information provided with your letter of January 8, 2009, and the subsequent report in the draft LCR MSCP Fiscal Year 2010 Work Plan and Fiscal Year 2008 Accomplishment Report concerning SIA Conservation Measure implementation. We believe

that the implementation accomplished to date, and the commitment to maintain and monitor conditions as appropriate, meets the requirements of the 2001 Biological Opinion for the SIA. Continuing work on maintaining the Imperial Ponds backwaters, monitoring the 372 acres of flycatcher habitat, and implementation of Conservation Measure 4, Tier 2 will be required over the remaining term of the consultation.

We appreciate the efforts of Reclamation, SDWA, and MWD to implement these SIA Conservation Measures effectively and in a timely manner. We look forward to further coordination on the continuing Conservation Measure implementation. If you have any questions, please contact Ms. Lesley Fitzpatrick of my staff at (602) 242-0210 (x236) or me at (x244).



Steven L. Spangle

cc: Assistant Field Supervisor, Central Arizona, Fish and Wildlife Service, Phoenix, AZ  
(Attn: Greg Beatty)

W:\Lesley Fitzpatrick\00-273 SIA CMs.docx:egg



## 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

July 22, 2008

### 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 2007 Accomplishment Report and Consistency Review of Fiscal Year 2009  
Work Plan and Budget

SEARCHED	7/25/08
SERIALIZED	7/28
INDEXED	8/20
FILED	
ENVU-110	
1069193	

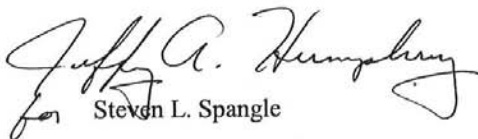
This responds to your memorandum of July 16, 2008, requesting review by the Fish and Wildlife Service (FWS) of the combined document containing the Fiscal Year 2007 Accomplishment Report and the Fiscal Year 2009 Work Plan and Budget for the Lower Colorado River Multi-Species Conservation Program (LCR 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 2007 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 2007 covered by the LCR MSCP (October 1, 2006-September 31, 2007), 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 2007 that would be credited to the cost of LCR MSCP implementation. The FWS concurs with the amounts included on page 12, in the sum of \$16,701,645.00. This sum includes a credit to Reclamation of \$3,869,537.00 and San Diego County Water Association of \$250,000.00 against future expenditures.

The Fiscal Year 2009 Work Plan and Budget contains the work tasks and estimated costs for LCR MSCP implementation during Fiscal Year 2009 beginning on October 1, 2008. 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).

  
for Steven L. Spangle

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES: Luela Roberts)  
Lower Colorado River Coordinator, Fish and Wildlife Service, Phoenix, AZ

W:\Lesley Fitzpatrick\LCR MSCP 07-09 Concurrence.doc:egg





DEPARTMENT OF FISH AND GAME

Inland Deserts Region (6)  
P.O. Box 2160  
Blythe, California 92226  
Phone (760) 922-6508  
Fax (760) 922-5638



November 4, 2008

Mr. John Swett  
Bureau of Reclamation  
Lower Colorado Regional Office  
P. O. Box 61470  
Boulder City, Nevada 89006-1470

Subject: Consistency Review of Final Implementation Report, LCRMSCP, June 2008

Dear Mr. Swett:

As requested in your letter dated July 16, 2008, the California Department of Fish and Game (Department), has reviewed the *Final Implementation Report, Fiscal Year 2009 Work Plan and Budget, Fiscal Year 2007 Accomplishment Report Lower Colorado River Multi-Species Conservation Program (Work Plan)* and finds the Work Plan to be inconsistent pursuant to the terms of the Department's 2081 Incidental Take Permit (ITP) (No. 2081-2005-008-06).

The LCRMSCP procedure whereas the LCRMSCP Program Manager consults with the Department but the ITP Permittees do not consult with the Department is unacceptable. As stated in the ITP Conditions of Approval 3(a)(v), "*The Permittees shall consult with the Department, and receive the Department's concurrence on the implementation of LCRMSCP activities conducted in California and provided as Conditions of Approval in this Permit.*" The Bureau of Reclamation (Reclamation) holds a limited role and nearly no responsibility with regards to the ITP compliance as stated in the ITP as "*Reclamation, an agency of the United States, is not a Permittee, and in its role as implementing agency for the LCRMSCP, is not subject to the terms of this permit.*" A designated representative responsible for communications with the Department from the undersigned applicants of the ITP, and not Reclamation, should request the consistency review.

The Work Plan contains an ITP compliance status report titled "Compliance Reporting CESA Permit" (see pages 40-41) that does not meet the terms of the ITP. The report makes the following three concluding statements without explanation: "*1) The LCRMSCP conservation activities fulfill the requirements of the CESA permit. 2) All other CESA permit requirements are otherwise the same as those for the LCRMSCP. 3) The LCRMSCP accomplishments in FY07 also meet the CESA permit requirements.*"

ITP Conditions of Approval 3(b)(iii) require the Permittees, not Reclamation, to provide the report and to include eight content provisions. The Permittees did not provide the report and the report was inadequate for content as follows: Provision 1) provided elsewhere in the document; 2) not provided; 3) provided elsewhere; 4) provided elsewhere; 5) provided elsewhere and inadequate; 6) not provided; 7) not provided and California data missing from page 291, App. B, Table B-3, Section 2.3.3; and 8) provided elsewhere. The ITP report requirements are fragmented throughout the Work Plan and should be compiled specifically for California Permittees' compliance with the terms of the ITP.

The Department concludes that the compliance reporting components within the Work Plan will not meet the standards required under Fish and Game Code Section 2081(b)(4), for monitoring compliance with, and effectiveness of, the mitigation measures of the ITP. The Permittees' designated responsible representative, not Reclamation, should consult with the Department for compliance with the ITP Conditions of Approval. The ITP annual report should be California-specific and compiled effectively without fragmentation throughout the Work Plan. Please contact me at 760-922-6508 with any questions.

Sincerely,

Chris Hayes  
Deputy Regional Manager

Cc: Chris Harris, CRB

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## Appendix D. LCR MSCP Closed Work Tasks

Work Task		FY Closed	Total Accomplishment
	<b>Pre FY08</b>		
A1	Annual Report Writing and Production (transferred from G2)	FY07	\$165,789.34
	<b>Pre FY08</b>		
B9	Boulder City Wetland Ponds	FY05	\$4,370.00
	<b>Pre FY08</b>		
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	\$103,551.00
C9	Razorback Sucker and Bonytail Pen Rearing Tests	FY07	\$111,040.00
C16	Evaluation of Past Bonytail Stockings	FY07	\$55,333.00
	<b>Pre FY08 Total</b>		<b>\$780,719.00</b>
	<b>FY08</b>		
C6	Insect Pop in Riparian Sites - Adjustment	FY07	(\$2,110.00)
	<b>Cumulative Total Closed C Work Tasks</b>		<b>\$778,609.00</b>
	<b>Pre FY08</b>		
D11	Vegetation Type Mapping	FY05	\$725,873.00
D10	System Monitoring and Studies on Small Mammal Populations	FY07	\$46,828.00
	<b>Pre FY08 Total</b>		<b>\$772,701.00</b>
	<b>FY08</b>		
D10	System Monitoring and Studies of Small Mammal Populations - Adjustment	FY07	\$5,369.81
	<b>Cumulative Total Closed D Work Tasks</b>		<b>\$778,070.81</b>
	<b>Pre FY08</b>		
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	\$172,364.00

<b>Work Task</b>		<b>FY Closed</b>	<b>Total Accomplishment</b>
	<b>Pre FY08 Total</b>		<b>\$393,802.00</b>
	<b>FY08</b>		
E13	McAllister Lake - Adjustment	FY07	\$110.00
	<b>Cumulative Total Closed E Work Tasks</b>		<b>\$393,912.00</b>
	<b>Pre FY08</b>		
G2	Annual Report Writing		\$16,535.00
Notes:			
E6 & E7 were closed in FY07 after the FY08 Work Plan was approved. Work Task Obligations are shown in Table 1-5			
E21 was re-opened in FY09			

## Appendix E. Financial Statement

	CASH CONTRIBUTIONS				HABITAT MAINTENANCE FUND w/out interest			
	FY06	FY07	FY08	TOTAL CASH	FY06	FY07	FY08	TOTAL
<b>Reclamation</b>	6,072,381.00	6,291,054.00	6,655,509.00	<b>19,018,944.00</b>	0.00	0.00	0.00	<b>0.00</b>
<b>Arizona</b>	471,863.10	488,855.40	517,175.90	<b>1,477,894.40</b>	135,375.00	140,250.00	148,375.00	<b>424,000.00</b>
<b>Nevada</b>	1,838,148.82	1,904,342.55	2,014,665.43	<b>5,757,156.80</b>	135,375.00	140,250.00	148,375.00	<b>424,000.00</b>
<b>California</b>	3,220,869.08	3,336,856.05	3,530,167.67	<b>10,087,892.80</b>	270,750.00	280,500.00	296,750.00	<b>848,000.00</b>
Metropolitan Water District	1,715,447.63	1,955,327.46	2,068,604.00					
Imperial Irrigation District	500,971.43	519,011.96	549,079.48					
Cochella Valley Water District	273,257.15	283,097.43	299,497.92					
Los Angeles Dept Water Power	154,845.72	160,421.88	169,715.48					
San Diego County Water	145,737.14	150,985.30	159,732.20					
Palo Verde Irrigation District	122,067.53	126,463.31	133,789.60					
S. Cal Public Power Authority	63,760.00	66,056.07	69,882.84					
Southern California Edison	54,651.43	56,619.49	59,899.60					
Bard Water District	6,072.38	6,291.05	6,655.52					
Colorado River Board of CA	6,072.38	6,291.05	6,655.52					
Needles	6,072.38	6,291.05	6,655.52					
<b>GRAND TOTALS</b>	<b>\$11,603,262.00</b>	<b>\$12,021,108.00</b>	<b>\$12,717,518.00</b>	<b>\$36,341,888.00</b>	<b>\$541,500.00</b>	<b>\$561,000.00</b>	<b>\$593,500.00</b>	<b>\$1,696,000.00</b>

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