



Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Final Implementation Report, Fiscal Year 2009 Work Plan and Budget, Fiscal Year 2007 Accomplishment Report



June 2008

Lower Colorado River Multi-Species Conservation Program Steering Committee Members

Federal Participant Group

Bureau of Reclamation
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

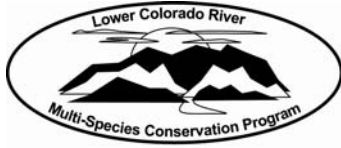
Colorado River Commission of Nevada
Nevada Department of Wildlife
Southern Nevada Water Authority
Colorado River Commission Power Users
Basic Water Company

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 2009 Work Plan and Budget, Fiscal Year 2007 Accomplishment Report

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

June 2008

Contents

Program Overview	9
Program Implementation	9
LCR MSCP Program Funding.....	11
FY08 Contributions and Adjustments	12
2001 Biological Opinion Account	13
Habitat Maintenance Fund.....	13
In-Kind Contributions.....	13
CESA Permit.....	14
Proposed FY08 Program and FY07 Accomplishment.....	14
Compliance Reporting	23
LCR MSCP	23
2001 Biological Opinion.....	37
CESA Permit.....	40
Overview of Work Tasks.....	42
Fish Augmentation, Monitoring, and Research	42
Monitoring and Research for Terrestrial, Riparian, and Marsh Habitats and Associated Covered Species	49
Conservation Area Development and Management	56
Work Tasks Section A Program Administration	64
Work Task A1: Program Administration.....	65
Work Tasks Section B Fish Augmentation.....	67
Work Task B1: Lake Mohave Razorback Sucker Larvae Collections	68
Work Task B2: Willow Beach National Fish Hatchery.....	70
Work Task B3: Achii Hanyo Rearing Station	73
Work Task B4: Dexter National Fish Hatchery.....	75
Work Task B5: Bubbling Ponds Fish Hatchery.....	77
Work Task B6: Lake Mead Fish Hatchery	79
Work Task B7: Lake-side Rearing Ponds.....	81
Work Task B8: Fish Tagging Equipment	83
Work Task B10: Uvalde National Fish Hatchery	85
Work Task B11: Overton Wildlife Management Area.....	88
Work Tasks Section C Species Research.....	90
Work Task C2: Sticky Buckwheat and Threecorner Milkvetch Conservation	91
Work Task C3: Multi-Species Conservation Program Covered Species Profile Development.....	93
Work Task C4: Relict Leopard Frog	95
Work Task C5: Effects of Abiotic Factors on Insect Populations in Riparian Restoration Sites.....	97
Work Task C6: Insect Population Biology in Riparian Restoration Sites.....	100
Work Task C7: Survey and Habitat Characterization for MacNeill's Sootywing	102

Work Task C8: Razorback Sucker Survival Studies	105
Work Task C9: Razorback Sucker and Bonytail Pen Rearing Tests	108
Work Task C10: Razorback Sucker Growth Studies.....	110
Work Task C11: Bonytail Rearing Studies.....	112
Work Task C12: Demographics and Post-Stocking Survival of Repatriated Razorback Suckers in Lake Mohave	114
Work Task C13: Lake Mead Razorback Sucker Study	117
Work Task C14: Humpback Chub Program Support	119
Work Task C15: Flannelmouth Sucker Habitat Use, Preference and Recruitment Downstream of Davis Dam.....	120
Work Task C16: Evaluation of Past Bonytail Stockings	122
Work Task C23: Evaluation of Remote Sensing Techniques for PIT-Tagged Fish	124
Work Task C24: Avian Species Habitat Requirements.....	126
Work Task C25: Imperial Ponds Native Fish Research	128
Work Task C26: Evaluation of Raceway Rearing of Razorback Sucker at Lake Mead Fish Hatchery	130
Work Task C27: Small Mammal Population Studies.....	132
Work Task C28: Nest Predation Effects on Riparian Bird Species.....	134
Work Task C29: Age Characterization of Reach 3 Razorback Sucker Population	136
Work Task C30: Development and Evaluation of Measures to Reduce Transport of Quagga Mussel During Fish Transfer and Stocking Activities.....	138
Work Task C31: Razorback Sucker Genetic Diversity Assessment	140
Work Task C32: Determination of Salinity, Temperature and Oxygen Limits for Bonytail and Razorback Sucker	142
Work Task C33: Comparative Survival of 500-mm Razorback Sucker Released in Reach 3	143
Work Task C34: Characterization of Zooplankton Communities in Off-channel Native Fish Habitats	145
Work Tasks Section D System Monitoring	147
Work Task D1: Marsh Bird Surveys	148
Work Task D2: Southwestern Willow Flycatcher Presence/Absence Surveys.....	150
Work Task D3: Southwestern Willow Flycatcher Habitat Monitoring...	153
Work Task D4: Southwestern Willow Flycatcher Presence/Absence Survey — Hualapai Tribal Lands	155
Work Task D5: Monitoring Avian Productivity and Survivorship	157
Work Task D6: System Monitoring for Riparian Obligate Avian Species	160
Work Task D7: Yellow-billed Cuckoo Presence/Absence Surveys.....	162
Work Task D8: Razorback Sucker and Bonytail Stock Assessment.....	165
Work Task D9: System Monitoring and Research of Covered Bat Species	169

Work Task D10: System Monitoring and Studies on Small Mammal Populations.....	172
Work Tasks Section E Conservation Area Development and Management	174
Work Task E1: Beal Lake Riparian Restoration.....	175
Work Task E2: Beal Lake Native Fish	179
Work Task E3: ‘Ahakhav Tribal Preserve.....	182
Work Task E4: Palo Verde Ecological Reserve	185
Work Task E5: Cibola Valley Conservation Area.....	189
Work Task E6: Cottonwood Genetics Study	194
Work Task E7: Mass Transplanting Demonstration.....	196
Work Task E8: Seed Feasibility Study	198
Work Task E9: Hart Mine Marsh	201
Work Task E12: Butler Lake	204
Work Task E13: McAllister Lake.....	206
Work Task E14: Imperial Ponds Conservation Area.....	208
Work Task E15: Backwater Site Selection.....	212
Work Task E16: Conservation Area Site Selection.....	215
Work Task E17: Topock Marsh Pumping	218
Work Task E18: Law Enforcement and Fire Suppression.....	220
Work Task E24: Cibola NWR Unit #1	222
Work Task E25: Big Bend Conservation Area.....	226
Work Task E26: Headquarters Lake.....	228
Work Tasks Section F Post-Development Monitoring.....	230
Work Task F1: Habitat Monitoring	231
Work Task F2: Avian Use of Habitat Creation Sites.....	233
Work Task F3: Small Mammal Colonization of Restoration Sites	236
Work Task F4: Post-Development Monitoring of Covered Bat Species	238
Work Task F5: Post-Development Monitoring of Fish Restoration Sites.....	241
Work Task F6: Post-Development Monitoring of MacNeill's Sootywing in Habitat Creation Sites.....	243
Work Tasks Section G Adaptive Management Program.....	245
Work Task G1: Data Management	246
Work Task G2: Annual Report Writing and Production	248
Work Task G3: Adaptive Management Research Projects.....	249
Work Task G4: Science/Adaptive Management Strategy	253
Work Tasks Section H Existing Habitat Maintenance	255
Work Task H1: Existing Habitat Maintenance.....	256
Work Tasks Section I Public Outreach.....	257
Work Task I1: Public Outreach	258

Appendices

Appendix A	Letter from Central Arizona Water Conservation District	260
Appendix B	Description of Take.....	267
Appendix C	Recommendations from Resource Agencies	293
Appendix D	LCR MSCP Closed Work Tasks	297
Appendix E	Financial Statement	299

Tables

Table 1-1a	Federal/Non-Federal Funding Requirements	11
Table 1-1b	Funding Credit and Deficit Report.....	11
Table 1-1c	LCR MSCP Program Account.....	12
Table 1-2	FY09 Contribution Schedule.....	12
Table 1-3	Existing Habitat Maintenance Fund.....	13
Table 1-4	FY09 Proposed Program Funding	14
Table 1-5	Annual Funding Matrix	16
Table 1-6	LCR MSCP Habitat Objectives.....	25
Table 1-7	Summary of Fish Augmentation	26
Table 1-8	Status of Conservation Measures	27
Table 1-9	Summary of Razorback Sucker Stockings for the 2001 BO	37
Table 1-10	Cottonwood-Willow Land Cover Types Established for the 2001 BO	39

Acronyms

AGFD	Arizona Game and Fish Department	NAU	Northern Arizona University
AMP	Adaptive Management Program	NDOW	Nevada Division of Wildlife
ASU	Arizona State University	NEPA	National Environmental Policy Act
BEVI	Arizona Bell's Vireo	NFH	National Fish Hatchery
BHCO	Brown-headed Cowbird	NFWG	Native Fish Work Group
BLM	Bureau of Land Management	NPS	National Park Service
BLRA	California Black Rail	NWR	National Wildlife Refuge
BO	Biological and Conference Opinion	PIT	Passive Integrated Transponder
BONY	Bonytail	PVER	Palo Verde Ecological Reserve
CAP	Central Arizona Project	RASU	Razorback Sucker
CAWCD	Central Arizona Water Conservation District	Reclamation	Bureau of Reclamation
CDFG	California Department of Fish and Game	RFP	Request for Projects
CESA	California Endangered Species Act	SDCWA	San Diego County Water Authority
CLRA	Yuma Clapper Rail	SFH	State Fish Hatchery
CNWR	Cibola National Wildlife Refuge	SIA	Secretarial Implementation Agreement
CRIT	Colorado River Indian Tribes	SNWA	Southern Nevada Water Authority
CRITER	Colorado River Terrestrial and Riparian Ecosystem	SUTA	Summer Tanager
CVCA	Cibola Valley Conservation Area	SWA	State Wildlife Area
ELOW	Elf Owl	SWFL	Southwestern Willow Flycatcher
ESA	Endangered Species Act	U of A	University of Arizona
FLSU	Flannelmouth Sucker	UCD	University of California, Davis
FMA	Funding and Management Agreement	USFWS	U.S. Fish and Wildlife Service
FY	Fiscal Year	USGS	United States Geological Survey
GBBO	Great Basin Bird Observatory	VEFL	Vermilion Flycatcher
GIFL	Gilded Flicker	WMA	Wildlife Management Area
GIS	Geographic Information System	YAO	Reclamation, Yuma Area Office
GIWO	Gila Woodpecker	YBCU	Yellow-billed Cuckoo
GPS	Global Positioning System	YWAR	Yellow Warbler
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		

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 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. Jerry Zimmerman, Colorado River Board of California, served as Chair of the Steering Committee, and George Caan, Colorado River Commission of Nevada, served as Vice-Chair through April 25, 2007. George Caan, Colorado River Commission of Nevada, was then elected as Chair, and Bill Werner, Arizona Department of Water Resources, was elected 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 FY07, a summary of work underway during FY08, and proposed work to be performed during FY09. It also documents research and monitoring activities undertaken in support of the LCR MSCP. Incidental Take for covered actions implemented during FY07 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

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

*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 financial accomplishments. The table outlines required program funding, credits and deficits, the budget available in a given fiscal year, program accomplishment per year, and the LCR MSCP cumulative financial accomplishment.

Table 1-1c. LCR MSCP Program Account

Fiscal Year	Required Federal Funding	Required Non-Federal Funding	Federal Credits	Non-Federal Credits	Program Accomplishment	Cumulative Program Accomplishment
2004	\$0	\$0	\$3,381,440	\$0	\$3,381,440	\$3,381,440
2005	\$0	\$0	\$5,980,712	\$145,737	\$6,126,449	\$9,507,889
2006	\$6,072,381	\$6,072,381	\$506,149	\$500,000	\$13,150,911	\$22,658,800
2007	\$6,291,054	\$6,291,054	\$3,869,537	\$250,000	\$16,701,645	\$39,360,445
					Total:	\$39,360,445

FY09 Contributions and Adjustments

As outlined in Table 1-1a, the annual funding commitment for FY09 is \$11,214,000, based on the 2003 estimate, and \$13,568,940 after the preliminary Composite Inflation Index of 1.210 is applied. In accordance with Section 8.3 of the FMA, the non-Federal share of the cost by state and the Federal share of the cost for FY09 are shown below. Section 8.3 of the FMA allows for adjusted non-Federal funding during the first 10 years of the program. The FY09 preliminary 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. FY09 Contribution Schedule

Funding Entity	FY09 Contributions	FY09 Adjusted Contributions
Federal:	\$6,784,470.00	\$6,784,470.00
Non-Federal:	\$6,784,470.00	\$6,784,470.00
<i>California</i>	<i>\$3,392,235.00</i>	<i>\$3,731,458.50</i>
<i>Arizona</i>	<i>\$1,696,117.50</i>	<i>\$1,017,670.50</i>
<i>Nevada</i>	<i>\$1,696,117.50</i>	<i>\$2,035,341.00</i>
Total:	\$13,568,940.00	\$13,568,940.00

2001 Biological Opinion Account

A total of \$6 million, plus interest, is 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 will be used to meet the financial commitments for these entities. The mitigation requirements outlined in the 2001 BO must be implemented on the front-end of the LCR MSCP; therefore, funding in excess of the entities' LCR MSCP annual required contribution may be requested by Reclamation and result in a funding credit in the early years.

In FY07, Reclamation withdrew \$150,985.30 from SDCWA for implementation of the 2001 BO activities. This amount was part of the FY07 LCR MSCP required funding contribution. In addition, Reclamation drew an additional \$250,000 in FY07 from SDCWA's account. This money was used to complete construction of the Imperial Ponds Project. While the FY07 LCR MSCP required funding is not a credit, the \$250,000 from SDCWA 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 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 FY07 with interest, FY08 contributions, and FY09 projected contributions. No funds have been withdrawn from any of the accounts to date.

Table 1-3. Existing Habitat Maintenance Fund

Funding Partner	FY07 Contributions	Cumulative through 2007*	FY08 Contribution	FY09 Projected Contribution
California:	\$280,500	\$656,962	\$296,750	\$302,500
Arizona:	\$140,250	\$287,860	\$148,375	\$151,250
Nevada:	\$140,250	\$290,416	\$148,375	\$151,250
Total:	\$561,000	\$1,235,238	\$593,500	\$605,000

*Includes interest earned.

In-Kind Contributions

Section 8.7.4 of the FMA provides that in-kind goods or services shall be credited based on approval by the Program Manager and the Steering Committee. In April 2007, the Steering Committee passed Program Decision Document 08-001, *In-Kind Credit for Goods and Services*, which provides specific guidelines for the calculation of in-kind credit for goods and services. No in-kind contributions were received in FY07.

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 FY09 Program and FY07 Accomplishment

The minimum funding required in the LCR MSCP program documents for FY09 is \$13,568,940. Reclamation is proposing an annual program budget totaling \$18,772,780, as shown in Table 1-4. Table 1-5 shows by work task: FY07 estimates and actual accomplishment, cumulative program accomplishment (FY04-FY07), FY08 approved program, FY09 proposed program, and out-year funding for FY10 and FY11. Out-year funding estimates are not adjusted for future inflation.

Table 1-4. FY09 Proposed Program Funding

Program Area	FY09 Funding
Program Administration	\$1,231,780
Fish Augmentation	\$1,840,000
Species Research	\$2,757,000
System Monitoring	\$2,270,000
Conservation Area Development and Management	\$8,494,000
Post-Development Monitoring	\$805,000
Adaptive Management Program	\$730,000
Existing Habitat Maintenance	\$605,000
Public Involvement	\$40,000
TOTAL	\$18,772,780

Reclamation will ensure the minimum program accomplishment occurs that meets the Indexed Annual Contribution outlined in Table 1-1a of \$13,568,940; however, Reclamation is presenting work tasks totaling \$18,772,780 to ensure adequate flexibility in accomplishing the program. By receiving Steering Committee and USFWS input on the broad range of work, Reclamation can accomplish additional work should funds become available, or 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 FY09, 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 FY10 or FY11, 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 FY07, Reclamation estimated work tasks totaling \$16,446,196. Actual LCR MSCP costs for FY07 were \$16,701,645. In accordance with the FMA, Reclamation is seeking a credit for FY07 in the amount of \$3,869,537 and SDCWA is seeking a credit for FY07 in the amount of \$250,000 (Tables 1-1b and 1-1c).

Table 1-5. Annual Funding Matrix

Work Task	Name	FY2007 Estimate	FY2007 Actual Accomplishment ¹	Cumulative through FY2007	FY2008 Approved Estimate	FY2009 Proposed Estimate	FY2010 Projected Estimate ²	FY2011 Projected Estimate ²
A	Program Administration							
A-1	Program Administration	\$1,142,196	\$1,052,868	\$2,620,111	\$1,187,000	\$1,231,780	\$1,231,780	\$1,231,780
		\$1,142,196	\$1,052,868	\$2,620,111	\$1,187,000	\$1,231,780	\$1,231,780	\$1,231,780
B	Fish Augmentation							
B-1	Lake Mohave Razorback Sucker Larvae Collection	\$200,000	\$237,020	\$661,234	\$200,000	\$200,000	\$200,000	\$200,000
B-2	Willow Beach National Fish Hatchery	\$225,000	\$233,348	\$619,834	\$235,000	\$350,000	\$250,000	\$250,000
B-3	Achii Hanyo Rearing Station	\$50,000	\$41,589	\$154,779	\$50,000	\$170,000	\$100,000	\$100,000
B-4	Dexter National Fish Hatchery	\$125,000	\$117,699	\$367,327	\$130,000	\$250,000	\$180,000	\$180,000
B-5	Bubbling Ponds Fish Hatchery	\$225,000	\$301,360	\$515,377	\$235,000	\$335,000	\$250,000	\$250,000
B-6	Lake Mead Fish Hatchery	\$55,000	\$20,654	\$154,367	\$50,000	\$50,000	\$50,000	\$50,000
B-7	Lake-side Rearing Ponds	\$150,000	\$136,000	\$571,641	\$175,000	\$175,000	\$175,000	\$150,000
B-8	Fish Tagging Equipment	\$75,000	\$46,711	\$241,043	\$75,000	\$75,000	\$75,000	\$75,000
B-10	Uvalde National Fish Hatchery	\$260,000	\$260,000	\$317,122	\$60,000	\$60,000	\$60,000	\$60,000
B-11	Overton Wildlife Management Area	\$75,000	\$67,010	\$106,714	\$75,000	\$175,000	\$75,000	\$50,000
Closed	Work Tasks Pre-FY07	\$0	\$0	\$4,370	\$0	\$0	\$0	\$0
		\$1,440,000	\$1,461,391	\$3,713,808	\$1,285,000	\$1,840,000	\$1,415,000	\$1,365,000

Work Task	Name	FY2007 Estimate	FY2007 Actual Accomplishment¹	Cumulative through FY2007	FY2008 Approved Estimate	FY2009 Proposed Estimate	FY20010 Projected Estimate²	FY2011 Projected Estimate²
C	Species Research							
C-2	Sticky Buckwheat and Threecorner Milkvetch ...	\$11,000	\$10,000	\$20,000	\$11,000	\$11,000	\$11,000	\$11,000
C-3	MSCP Covered Species Profile Development	\$15,000	\$34,848	\$244,140	\$15,000	\$15,000	\$15,000	\$15,000
C-4	Relict Leopard Frog	\$11,000	\$11,781	\$25,909	\$11,000	\$11,000	\$11,000	\$11,000
C-5	Effects of Abiotic Factors on Insect Populations ...	\$90,000	\$47,426	\$56,010	\$90,000	\$90,000	\$90,000	\$90,000
C-6	Insect Population Biology in Riparian Restoration Sites	\$30,000	\$26,676	\$103,551	\$0	\$0	\$0	\$0
C-7	Survey and Habitat Characterization for MacNeill's Sootywing	\$160,000	\$80,818	\$270,607	\$160,000	\$145,000	\$90,000	\$0
C-8	Razorback Sucker Survival Studies	\$190,000	\$180,752	\$606,705	\$205,000	\$25,000	\$0	\$0
C-9	Razorback Sucker and Bonytail Pen Rearing Tests	\$35,000	\$38,786	\$111,040	\$0	\$0	\$0	\$0
C-10	Razorback Sucker Growth Studies	\$125,000	\$106,383	\$169,901	\$125,000	\$125,000	\$125,000	\$125,000
C-11	Bonytail Rearing Study	\$165,000	\$142,661	\$237,962	\$165,000	\$165,000	\$165,000	\$165,000
C-12	Demographics ... of Repatriated Razorback Suckers ...	\$185,000	\$184,686	\$358,262	\$215,000	\$200,000	\$200,000	\$200,000
C-13	Lake Mead Razorback Sucker	\$300,000	\$302,066	\$665,687	\$150,000	\$150,000	\$150,000	\$150,000

Work Task	Name	FY2007 Estimate	FY2007 Actual Accomplishment¹	Cumulative through FY2007	FY2008 Approved Estimate	FY2009 Proposed Estimate	FY2010 Projected Estimate²	FY2011 Projected Estimate²
C-14	Humpback Chub Program Support	\$10,000	\$68	\$38,297	\$10,000	\$200,000	\$0	\$0
C-15	Flannelmouth Sucker Habitat ...	\$80,000	\$92,893	\$242,918	\$80,000	\$80,000	\$80,000	\$25,000
C-16	Evaluation of Past Bonytail Stockings	\$60,000	\$55,333	\$55,333	\$0	\$0	\$0	\$0
C-23	Evaluation of Remote Sensing Techniques ...	\$145,000	\$138,945	\$138,945	\$145,000	\$60,000	\$0	\$0
C-24	Avian Species Habitat ...	\$0	\$0	\$0	\$150,000	\$375,000	\$375,000	\$375,000
C-25	Imperial Ponds Native Fish ...	\$0	\$0	\$0	\$225,000	\$225,000	\$225,000	\$225,000
C-26	Raceway Rearing of Razorback Sucker ...	\$0	\$0	\$0	\$100,000	\$100,000	\$100,000	\$0
C-27	Small Mammal Population Studies	\$0	\$0	\$0	\$65,000	\$65,000	\$65,000	\$0
C-28	Nest Predation Effects on Riparian Bird Species	\$0	\$0	\$0	\$0	\$145,000	\$25,000	\$0
C-29	Age ... of Reach 3 Razorback Sucker Population	\$0	\$0	\$0	\$0	\$125,000	\$125,000	\$0
C-30	Measures to Reduce Transport of Quagga Mussel	\$0	\$0	\$0	\$0	\$100,000	\$100,000	\$100,000
C-31	Razorback Sucker Genetic Diversity Assessment	\$0	\$0	\$0	\$0	\$125,000	\$125,000	\$125,000
C-32	Salinity, Temperature, and Oxygen Limits for Bonytail and Razorback Sucker	\$0	\$0	\$0	\$0	\$85,000	\$100,000	\$150,000

Work Task	Name	FY2007 Estimate	FY2007 Actual Accomplishment¹	Cumulative through FY2007	FY2008 Approved Estimate	FY2009 Proposed Estimate	FY2010 Projected Estimate²	FY2011 Projected Estimate²
C-33	Survival of 500-mm Razorback Sucker Released in Reach 3	\$0	\$0	\$0	\$0	\$75,000	\$125,000	\$125,000
C-34	Zooplankton Communities in Off-channel Native Fish Habitats	\$0	\$0	\$0	\$0	\$60,000	\$60,000	\$0
Closed	Work Tasks Pre-FY07	\$0	\$0	\$510,795	\$0	\$0	\$0	\$0
		\$1,612,000	\$1,454,122	\$3,856,062	\$1,922,000	\$2,757,000	\$2,362,000	\$1,892,000
D	System Monitoring							
D-1	Marsh Bird Surveys	\$25,000	\$18,767	\$98,684	\$35,000	\$35,000	\$35,000	\$35,000
D-2	Southwestern Willow Flycatcher Surveys	\$925,000	\$915,331	\$2,548,430	\$575,000	\$690,000	\$690,000	\$700,000
D-3	Southwestern Willow Flycatcher Habitat Monitoring	\$90,000	\$72,363	\$306,678	\$90,000	\$90,000	\$90,000	\$95,000
D-4	Southwestern Willow Flycatcher Survey — Hualapai Tribal Lands	\$76,000	\$71,105	\$201,808	\$78,000	\$0	\$0	\$0
D-5	Monitoring Avian Productivity ...	\$300,000	\$238,685	\$777,735	\$300,000	\$300,000	\$300,000	\$300,000
D-6	System Monitoring for Riparian Obligate Avian Species	\$100,000	\$177,773	\$336,734	\$135,000	\$135,000	\$135,000	\$135,000
D-7	Yellow-Billed Cuckoo Surveys	\$500,000	\$450,165	\$904,940	\$500,000	\$540,000	\$550,000	\$550,000

Work Task	Name	FY2007 Estimate	FY2007 Actual Accomplishment¹	Cumulative through FY2007	FY2008 Approved Estimate	FY2009 Proposed Estimate	FY2010 Projected Estimate²	FY2011 Projected Estimate²
D-8	Razorback Sucker and Bonytail Stock Assessment	\$325,000	\$332,621	\$805,245	\$300,000	\$350,000	\$400,000	\$400,000
D-9	... Covered Bat Species	\$100,000	\$89,832	\$244,719	\$100,000	\$130,000	\$130,000	\$130,000
D-10	... Small Mammal Populations	\$65,000	\$27,484	\$46,828	\$0	\$0	\$0	\$0
Closed	Work Tasks Pre-FY07	\$0	\$0	\$725,873	\$0	\$0	\$0	\$0
		\$2,506,000	\$2,394,126	\$6,997,674	\$2,113,000	\$2,270,000	\$2,330,000	\$2,345,000
E	Conservation Area Development and Management							
E-1	Beal Lake Riparian Restoration	\$358,000	\$198,890	\$2,096,535	\$150,000	\$180,000	\$180,000	\$180,000
E-2	Beal Lake Native Fish	\$100,000	\$91,325	\$576,737	\$50,000	\$70,000	\$50,000	\$50,000
E-3	'Ahakhav Tribal Preserve	\$60,000	\$94,431	\$1,229,730	\$145,000	\$145,000	\$145,000	\$145,000
E-4	Palo Verde Ecological Preserve	\$976,000	\$782,488	\$1,439,719	\$1,185,000	\$1,250,000	\$1,800,000	\$1,800,000
E-5	Cibola Valley Conservation Area	\$2,656,000	\$3,397,386 ³	\$4,808,031	\$1,703,000	\$1,000,000	\$1,100,000	\$1,200,000
E-6	Cottonwood Genetics Study	\$15,000	\$16,036	\$259,405	\$15,000	\$0	\$0	\$0
E-7	Mass Transplanting Demonstration	\$15,000	\$5,516	\$324,825	\$15,000	\$0	\$0	\$0
E-8	Seed Feasibility Study	\$160,000	\$71,382	\$563,992	\$65,000	\$210,000	\$0	\$0
E-9	Hart Mine Marsh	\$125,000	\$85,085	\$255,944	\$250,000	\$3,125,000	\$3,100,000	\$300,000

Work Task	Name	FY2007 Estimate	FY2007 Actual Accomplishment¹	Cumulative through FY2007	FY2008 Approved Estimate	FY2009 Proposed Estimate	FY2010 Projected Estimate²	FY2011 Projected Estimate²
E-12	Butler Lake	\$120,000	\$11,633	\$121,350	\$0	\$0	\$0	\$0
E-13	McAllister Lake	\$50,000	\$18,876	\$172,364	\$0	\$0	\$0	\$0
E-14	Imperial Ponds ...	\$2,070,000	\$3,190,255	\$5,409,432	\$974,000	\$483,000	\$465,000	\$255,000
E-15	Backwater Site Selection	\$430,000	\$421,635	\$687,132	\$387,000	\$209,000	\$443,000	\$388,500
E-16	Conservation Area Site Selection	\$50,000	\$102,883	\$396,027	\$200,000	\$200,000	\$200,000	\$200,000
E-17	Topock Marsh ...	\$70,000	\$4,757	\$5,884	\$5,000	\$5,000	\$5,000	\$70,000
E-18	Law Enforcement and Fire Suppression	\$75,000	\$2,376	\$2,376	\$25,000	\$200,000	\$200,000	\$200,000
E-24	Cibola NWR Unit #1	\$120,000 ⁴	\$55,957	\$55,957	\$1,213,000	\$1,072,000	\$1,236,000	\$1,700,000
E-25	Big Bend Conservation Area	\$0	\$0	\$0	\$0	\$80,000	\$580,000	\$580,000
E-26	Headquarters Lake	\$0	\$0	\$0	\$0	\$265,000	\$750,000	\$255,000
Closed	Work Tasks Pre-FY07	\$0	\$0	\$120,088	\$0	\$0	\$0	\$0
		\$7,450,000	\$8,550,911	\$18,525,528	\$6,382,000	\$8,494,000	\$10,254,000	\$7,323,500
F	Post-Development Monitoring							
F-1	Habitat Monitoring	\$275,000	\$286,184	\$661,654	\$325,000	\$350,000	\$390,000	\$425,000
F-2	Avian Use of Habitat Creation Sites	\$150,000	\$143,493	\$249,588	\$150,000	\$150,000	\$150,000	\$150,000
F-3	Small Mammal Colonization of Restoration Sites	\$50,000	\$30,038	\$67,799	\$55,000	\$55,000	\$55,000	\$55,000
F-4	Monitoring of Covered Bat Species	\$60,000	\$69,898	\$69,898	\$70,000	\$90,000	\$90,000	\$90,000
F-5	Monitoring of Fish Restoration Sites	\$65,000	\$41,574	\$41,574	\$130,000	\$150,000	\$180,000	\$200,000

Work Task	Name	FY2007 Estimate	FY2007 Actual Accomplishment ¹	Cumulative through FY2007	FY2008 Approved Estimate	FY2009 Proposed Estimate	FY2010 Projected Estimate ²	FY2011 Projected Estimate ²
F-6	Monitoring of MacNeill's Sootywing ...	\$0	\$0	\$0	\$0	\$10,000	\$25,000	\$50,000
		\$600,000	\$571,187	\$1,090,513	\$730,000	\$805,000	\$890,000	\$970,000
G	Adaptive Management Program							
G-1	Data Management	\$650,000	\$143,492	\$476,451	\$450,000	\$450,000	\$450,000	\$450,000
G-2	Annual Report Writing	\$75,000	\$73,272	\$165,535	\$0	\$0	\$0	\$0
G-3	Adaptive Management Research Projects	\$275,000	\$343,216	\$624,544	\$230,000	\$230,000	\$230,000	\$230,000
G-4	Science/Adaptive Management	\$100,000	\$60,549	\$143,419	\$20,000	\$50,000	\$50,000	\$50,000
		\$1,100,000	\$620,529	\$1,409,949	\$700,000	\$730,000	\$730,000	\$730,000
H	Existing Habitat Maintenance							
H-1	Existing Habitat Maintenance	\$561,000	\$561,000	\$1,102,500 ⁵	\$593,500	\$605,000	\$605,000	\$5,445,000
		\$561,000	\$561,000	\$1,102,500	\$593,500	\$605,000	\$605,000	\$5,445,000
I	Public Outreach							
I-1	Public Outreach	\$35,000	\$35,511	\$44,300	\$35,000	\$40,000	\$50,000	\$70,000
		\$35,000	\$35,511	\$44,300	\$35,000	\$40,000	\$50,000	\$70,000
	Program Total:	\$16,446,196	\$16,701,645	\$39,360,445	\$14,947,500	\$18,772,780	\$19,867,780	\$21,372,280

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

² FY09 and FY10 numbers are not adjusted for projected inflation.

³ Steering Committee approved securing land and water at 4/25/07 meeting.

⁴ Steering Committee approved new work task at 4/25/07 meeting.

⁵ 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 FY07 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 FY07. 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.*

None.

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

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

Table 1-6. LCR MSCP Habitat Objectives

Land Cover Type	Projected Acres¹	Year Established	Projected Year To Be Credited	Actual Habitat Created (Acres)	Year Achieved
Nurseries (Upland Species))					
E4 PVER, Phase 1	11	FY06			
Total	11				
Cottonwood-Willow					
E5 CVCA Nursery, Phase 1	22	FY06			
CVCA, Phase 1	64	FY06	FY09		
CVCA, Phase 2	69	FY08 ²	FY11		
CVCA, Phase 3	105	FY07	FY10		
E4 PVER Nursery, Phase 1	20	FY06			
PVER, Phase 2	80	FY07	FY10		
PVER, Phase 3	90	FY08 ²	FY11		
PVER, Phase 4	110	FY09 ²	FY11		
PVER, Phase 5	140	FY10 ²	FY13		
PVER, Phase 6	219	FY11 ²	FY14		
E14 Imperial Ponds	34	FY10 ²	FY13		
E24 Unit 1, Crane Roost	150	FY09 ²	FY12		
Unit 1, 1/3 Hippy Burn	100	FY10 ²	FY13		
Unit 1, 1/3 Hippy Burn	100	FY11 ²	FY14		
Total	1,303				
Honey Mesquite					
E5 CVCA, Phase 4	60	FY09 ²	FY10		
CVCA, Phase 5	72	FY10 ²	FY11		
CVCA, Phase 6	89	FY11 ²	FY12		
Total	221				
Marsh					
E14 Imperial Ponds, Field 18	12	FY08 ²	FY09		
E9 Hart Mine Marsh	100	FY10 ²	FY12		
Total	112				
Backwater					
Isolated					
E14 Imperial Ponds	80	FY07	FY08		
E26 Headquarters Lake	5	FY10	FY11		
Surface Connected					
E25 Big Bend	15	FY09	FY10		
Total	100				
Total habitat projected to be established through FY11 is 1736 acres					

¹This 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.

²Projected.

Table 1-7. Summary of Fish Augmentation

Razorback Sucker	
Reach 2 (Lake Mohave)	
FY05 Work Task B2	10,373
FY05 Work Task B4	136
FY05 Work Task B7	1,691
FY06 Work Task B2	10,191
FY06 Work Task B7	1,151
FY07 Work Task B2	601
FY07 Work Task B7	683
Total	24,826
Reach 3 (Davis to Parker Dam)	
FY06 Work Task B2	6,268
FY07 Work Task B2	7,080
Total	13,348
Reach 4-5 (Below Parker Dam)	
FY05 Work Task B5	4,814
FY06 Work Task B5	11,455
FY07 Work Task B5	12,750
Total	29,019
Total Razorback Sucker	67,193
Bonytail	
Reach 3 (Davis to Parker Dam)	
FY05 Work Task B3	6,725
FY06 Work Task B3	1,708
FY06 Work Task B4	2,397
FY07 Work Task B3	38
FY07 Work Task B4	5,080
Total	15,948
Reach 4-5 (Below Parker Dam)	
FY06 Work Task B3	4,006
FY07 Work Task B3	4,019
Total	8,025
Total Bonytail	23,973
Total Razorback Sucker and Bonytail	91,166

Table 1-8. Status of Conservation Measures

Species/Habitat/Action	Code	Description	FY2007 Approved	FY2008 Approved	FY2009 Proposed
Yuma Clapper Rail	CLRA1	Create habitat, 512 acres	E1 E4 E5 E9 E10 E11 E12 E13 E14 E15 E19 E20 E21 E23 F1 F2	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
	CLRA-R	Restoration research	E1 E3	E1 E3	E1 E3
	CLRA2	Maintain existing important habitat	D1 H1	C24 D1 H1	C24 D1 H1
	MRM1	Define habitat characteristics	C3 C21 D1 D2 D5 D6 F1 F2	C3 C21 D1 D2 D5 D6 F1 F2	C3 C21 C28 D1 D2 D5 D6 F1 F2
	MRM2	Monitor and adaptively manage created habitat	C3 D1 D2 D5 D6 F1 F2 F4	C3 D1 D2 D5 D6 F1 F2 F4	C3 C28 D1 D2 D5 D6 F1 F2 F4
	MRM5	Monitor selenium levels in backwater			
	CMM1	Reduce risk of loss to wildfire	F18	F18	F18
	CMM2	Replace created habitat affected by wildfire			
Southwestern Willow Flycatcher	WIFL1	Create habitat, 4,050 acres	C5 C6 C20 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E22 E23 G3 F1 F2	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
	WIFL1-R	Restoration research	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19
	WIFL2	Maintain existing important habitat	C5 C6 C20 D3 D4 E21 H1	C5 C6 C20 C24 D3 D4 E21 H1	C5 C20 C24 D3 D4 E21 H1
	MRM1	Define habitat characteristics	C3 C5 C6 D1 D2 D3 D4 D5 D6 F2	C3 C5 C6 D1 D2 D3 D4 D5 D6 F2	C3 C5 C28 D1 D2 D3 D4 D5 D6 F2
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 C21 D1 D2 D3 D4 D5 D6 F1 F2 F4	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
	MRM4	Brown-headed cowbird evaluation	C1 D2	D2	D2
	CMM1	Reduce risk of loss to wildfire	E18	E18	E18
	CMM2	Replace created habitat affected by wildfire			
Desert Tortoise	DETO1	Acquire, protect 230 acres		E16	E16
	DETO2	Avoid impacts on individuals and burrows			
Bonytail	BONY1	Coordinate conservation efforts with USFWS and recovery programs			

Species/Habitat/Action	Code	Description	FY2007 Approved	FY2008 Approved	FY2009 Proposed
	BONY2	360 acres	E2 E10 E11 E12 E13 E14 E15	C25 E2 E12 E13 E14 E15	C25 C30 E2 E12 E13 E14 E15 E25 E26
	BONY2-R	Restoration Research	E14 E20	E14 E20	E14 E20
	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 B9 B10 C9 C11 C16 D8	B2 B3 B4 B7 B8 B10 C9 C11 C16 D8	B2 B3 B4 B7 B8 B10 C11 C30 D8
	BONY4	Develop (if necessary) additional rearing capacity	B2 B3 B4 B7 B8 B10 C9 C11	B2 B3 B4 B7 B8 B10 C9 C11	B2 B3 B4 B7 B8 B10 C11 C30
	BONY5	Monitor and research, adaptive management pops. and backwater habitat	B7 B8 B9 D8 C11 C16 C23 F5 G3	B7 B8 B9 D8 C11 C16 C23 F5 G3	B7 B8 B9 C11 C30 C34 D8 F5 G3
	MRM5	Monitor selenium levels in backwater	E15	E15	E15
Humpback Chub	HUCH1	\$500,000 to existing programs	C14	C14	C14
Razorback Sucker	RASU1	Coordinate conservation efforts with USFWS and recovery programs			
	RASU2	360 acres	E2 E10 E11 E12 E13 E14 E15	C25 E2 E12 E13 E14 E15	C25 C30 C31 C32 E2 E12 E13 E14 E15 E25 E26
	RASU2-R	Restoration research			
	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 C9 C10 D8	B1 B2 B3 B4 B5 B6 B7 B8 B10 B11C10 C30 C31 C32 C33 D8
	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 C9 C10	B2 B4 B3 B5 B6 B7 B8 B10 B11 C10 C30
	RASU5	Support ongoing Lake Mohave conservation efforts	B1 B2 B7 B8 C12 D8	B1 B2 B7 B8 C12 D8	B1 B2 B7 B8 C12 C30 C31 C32 D8

Species/Habitat/Action	Code	Description	FY2007 Approved	FY2008 Approved	FY2009 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 C23 D8 F5 G3	B2 B7 B8 B11 C8 C10 C12 C17 C29 C30 C31 C32 C33 C34 D8 F5 G3
	RASU7	Funding for ongoing USBR/SNWA Lake Mead Studies	B6 B11 C13	B6 B11 C13	B6 B11 C13
	RASU8	Continue conservation efforts identified in ISC/SIA BO	B1 B6 B8 B11 C8	B1 B6 B8 B11 C8	B1 B6 B8 B11 C8 C30
	MRM5	Monitor selenium levels in backwater			
Western Red Bat	WRBA1	Status/habitat surveys	D9	D9	D9
	WRBA2	Create 765 acres	C5 C6 D9 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E23 F1 F4	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
	WRBA2-R	Restoration research	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19
	MRM1	Define habitat characteristics	C3 C5 C6 C18 C19 D1 D2 D10	C3 C5 C6 C18 C19 C24 C27 D1 D2	C3 C5 C18 C19 C24 C27 D1 D2
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 C18 C19 D1 D2 D10 F1 F4	C3 C5 C6 C18 C19 C24 C27 D1 D2 F1 F4 G6	C3 C5 C18 C19 C24 C27 D1 D2 F1 F4 G6
	CMM1	Reduce risk of loss of habitat to wildfire	E18	E18	E18
	CMM2	Replace created habitat affected by wildfire			
Western Yellow Bat	WYBA1	Conduct surveys for species distribution	D9 F4	D9 F4	D9 F4
	WYBA2	Avoid removal of roost trees (palms)	F4	F4	F4
	WYBA3	Create 765 acres	C5 C6 D9 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E23 F1 F4	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
	WYBA3-R	Restoration research	E1 E3 E6 E7 E8	E1 E3 E6 E7 E8	E1 E3 E6 E7 E8
	MRM1	Define habitat characteristics	C3 C5 C6 D1 D5 D10	C3 C5 C6 C24 C27 D1 D5	C3 C5 C24 C27 C28 D1 D5
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 D5 D10 F1 F4	C3 C5 C6 C27 D5 F1 F4	C3 C5 C27 C28 D5 F1 F4
	CMM1	Reduce risk of loss of habitat to wildfire	E18	E18	E18
	CMM2	Replace created habitat affected by wildfire			

Species/Habitat/Action	Code	Description	FY2007 Approved	FY2008 Approved	FY2009 Proposed
Desert Pocket Mouse	DPMO1	Locate occupied habitat, restore disturbed habitat	D10 F3	C27 F3	C27 F3
Colorado River Cotton Rat	CRCR1	Status/habitat surveys — define habitat first 5 years	D10 F3 G3	C27 F3 G3	C27 F3 G3
	CRCR2	Create 125 acres	D10 E1 E3 E4 E5 E6 E7 E8 E16 E19 E21 E22 F1 F3	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
	CRCR2-R	Restoration research	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19
	MRM2	Monitor and adaptively manage created habitat	C3 D11 F1 F3	C3 C24 D11 F1 F3	C3 C24 C28 D11 F1 F3
	CMM1	Reduce risk of loss of habitat to wildfire	E18	E18	E18
	CMM2	Replace created habitat affected by wildfire			
Yuma Hispid Cotton Rat	YHCR1	Status/habitat surveys — define habitat first 5 years	D10 F3 G3	C27 F3 G3	C27 F3 G3
	YHCR2	Create 76 acres	D10 E1 E3 E4 E5 E6 E7 E8 E16 E19 E22 E23 F1 F3	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
	YHCR2-R	Restoration research	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19
	MRM2	Monitor and adaptively manage created habitat	C3 D11 F1 F3 F4	C3 C24 D11 F1 F3 F4	C3 C24 C28 D11 F1 F3 F4
	CMM1	Reduce risk of loss of habitat to wildfire	E18	E18	E18
	CMM2	Replace created habitat affected by wildfire			
Western Least Bittern	LEBI1	Create 512 acres	E1 E3 E4 E5 E7 E8 E9 E10 E11 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 F1 F2	C24 E1 E3 E4 E5 E7 E8 E9 E12 E13 E14 E15 E19 E20 E21 E22 E26 F1 F2
	LEBI1-R	Restoration research	E1 E3	E1 E3	E1 E3
	MRM1	Define habitat characteristics	C3 D1 D5 F1 F2	C3 D1 D5 F1 F2	C3 C28 D1 D5 F1 F2
	MRM2	Monitor and adaptively manage created habitat	C3 D1 D5 F1 F2 F4	C3 D1 D5 F1 F2 F4	C3 C28 D1 D5 F1 F2 F4
	MRM5	Monitor selenium levels			
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18

Species/Habitat/Action	Code	Description	FY2007 Approved	FY2008 Approved	FY2009 Proposed
	CMM2	Replace created habitat affected by wildfire			
California Black Rail	BLRA1	Create 130 acres	E1 E3 E4 E5 E8 E9 E10 E11 E12 E13 E14 E15 E23 F1 F2	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
	BLRA1-R	Restoration research	E1 E3 E7 E8	E1 E3 E7 E8	E1 E3 E7 E8
	BLRA2	Maintain existing occupied habitat	D1 H1	C24 D1 H1	C24 D1 H1
	MRM1	Define habitat characteristics	C3 D1 D5 D6 F1 F2	C3 D1 D5 D6 F1 F2	C3 C28 D1 D5 D6 F1 F2
	MRM2	Monitor and adaptively manage created habitat	C3 D1 D2 D6 F1 F2 F4	C3 D1 D2 D6 F1 F2 F4	C3 C28 D1 D2 D6 F1 F2 F4
	MRM5	Monitor selenium levels			
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18
	CMM2	Replace created habitat affected by wildfire			
Yellow-billed Cuckoo	YBCU1	Create 4,050 acres	C5 C6 C21 C22 E1 E3 E4 E5 E6 E8 E14 E19 E20 E21 E22 E23 F1 F2	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
	YBCU1-R	Restoration research	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19
	YBCU2	Maintain existing habitat	C5 C6 C21 C22 E22 H1	C5 C6 C21 C22 C24 E22 H1	C5 C6 C21 C22 C24 E22 H1
	MRM1	Define habitat characteristics	C3 C5 C6 C22 D1 D5 D6 D7 F1 F2	C3 C5 C6 C22 D1 D5 D6 D7 F1 F2	C3 C5 C6 C22 C28 D1 D5 D6 D7 F1 F2
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 C22 D5 D6 D7 F1 F2 F4	C3 C5 C6 C22 D5 D6 D7 F1 F2 F4	C3 C5 C6 C22 C28 D5 D6 D7 F1 F2 F4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18
	CMM2	Replace created habitat affected by wildfire			
Elf Owl	ELOW1	Create 1,784 acres reaches 3-5	E1 E3 E4 E5 E6 E8 E19 E21 E22 E23 F1 F2	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
	ELOW1-R	Restoration research	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19

Species/Habitat/Action	Code	Description	FY2007 Approved	FY2008 Approved	FY2009 Proposed
	ELOW2	Install elf owl boxes before Gila woodpeckers established			
	MRM1	Define habitat characteristics	C3 D1 D5 D6 F1 F2	C3 D1 D5 D6 F1 F2	C3 C28 D1 D5 D6 F1 F2
	MRM2	Monitor and adaptively manage created habitat	C3 D5 D6 F1 F2 F4	C3 D5 D6 F1 F2 F4	C3 C28 D5 D6 F1 F2 F4
	MRM3	Research nest competition European starlings			
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18
	CMM2	Replace created habitat affected by wildfire			
Gilded Flicker	GIFL1	Create 4,050 acres reaches 3-7	C5 C6 E1 E3 E4 E5 E6 E8 E19 E21 E22 E23 F1 F2	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
	GIFL1-R	Restoration research	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19
	GIFL2	Install artificial snags until vegetation has matured			
	MRM1	Define habitat characteristics	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C28 D1 D5 D6 F1 F2
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 D5 D6 F1 F2 F4	C3 C5 C6 D5 D6 F1 F2 F4	C3 C5 C28 D5 D6 F1 F2 F4
	MRM3	Research nest competition European starlings			
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18
	CMM2	Replace created habitat affected by wildfire			
Gila Woodpecker	GIWO1	Create 1,702 acres reaches 3-6	C5 C6 E3 E1 E4 E5 E6 E8 E19 E20 E21 E22 E23 F1 F2	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
	GIWO1-R	Restoration research	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19
	GIWO2	Install artificial snags			

Species/Habitat/Action	Code	Description	FY2007 Approved	FY2008 Approved	FY2009 Proposed
	MRM1	Define habitat characteristics	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C28 D1 D5 D6 F1 F2
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 D5 D6 F1 F2 F4 G6	C3 C5 C6 D5 D6 F1 F2 F4	C3 C5 C6 C28 D5 D6 F1 F2 F4
	MRM3	Research nest competition European starlings			
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18
	CMM2	Replace created habitat affected by wildfire			
Vermilion Flycatcher	VEFL1	Create 5,208 acres	C5 C6 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E22 E23 F1 F2	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
	VEFL1-R	Restoration research	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19
	MRM1	Define habitat characteristics	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C28 D1 D5 D6 F1 F2
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 D5 D6 F1 F2 F4	C3 C5 C6 D5 D6 F1 F2 F4	C3 C5 C28 D5 D6 F1 F2 F4
	MRM4	Brown-headed cowbird evaluation	C1	C1	C1
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18
	CMM2	Replace created habitat affected by wildfire			
Arizona Bell's Vireo	BEVI1	Create 2,983 acres	C5 C6 E1 E4 E5 E6 E8 E21 E22 E23 F1 F2	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
	BEVI1-R	Restoration research	E1 E3 E6 E7 E8 E19 E20	E1 E3 E6 E7 E8 E19 E20	E1 E3 E6 E7 E8 E19 E20
	MRM1	Define habitat characteristics	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C28 D1 D5 D6 F1 F2
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 D5 D6 F1 F2 F4	C3 C5 C6 D5 D6 F1 F2 F4	C3 C5 C28 D5 D6 F1 F2 F4
	MRM4	Brown-headed cowbird evaluation	C1		

Species/Habitat/Action	Code	Description	FY2007 Approved	FY2008 Approved	FY2009 Proposed
Sonoran Yellow Warbler	YWAR1	Create 4,050 acres	C5 C6 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E22 E23 F1 F2	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
	YWAR1-R	Restoration research	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19	E1 E3 E6 E7 E8 E19
	MRM1	Define habitat characteristics	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C28 D1 D5 D6 F1 F2
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 D5 D6 F1 F2 F4	C3 C5 C6 D5 D6 F1 F2 F4	C3 C5 C28 D5 D6 F1 F2 F4
	MRM4	Brown-headed cowbird evaluation	C1	C1	C1
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18
	CMM2	Replace created habitat affected by wildfire			
Summer Tanager	SUTA1	Create 602 acres	C5 C6 E3 E4 E5 E6 E7 E8 E19 E20 E21 E22 F1 F2	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
	SUTA1-R	Restoration research	E1 E3 E6 E7 E8	E1 E3 E6 E7 E8	E1 E3 E6 E7 E8
	MRM1	Define habitat characteristics	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C6 D1 D5 D6 F1 F2	C3 C5 C28 D1 D5 D6 F1 F2
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 D5 D6 F1 F2	C3 C5 C6 D5 D6 F1 F2	C3 C5 C6 C28 D5 F1 F2
	MRM4	Brown-headed cowbird evaluation	C1	C1	C1
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18
	CMM2	Replace created habitat affected by wildfire			
Flat-tailed Horned Lizard	FTHL1	Acquire and protect 230 acres		E16	E16
	FTHL2	Implement conservation measures to avoid take			
Relict Leopard Frog	RLFR1	10,000/year for 10 years to conservation program	C4	C4	C4
Flannelmouth Sucker	FLSU1	85 acres Reach 3	E15 G3	E15 G3	E15 E25 G3
	FLSU1-R	Restoration research			
	FLSU2	80,000/year for 5 years	C15	C15	C15

Species/Habitat/Action	Code	Description	FY2007 Approved	FY2008 Approved	FY2009 Proposed
	FLSU3	Develop management needs/strategies	C15	C15	C15
	MRM2	Monitor and adaptively manage created habitat	C15 F4	C15 F4	C15 C28 F4
	MRM5	Monitor selenium levels in backwater			
MacNeill's Sootywing Skipper	MNSW1	Status surveys/habitat — define habitat first 5 years	C7	C7	C7
	MNSW2	222 acres	C7 E1 E3 E4 E5 E19 E21 E22 F1	C7 E1 E3 E4 E5 E19 E21 E22 F1	C7 E1 E3 E4 E5 E19 E21 E22 F1 F6
	MNSW2-R	Restoration research	E1 E3 E7 E8	E1 E3 E7 E8	E1 E3 E7 E8
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 F1 F2 F4	C3 C5 C6 F1 F2 F4	C3 C5 C28 F1 F2 F4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18 G3	E18 G3	E18 G3
	CMM2	Replace created habitat affected by wildfire			
Sticky Buckwheat	STBU1	10,000 year until 2030 to MSCP HCP	C2	C2	C2
Threecorner Milkvetch	THMI1	10,000 year until 2030 to MSCP HCP	C2	C2	C2
California Leaf-nosed Bat	CLNB1	Distribution surveys	D9 F4	D9 F4	D9 F4
	CLNB2	Create habitat near roost sites (priority when creating cottonwood-willow, mesquite habitat for other species)	C5 C6 E21	C5 C6 E21	C5 E21
	MRM1	Define habitat characteristics	C3 C5 C6 D1 D10 F1	C3 C5 C6 C27 D1 F1	C3 C5 C28 C27 D1 F1
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 D10 F1 F4	C3 C5 C6 C27 F1 F4	C3 C5 C27 C28 F1 F4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18
	CMM2	Replace created habit affected by wildfire			
Pale Townsend's Big-eared Bat	PTBB1	Distribution surveys	D9 F4	D9 F4	D9 F4
	PTBB2	Create habitat near roost sites	C5 C6 E21	C5 C6 E21	C5 E21
	MRM1	Determine habitat characteristics	C3 C5 C6 D10 F1	C3 C5 C6 C24 C27 F1	C3 C5 C24 C27 C28 F1
	MRM2	Monitor and adaptively manage created habitat	C3 C5 C6 D10 F1 F4	C3 C5 C6 C24 C27 F1 F4	C3 C5 C24 C27 C28 F1 F4
	CMM1	Reduce risk of loss of habitat affected by wildfire	E18	E18	E18

Species/Habitat/Action	Code	Description	FY2007 Approved	FY2008 Approved	FY2009 Proposed
	CMM2	Replace created habitat affected by wildfire			
Colorado River Toad	CRT01	Distribution surveys, habitat affinity, limiting factors	C3	C3	C3
	CRT02	Protect existing occupied habitat	H1	H1	H1
	CRT03	Research to establish in unoccupied habitat			
Lowland Leopard Frog	LLFR1	Distribution surveys, habitat affinity, limiting factors	C3 G3	C3 G3	C3 G3
	LLFR2	Protect existing occupied habitat	H1	H1	H1
	LLFR3	Research to establish in unoccupied habitat	C3 G3	C3 G3	C3 G3
OTHER					
Topock Marsh Pumping	AMM2	Avoid flow-related impacts on covered species	C21 C22 D2 E17	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	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 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
	Subtotal	4,814	
	2006	21-Jan	790
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
Subtotal		11,455	
2007	19-Jan	1,926	River Island Park
	25-Jan	1,143	A-10 Upper
	25-Jan	674	A-10 Lower
	Subtotal	3,743	
	TOTAL	20,012	

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

Status: In FY05, Reclamation modified an existing contract to include the monitoring of 372 acres of occupied southwestern willow flycatcher habitat. This acreage is split into 11 different sites between Palo Verde Diversion Dam and Imperial Dam. Annual monitoring of soil moisture conditions at these sites is being performed to determine whether a change in soil moisture conditions has occurred due to water transfer actions. No change in soil moisture conditions attributable to water transfer actions was observed through 2007; therefore, no management actions have been required.

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 1-3 at the Cibola Valley Conservation Area (CVCA) and Palo Verde Ecological Reserve (PVER) have been identified to fulfill the habitat creation requirements of Conservation Measure 4, Tier 1. In FY07,

Reclamation implemented Phase 3 of the CVCA by planting 105 acres of cottonwood-willow land cover. At PVER, 80 acres of cottonwood-willow land cover was established. By the end of FY07, approximately 291 acres have been planted and are intended to be managed as southwestern willow flycatcher habitat.

Completion of this conservation measure is anticipated in FY08 when additional acres are planted at both CVCA and PVER. Table 1-10 shows how habitat will be credited for the 2001 BO at each site.

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

Project	Phase 1	Phase 2	Phase 3	Total Acres
CVCA	86	0	96	182
PVER	20	80	90*	190
Grand Total	106	176	90	372

*projected

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 under review.

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 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 FY07 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 and 4/5.

Key activities accomplished in FY07 include stocking 12,750 RASU in reaches 4 and 5 (B5). More than 91,166 RASU and BONY in total were repatriated to the LCR.

Through FY07, a total of 100 acres of cottonwood-willow land cover has been established at the Palo Verde Ecological Reserve (PVER).

OVERVIEW OF WORK TASKS

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.

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. 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 are being requested in FY09 and FY10 for work tasks B2, B3, B4, B5, B6, and B11 to 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)

To fully comply with the HCP, research will be conducted on covered species and their habitats to guide selection and application of conservation techniques, to document successful implementation of conservation measures, and to develop alternatives to conservation actions that prove ineffective. This strategy will allow researchers to quantify existing knowledge, identify data gaps, and design and implement species research to fill these data gaps. Species research for fishes is currently focusing on the following areas:

1. *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. One focus area for species research is the rearing of RASU and BONY. 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. A new study for 2008 will evaluate raceway rearing of RASU at Lake Mead SFH (C26) and assess growth rates, food conversion, and condition factor for fish reared in flowing water. A study to evaluate the effectiveness of quagga mussel protocols for transporting these fishes is proposed for FY09 (C30).
2. *Post-Stocking Survival:* Reclamation has reared and stocked more than 70,000 RASU into the Colorado River downstream of Parker Dam, and the LCR MSCP is expected to stock another 200,000 or more RASU. Reclamation began a study to assess post-stocking survival of RASU in 2003. This study, Razorback Sucker Survival Studies (C8), was integrated into the LCR MSCP. The work continues and is expected to be completed in FY08. Species research to evaluate past BONY stockings (C16) began in 2007. Aging razorback suckers is being added to investigations during 2008 and 2009 (C29) to better assess the impacts of past stockings in Reach 3 where PIT tags were not used and instead, fish were wire-tagged and released in large groups. Other studies proposed for FY09 in regards to post stocking survival 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.
3. *Brood Stock Development and Maintenance:* The LCR MSCP continues the development and maintenance of the RASU brood stock in Lake Mohave. The target population size for this group is 50,000 adult fish. 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 5,000 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 (TL). This targeted fish size will be in place through 2008.
4. *Lake Mead Investigations:* The LCR MSCP is continuing the Lake Mead Razorback Sucker Study (C13), which is a conservation measure from an earlier ESA consultation, the 2001 BO. This is the eleventh year of the Lake Mead Razorback Sucker Study; a 10-year summary is in preparation and will be distributed in 2008. This will allow resource managers to evaluate results to date and determine the scope and direction of further work. While this decision is being made, monitoring of the Lake Mead RASU population will continue.

5. *Managing Native Fishes in Restored Backwaters:* Creation of backwater habitats for covered fish species is another major goal of the LCR MSCP. Work accomplished under Covered Species Profile Development (C3), Development of Backwater Rating Criteria, synthesized existing data for covered species that are found in backwater habitats. These data are being used to develop backwater rating criteria under Backwater Site Selection (E15). In 2007, pond construction activities for Imperial Ponds were completed, and research into operation and maintenance of native fish populations in the ponds began (C25). Two studies are proposed for FY09 to help better understand the ecology of restored backwaters relative to their value as fish habitat. (Both studies started in FY08 under the Adaptive Management (G3.) 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.
6. *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.
7. *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 third year and is expected to continue through 2010.
8. *Remote Sensing for Fish:* Research is underway to look at ways to census and monitor stocked fish without having to actually capture them. Evaluation of Remote Sensing Techniques for PIT-Tagged Fish (C23) is evaluating the use of stationary PIT-tag detection equipment. Under Adaptive Management Research Projects (G3), ocular surveys, photography, and video-monitoring techniques were investigated and a final report will be available in spring 2008.

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. System monitoring allows program staff to develop and maintain a knowledge base of data for existing populations and their habitats, and to have these data available for long-term assessment of species under the AMP.

Only three of the four covered native fish species (RASU, BONY, and FLSU) are being monitored by the LCR MSCP at this time. The fourth species, HUCH, is essentially extirpated from the main-stem Colorado River below the Grand Canyon. It is possible that a stray HUCH

could occasionally be found in upper Lake Mead, but this would be a remarkable find (no such find has occurred in the last three decades).

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

Conservation Area Development (Section E)

Habitat creation for native fish is limited to backwater development. The LCR MSCP is required to establish 360 acres of backwater habitat for BONY and RASU in reaches 3-6. Up to 85 acres will be created in Reach 3 for FLSU. Implementation strategies range from making minor modifications in existing backwaters to major modifications such as the complete excavation of undeveloped land. Future backwater development for native fishes will be guided by the outcome of Backwater Site Selection (E15). 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.

Implementation of the LCR MSCP began in FY06. It is not yet necessary to formally change any part of the program through the AMP. 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. Data Management (G1) will fund the database management for the AMP. For native fishes, all stocking and tagging data developed by the LCR MSCP are provided to and maintained by Arizona State University (ASU) in an electronic database.

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. The *Final Science Strategy* was completed in FY07, which provides programmatic guidance for ensuring that the implementation of conservation measures will be based on scientific information, methods, principles, and standards. The *Final Science Strategy* can be found on the LCR MSCP Web site. A 5-year planning and evaluation period has been identified in the science strategy to provide short-term priorities. The *Draft Five Year Monitoring and Research Priorities for the Lower Colorado River Multi-Species Conservation Program: 2008-2012* was completed in FY07.

Initial monitoring and research efforts emphasized 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 will then be designed to acquire the additional data needed for successful implementation of the conservation measures.

Creation of riparian, marsh, and backwater habitats for targeted covered species is a major goal of the LCR MSCP. Information gathered through the synthesis of past and ongoing research and monitoring programs, and new data accumulated through targeted research projects identified during the above process, will be used to guide the project design of proposed habitat creation. In addition, research will be conducted to evaluate habitat restoration and maintenance techniques to ensure that efficient and effective techniques are used through the adaptive management process. Each habitat creation project will have a restoration development and monitoring plan detailing targeted covered species habitat requirements and methods used to monitor successful implementation of the project. Post-development monitoring will occur to evaluate whether each

habitat creation project is implemented as designed, whether habitat requirements are provided 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 through the adaptive management process.

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. Existing system monitoring programs were evaluated and continued under the LCR MSCP, where applicable. System monitoring programs may utilize single species or multi-species protocols, depending on data priority, existing activities, effectiveness, and efficiency.

The monitoring and research program of the LCR MSCP provides information to manage existing habitats, create new habitats, enhance covered species populations, and avoid or minimize disturbance to covered species and their habitats. Information gathered during species research, system monitoring, restoration research, and post-development activities may be utilized for a variety of purposes. Some monitoring projects are designed to answer research questions, provide information for system monitoring, and provide post-development monitoring data. Research projects are designed to provide data for monitoring protocols and habitat creation plans. Information gathered by non-LCR MSCP programs may be incorporated when applicable.

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 identifying known life history and habitat requirements for covered species (Multi-Species Conservation Program Covered Species Profile Development (C3)), and addressing information gaps in establishing and managing created habitats for these species. Information gained will be used to design and evaluate protocols for system-wide surveys in Section D, and to help design and manage habitat created in Section E. Species research activities fill specific needs described in conservation measures within the HCP or continue ongoing studies. New research projects have been identified since the completion of covered species accounts in FY06 (C3). These species accounts will be updated annually, when applicable.

In FY07, 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. Three species research work tasks were designed to define insect relationships to riparian plant communities. Effects of Abiotic Factors on Insect Populations in Riparian Restoration Sites (C5), and Insect Population Biology in Riparian Restoration Sites (C6) were initiated in FY06 and continued in FY07. Information gathered will help direct future habitat creation planning efforts for targeted covered species that utilize insects as a major portion of their prey base. Survey and Habitat Characterization for MacNeill's Sootywing (C7) defines surveys and habitat characterization for the MacNeill's sootywing skipper. Conservation measures call for surveying potential skipper habitat, locating skipper populations, and describing habitat requirements to guide future

restoration efforts. It is anticipated that these efforts will be completed during FY10. Information gathered from these research projects will be used to help design and manage the 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.

For FY08, two new species research work tasks have been written to acquire additional information identified in the species accounts (C3). Information obtained in Avian Species Habitat Requirements (C24) will be used to create habitat suitability index models for covered avian species. These models will identify potential limiting factors or important habitat requirements that will be used to design, create, and manage marsh habitat creation projects. This work task will be expanded in FY09 to acquire data to design marsh habitat mosaics for covered species and to determine the relationship between covered species habitat requirements and hydrology. In FY09, a new work task has been identified to study nest predation on avian covered species that utilize riparian habitat to determine whether management actions can be designed to minimize this threat, which has been identified as the leading cause of nest failure for southwestern willow flycatchers along the LCR.

Research will be conducted on covered mammal species in FY08 to determine distribution, population status, genetic differentiation, and habitat use (C27). These studies will be utilized to determine study plans and protocols for future system-wide monitoring that will be implemented in FY09. Data from these studies, and from Small Mammal Colonization of Restoration Sites (F3), will help determine habitat characteristics needed for the design and management of created habitats in Section E.

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 2005-08. In FY07, in addition to continuing existing monitoring programs (D1 through D5), several new system monitoring projects were initiated throughout the LCR MSCP area for species or guilds of species not previously monitored (System Monitoring for Riparian Obligate Avian Species (D6), Yellow-Billed Cuckoo Presence/Absence Surveys (D7), and System Monitoring and Research of Covered Bat Species (D9)). System monitoring may utilize single species or multi-species protocols, depending on species priority, effectiveness, and efficiency.

In accordance with previous BOs and in anticipation of the implementation of the LCR MSCP, Reclamation began system-wide monitoring for several species and guilds of species including the SWFL, CLRA, and neotropical migratory birds. These studies have been integrated into the LCR MSCP, where applicable.

System monitoring for CLRA has been conducted since the 1980s. In anticipation of LCR MSCP initiation, a multi-species marsh bird protocol was designed by the University of Arizona (U of A). Marsh bird surveys will continue to be conducted annually by an inter-agency group using the multi-species survey protocol approved by USFWS in 2006. Reclamation will continue to be an active participant in the LCR marsh bird survey effort under Work Task D1, to maintain existing CLRA (CLRA2) and BLRA (BLRA2) habitat areas in accordance with the HCP.

Three system monitoring work tasks (Southwestern Willow Flycatcher Presence/Absence Surveys (D2), Southwestern Willow Flycatcher Habitat Monitoring (D3), and Southwestern Willow Flycatcher Presence/Absence Survey Hualapai Tribe (D4)) 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 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. Cost estimates for FY08 anticipated changes to the protocol and deliverables; however, actual costs were slightly higher than estimated. Budget estimates for FY09 have been adjusted to incorporate actual contract costs. Additional surveys are being conducted by the Hualapai Tribe within the Grand Canyon (D4) in FY08; however, changes to existing habitat and recent survey results indicate that Hualapai surveys can be suspended in FY09 until conditions change in the Grand Canyon. 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).

System monitoring for YBCU was initiated in FY06 using data acquired from species research work tasks completed in FY05 (C21, C22). Presence/absence surveys continued in FY07 (D7). Surveys for YBCU utilize a species-specific protocol to provide data on this late successional riparian obligate species. In FY07, YBCU survey protocol and life history studies were evaluated and changes to the protocol or deliverables were incorporated into future work tasks. Data from these studies will be used to help design and manage created habitats in Section E. Cost estimates for FY08 anticipated changes to the protocol and deliverables; however, actual costs may differ once the new contract is finalized. Cost estimates for FY09 have changed to reflect actual contract costs.

System monitoring for SWFL and YBCU utilize single-species monitoring protocols. 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) will use a multi-species protocol and sample plan developed by the United States Geological Survey (USGS) in FY07. System monitoring will be fully implemented during the FY08 breeding season. Surveys

will be conducted annually for the first 5 years. Survey interval will be evaluated during the 5-year program review outlined in the *Final Science Strategy*.

Additional avian monitoring is being conducted through the establishment of Monitoring Avian Productivity and Survivorship (MAPS) stations along the LCR (D5). The MAPS program provides data for long-term trend analysis on a regional level and detailed information on a site-specific level, including demographic data not obtained through less intensive survey methods. In FY07, two MAPS stations were operated at Cibola and Havasu National Wildlife Refuges (NWR). Each station must be operated for at least 5 years to obtain site-specific data. It is anticipated that each MAPS site will be implemented through FY09. The MAPS program will be evaluated for effectiveness in achieving system and post-development monitoring goals and objectives.

In FY07, 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.

Post-Development Monitoring (Section F)

Because the LCR MSCP is a habitat-based program, extensive monitoring of created habitats is necessary to evaluate implementation and effectiveness of designed habitat creation projects. To accomplish this task, pre-development monitoring of proposed projects will be conducted to document baseline conditions prior to project implementation. After habitat creation has been initiated, post-development monitoring for biotic and abiotic habitat characteristics will be conducted to document successful implementation and to record successional change within the restored areas.

In FY07, post-development monitoring for habitat characteristics and avian use was conducted at several riparian restoration demonstration sites, which were established under Reasonable and Prudent Alternative 14 of the 1997 BO, and at habitat creation sites listed in Section E. Protocols developed during these monitoring activities will be used for monitoring prior to and after completion of LCR MSCP habitat creation projects.

Beal Lake Riparian Restoration (E1) and Cibola Nature Trail Restoration Demonstration sites were established as riparian restoration research projects under the 1997 BO. Habitat and avian use was monitored under Habitat Monitoring (F1) and Avian Use of Restoration Sites (F2) at each site during FY07 to acquire data necessary for riparian habitat creation.

Restoration Development and Monitoring plans were written for Beal Lake Riparian Restoration (E1), 'Ahakhav Tribal Preserve (E3), Palo Verde Ecological Reserve (E4), Cibola Valley Conservation Area (E5), Imperial Ponds (E14), and Cibola NWR Unit #1 (E24). These plans describe habitat creation activities, monitoring activities, and targeted habitat goals. Future habitat creation projects will require restoration and monitoring plans prior to initiation.

In FY07, monitoring was conducted to evaluate plant survivorship, growth, and successional change within created habitats (F1). Pre- and post-development monitoring were conducted at habitat creation sites that targeted avian and bat covered species (F2, F4). Presence/absence surveys were conducted for small mammals at these sites in FY07 (F3). Information obtained during these surveys will be used to develop monitoring protocols for future pre- and post-development monitoring, and for potential system monitoring or studies on distribution of covered small mammal species. Data from these studies, along with system monitoring of small mammal species (D10/C27), will be used to help prepare designs and manage created habitats in Section E.

In FY08, pre-development data will be 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 will occur for sites or phases where implementation has already occurred, such as 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.

Each proposed habitat creation project will be designed to provide known 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). 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.

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 *Draft Five Year Monitoring and Research Priorities for the Lower Colorado River Multi-Species Conservation Program: 2008-2012* was completed in FY07. 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 is expected to begin in FY08.

Some research and monitoring priorities may be established during the first years of program implementation. Funding has been allocated under Adaptive Management Research Projects (G3) to begin priority research identified at the start of LCR MSCP implementation, when applicable.

Conservation Area Development and Management

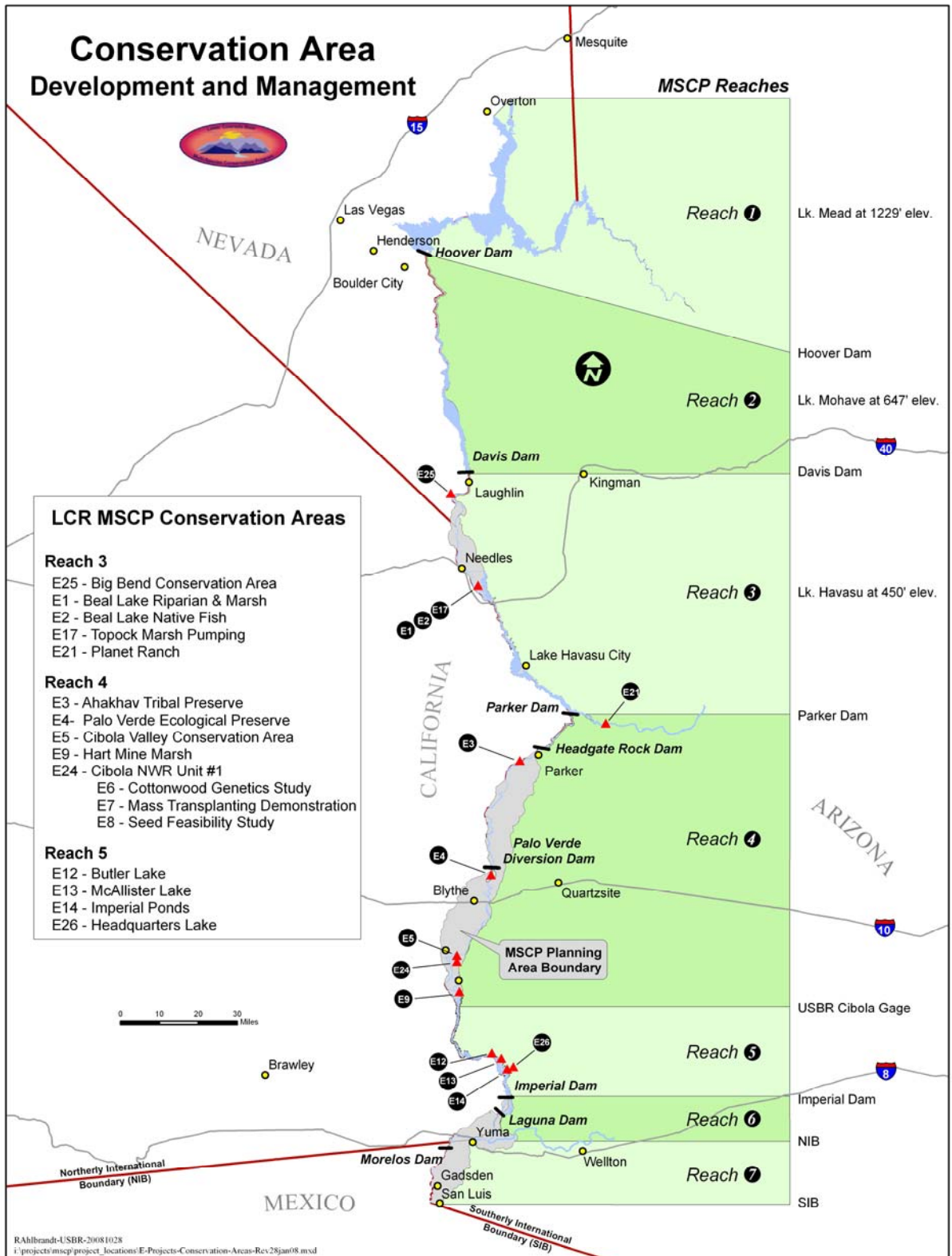
A major component of the LCR MSCP is the creation and management of habitat. Section E addresses the identification, selection, development, and management of created habitat and any restoration research being conducted. In general, habitat creation projects target land cover types with the intent that 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 be restored in proximity to each other 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 *Draft Final Science Strategy*. The requirements are expected to include methods to cost-effectively establish and manage planned land cover types while excluding growth of



nonnative plant species. Terrestrial restoration research projects underway include Beal Lake Riparian Restoration (E1), 'Ahakhav Tribal Preserve (E3), Cottonwood Genetics Study (E6), Mass Transplanting Demonstration (E7), and Seed Feasibility Study (E8).

Strategies for conservation areas that are being developed primarily as backwaters for native fish are likely to range from making modifications to existing backwaters with good water quality, to making improvements to backwaters with poor water quality, to the excavation and creation of backwaters on undeveloped land. Restoration research requirements for backwater development are being developed as part of the *Draft 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.

Two additional significant requirements are incorporated into the LCR MSCP in Section E. First, the LCR MSCP assumed management of 300 acres of backwater created and dedicated to native fish under the 1997 BO. These backwater acres are included in E2, E13, and E14. Second, a commitment from the 2001 BO to create 372 acres of cottonwood-willow for SWFL and create 44 acres of backwater for native fish was incorporated into the LCR MSCP. Habitat created to satisfy the SIA commitment also applies to the LCR MSCP habitat creation requirements and does not represent additional acreage to the totals listed above.

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 AMP to properly address and apply newly acquired information, allowing for more accurate assessment of development costs and success potential for future habitat creation projects.

FY07 Accomplishments:

Conservation Areas: The *Draft Guidelines for Conservation Area Site Selection* were prepared, reviewed, and approved by a Technical Work Group of the LCR MSCP Steering Committee. To validate the guidelines, four site visits were undertaken and four trip reports were drafted. As a result and with the concurrence of the Steering Committee, Cibola NWR Unit #1 was added to the program and allows for the creation of up to 900 acres of cottonwood-willow.

Backwater Site Selection: Under the backwater site selection work task, the *Final Model Evaluation Report* was completed and posted to the LCR MSCP Web site. The report evaluated the backwater rating criteria and recommended modifications. In addition, step 1 of the selection process was completed for backwaters within reaches 5 and 6. Subsequent steps to select backwaters in reaches 5 and 6 are projected for upcoming years. The initial inventory data review (Step 1) of Reach 3 and Reach 4 backwaters was also initiated.

FY08 Activities:

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 geared toward the additional habitat creation cover types.

Two appraisals have been initiated and are anticipated to be completed prior to the end of the fiscal year. The first is estimating the cost for securing land and water for E21: Planet Ranch. The second appraisal is for E25: Big Bend Conservation Area. Once these values have been determined, the cost-benefit of the acquisition will be presented to the Steering Committee.

Backwater Site Selection: Trip reports (Step 3) for reaches 5 and 6 were discussed with the Technical Work Group in February of 2008. Four to five sites in reaches 5 and 6 will be selected to undergo quarterly sampling (Step 4). At the completion of this sampling, habitat assessments will be prepared, which will include conceptual designs for habitat development and preliminary cost estimates. Completion of these reports is anticipated during FY09, after which time sites will be selected and prioritized for implementation, based on program needs and budgetary constraints.

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, E6, and E8 address specific research questions. In contrast, demonstration projects like E1, E3, and E7 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.

FY07 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.

The Cottonwood Genetics Study (E6) was replanted in spring of FY07. The design and composition of the garden planted was identical to the original garden as detailed in the study plan. Reclamation assisted with field preparation and personnel for planting; however, the majority of the replanting and labor costs (recollection, propagation, transportation, and planting) were assumed by NAU. Over the first growing season, establishment was initially high; however, tremendous competition from weeds (particularly sunflowers and Johnsongrass) and inconsistent delivery of water to all parts of the fields resulted in relatively high location-specific mortality. Total survival was about 50%; however, NAU may replant a number of the critical blocks for this experiment in future years. The original work task (E6) has been closed and the cost of irrigation and general maintenance have been assumed under E24.

Mass Transplanting Demonstration (E7): The cottonwood and willow trees for the mass transplanting demonstration are now 2 and 3 years old. Volunteer *Baccharis* and grasses have begun to move into the area forming an understory of vegetation. Significant growth has occurred among all the trees, which now can provide another site for plant material collection for other restoration sites and as cottonwood-willow land cover type for E24. The work task (E7) has been closed and the cost of irrigation and general maintenance have been assumed under E24.

Seed Feasibility Study—Laboratory and Greenhouse Results: Viability of seed from cottonwood and both species of willow that had been frozen since May 2006 remained greater than 80% during 2007, and monthly testing will continue until 2-year viability results are final. Although cleaning seed did not affect seed viability, germination on soils continues to be higher for frozen, cleaned seed than for frozen uncleaned seed.

Small-Scale Field Studies at CNWR: Variables tested in the field in 2007 included presence or absence of early sprinkler irrigation, seed cleaning (yes or no), seeding method (broadcast, hydroseeded), surface irrigation method (furrow or border strip), plot placement, and seeding rate. Target species indicators measured included crown cover, canopy cover, stems/m², average height, maximum height, biomass/m², and biomass/stem.

FY08 Activities:

Irrigation and monitoring of lands created at both the Beal Lake Riparian Restoration and the ‘Ahakhav Tribal Preserve are continuing.

Seed Feasibility Study: Based on results from the 2007 annual report, a contract modification will be required 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 is being discussed.

FY09 Proposed Activities:

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 will be dependant upon 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.

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 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.

FY07 Accomplishments:

In 2007, 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 conservation areas are being developed. 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.

Additional lands within PVER and CVCA that target cottonwood, willow, and honey mesquite land cover types were established. At PVER, 80 acres of cottonwood-willow was planted as Phase 2. This acreage as well as the 31-acre native plant nursery established as Phase 1 was irrigated through the FY07 growing season. At CVCA, an additional 105 acres of cottonwood-willow and honey mesquite land cover type was planted. This phase combined with the Phase 1 plantings, which included a 22-acre native plant nursery and 64 acres of cottonwood-willow land cover type, brings the total acreage established to approximately 191 acres. 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.

NEPA compliance activities, cultural surveys, topographic surveys, and pre-development surveys for marsh birds and riparian obligate birds were conducted at Hart Mine Marsh.

Excavation and construction of all six ponds, the service roads, and the water supply and drainage systems were completed at the Imperial Ponds Conservation Area. When complete (FY08), the 80 acres of open water will be available and managed for native fish.

FY08 Activities:

Phase 3 at PVER, scheduled for planting in the spring of FY08, is anticipated to establish an additional 90 acres of cottonwood-willow land cover type. Phase 2 at CVCA is anticipated to establish an additional 69 acres of cottonwood-willow.

Posting of the restoration development and monitoring plan for Cibola NWR Unit #1 is anticipated. Phase 1, which targets cottonwood-willow land cover type, is scheduled for planting in FY09.

At Hart Mine Marsh, we anticipate completion of the designs and quantity estimates for the marsh as well as development of a budget for construction, which is anticipated to begin in FY09.

At the Imperial Ponds Conservation Area, completion of the native fish component and stocking of native fish are anticipated for FY08. In addition, contouring and planting of field 19, which targets marsh land cover type, is scheduled.

FY09 Proposed Activities:

Continued cottonwood-willow and honey mesquite land cover types are planned. At PVER, Phase 4 is anticipated to create an additional 110 acres of cottonwood-willow. At CVCA, an additional 60 acres of honey mesquite is scheduled for planting. At Cibola NWR Unit #1, approximately 150 acres of cottonwood-willow land cover is anticipated to be established at the Crane Roost area.

Excavation, contouring, and installation of water control structures in the southern portion of the marsh is scheduled to begin at Hart Mine Marsh. Final construction of the northern half of the marsh is not anticipated until FY10.

At the Imperial Ponds Conservation Area, assuming soil salinity values are acceptable, an additional 34 acres of cottonwood-willow is anticipated to be planted.

With the concurrence of the Steering Committee, it is anticipated that Big Bend Conservation Area will be included in the program. The conservation area would ultimately contribute 15 acres of backwater within Reach 3.

**WORK TASKS
SECTION A**

PROGRAM ADMINISTRATION

Work Task A1: Program Administration

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$1,142,196	\$1,052,868	\$2,620,111	\$1,187,000	\$1,231,780	\$1,231,780	\$1,231,780

Contact: LCR MSCP Program Manager, (702) 293-8577

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: Provides senior staff and administration support to manage implementation of the LCR MSCP. The Program Manager will direct functions and activities associated with implementation of the HCP to ensure the completion of activities in accordance with the program documents.

Previous Activities: Established a new stand-alone LCR MSCP Office in the Lower Colorado Region of the Bureau of Reclamation. Established a new Steering Committee and recognized all participating entities in accordance with the Funding and Management Agreement (FMA). Finalized and received approval of the By-Laws for the Steering Committee. Developed a report format for the LCR MSCP Annual Work Plan. Developed a financial tracking system that allows users to track costs and audit expenditures. Developed draft final guidelines for the screening and evaluation of potential conservation areas, a draft science strategy, and a database management system requirements analysis. 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.

FY07 Accomplishments: Work in FY07 continued the development of processes for program implementation. One of the recommendations in the draft science strategy was for the development of 5-year science goals. These were drafted and presented to a Steering Committee work group for review. In addition, a program decision document for in-kind credit for goods and services was developed and approved by the Steering Committee. Reclamation continued to develop land use agreements to secure land and water resources for the program. Completed

agreements include Cibola NWR Unit #1 and the Imperial Ponds Conservation Area. In addition, 1,300 acres of land and 1,381 acre feet of water were acquired for the Cibola Valley Conservation Area (CVCA). An internal review of FY06 financial records was done to fine tune financial tracking, along with the establishment of a financial work group to review information once a year.

FY08 Activities: Program Administration for FY08 will continue the management of the LCR MSCP Program. This will include pursuing land and water resources opportunities including the acquisition of 1,500 acre feet of additional Hopi Reclamation water for the CVCA. A Request For Projects is being issued to identify potential restoration sites for honey mesquite in California and protection for existing flat-tailed horned lizard and desert tortoise habitat. In addition, the Implementation Report Fiscal Year 2009 Work Plan, and Budget, and Fiscal Year 2007 Accomplishment report will be prepared. Financial tracking for the program will continue and an annual financial work group meeting will be held.

In an effort to expedite compliance activities for Reclamation-covered actions and LCR MSCP implementation, Reclamation is working on a Memorandum of Understanding with the U.S. Corps of Engineers that will lay out a process to develop a strategy for 404 compliance.

Proposed FY09 Activities: Program Administration for FY09 will continue the management of the LCR MSCP. Processes for the program will continue to be developed including criteria for use of the Habitat Maintenance Fund and procedures for endowments for long-term maintenance. In conjunction with the USFWS, crediting methodology for habitat mosaics will be developed. A Request For Projects to identify potential restoration sites for all habitat types will be issued.

Pertinent Reports: *Implementation Report Fiscal Year 2007 Work Plan, and Budget, Fiscal Year 2005 Accomplishments, and Implementation Report Fiscal Year 2008 Work Plan, and Budget, Fiscal Year 2006 Accomplishments,* are posted on the LCR MSCP Web site.

WORK TASKS SECTION B

FISH AUGMENTATION

Work Task B1: Lake Mohave Razorback Sucker Larvae Collections

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$200,000	\$237,020	\$661,234	\$200,000	\$200,000	\$200,000	\$200,000

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

Start Date: FY04

Expected Duration: FY55

Long-term Goal: Fish augmentation.

Conservation Measures: RASU3, RASU5, and RASU8.

Location: Reach 2, Lake Mohave, AZ/NV.

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 two weeks to locate spawning groups, night-time larvae collection, and maintaining the boat fleet and field station at Cottonwood Cove. These larvae are captured one at a time, making this a labor-intensive program. Hence, most expenditures are for salary, travel, and fuel.

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 four to six 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.

FY07 Accomplishments: High survival for RASU larvae captured in 2005 and 2006, combined with concerns regarding quagga mussel investment, resulted in a target of only 20,000 larvae being required for 2007. RASU larvae for Bubbling Ponds SFH, which normally come from this venture, will be supplied by Dexter NFH due to quagga mussel issues. Twenty thousand five hundred sixty-eight (20,568) 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, 2007

	January	February	March	April	May	Total
N. Nine Mile	0	790	4,197	0	0	4,987
Tequila	0	3,760	2,250	0	0	6,010
Yuma	0	4,625	3,250	0	0	7,875
AOP	0	0	373	1,323	0	1,696
Total	0	9,175	10,070	1,323	0	20,568

The most significant event of this past season was the discovery of RASU larvae at 28 new sites above Owl Point. This information expands our knowledge concerning both habitat use and spawning behavior above Owl Point. In addition, locating new spawning sites affords us the opportunity to further secure the genetic diversity of the adult population.

FY08 Activities: A target of 30,000 larvae was established at the Lake Mohave Native Fish Work Group meeting. These will be delivered to Willow Beach NFH for rearing. Presence/absence surveys above Owl Point will lead to a continuation of this work in FY08. A survey will be conducted in the lower-most portion of Lake Mohave to search for additional new spawning sites.

Proposed FY09 Activities: RASU larval collections will continue. Target levels for FY09 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: The *2007 Fish Augmentation Summary* is in preparation and will be posted to the LCR MSCP Web site.

Work Task B2: Willow Beach National Fish Hatchery

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$225,000	\$233,348	\$619,834	\$235,000	\$350,000	\$250,000	\$250,000

Contact: Tom Burke, (702) 293-8310, tburke@lc.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, AZ.

Purpose: Annually contribute RASU and 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), and Humpback Chub Monitoring Program (C14).

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 1) provide fingerling RASU to Bubbling Ponds SFH to be further reared and ultimately stocked into reaches 3-5 of the LCR, 2) provide fingerling RASU from wild-caught larvae to Dexter NFH for further rearing and eventual repatriation to Lake Mohave, and 3) provide juvenile BONY to Achii Hanyo Rearing Facility for further rearing and ultimately for stocking into reaches 3-5 of the LCR.

3. *Annually rear RASU for release to LCR:* 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 LCR. Since the inception of the LCR MSCP, through 2006 a total of 20,564 RASU have been repatriated to Reach 2, and a total of 6,264 RASU have been stocked into Reach 3, bringing the cumulative total of RASU stocked from Willow Beach NFH into the LCR to 26,828.

FY07 Accomplishments: A total of 20,568 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 1,014 RASU juveniles (>380 mm TL) were distributed to lakeside rearing ponds (B7). A total of 601 RASU were repatriated into Lake Mohave (Reach 2), and 6,286 RASU were stocked into Lake Havasu (Reach 3). A total of 576 RASU were stocked into Imperial Wildlife Refuge Ponds on November 5, 2007 for the dedication of the site (Reach 5). The majority of funds were for salary and consumable materials (fish feed, medicines, chemicals, etc.).

Willow Beach NFH takes water directly out of the Colorado River. During October 2006, a severe, local thunderstorm deposited sand and gravel in the river above the intake, which subsequently resulted in reduced water passage through the intake system. In 2007, repairs were made, debris was removed, and sand was passed through the system, restoring operation to its previous level of efficiency.

During January 2007, the exotic quagga mussel were discovered in Lake Mead, and subsequently found in both Lake Mead SFH and 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 LCR 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 LCR corridor have been developed and are under review by cooperating resource agencies.

FY08 Activities: Willow Beach NFH will receive up to 40,000 RASU larvae from Lake Mohave. Facilities will continue to rear and distribute RASU and BONY that are currently on station for the LCR MSCP Fish Augmentation Program. This includes 14,000 RASU of the 2005 year class, 12,100 RASU of the 2006 year class, and 13,000 RASU of the 2007 year class. At the end of 2007 there were approximately 10,000 BONY of the 2005/2006 year classes, and 17,000 BONY of the 2007 year class at the hatchery. Some of these fish will be transferred to Achii Hanyo for rearing and stocking to the LCR under the LCR MSCP (B3). Fish transport protocols will be tested and revised under G3.

Proposed FY09 Activities: Facilities 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.

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). Increased funding will cover costs of increased production as well as facility maintenance and repair. Scheduled FY09 activities include replacement of solar panels originally installed in 1996 and 1997.

Pertinent Reports: *2007 Fish Augmentation Summary* is in preparation and will be posted to the LCR MSCP Web site.

Work Task B3: Achii Hanyo Rearing Station

	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
	\$50,000	\$41,589	\$154,779	\$50,000	\$170,000	\$100,000

Contact: Ty Wolters, (702) 293-8463, twolters@lc.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, AZ.

Purpose: Support operation and maintenance 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 has two specific actions. First, the development and maintenance of Achii Hanyo Rearing Facility as a grow-out site for BONY. Second, the rearing of BONY for release into reaches 3-5 of the LCR. Funds allocated to this work will be 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), and was formerly a privately owned hatchery, annually producing channel catfish and largemouth bass for sale to local growers and recreational fishing sites. The facility had been abandoned and unused for more than 5 years prior to being leased by the USFWS. Six earthen ponds are used for fish culture and 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.

The Achii Hanyo Rearing Facility will be used by the LCR MSCP Fish Augmentation Program for rearing BONY. The fish rearing operation is seasonal, producing one crop per year. Bonytail are brought in from Willow Beach NFH or Dexter NFH in the winter and stocked into the ponds. Ponds are monitored and fish are fed through the spring and summer. In the fall, the ponds are

drained, and the 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 station from Willow Beach NFH or Dexter NFH and the process is repeated. The annual Fish Augmentation Program production goal (from this facility) is 4,000 BONY subadults of 300 mm TL for stocking into the LCR.

Previous Activities: The USFWS and Reclamation have cooperatively worked to upgrade this facility through an interagency agreement since FY04, which annually provided \$50,000 for facility improvements. The agreement ended in FY07 and completed a commitment made under the SIA. 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. Since the inception of the LCR MSCP, through 2006 a total of 7,982 BONY have been stocked into Reach 3, and a total of 4,007 BONY have been stocked into Reaches 4-5, bringing the cumulative total to 11,989 BONY stocked from Achii Hanyo rearing station into the LCR.

FY07 Accomplishments: During 2007, a backup generator was connected, electrical upgrades were completed, and a restroom and office were finished. At the start of 2007, 10,000 BONY were already on station and 16,000 BONY and 10,000 RASU were brought in from Willow Beach NFH. A total of 4,057 BONY were harvested and tagged during 2007. These fish were distributed as follows: 38 BONY that were subjects of research being conducted under Bonetail Rearing Studies (C11) were stocked into Reach 3, 2,418 BONY were stocked at A7 backwater and River Island State Park (Reach 4), and 1,601 BONY were stocked into Imperial Wildlife Refuge Ponds (Reach 5). All of the 4,057 BONY released in 2007 were wire tagged. A subset of 1,789 BONY were also PIT tagged for various research studies on growth, survival, and distribution. Fish research is being conducted at Achii Hanyo to assess RASU growth to 500 mm and polyculture of RASU and BONY under C10. This research is expected to continue for 3 years.

FY08 Activities: The BONY on station for 2008 include 4,500 fish greater than 250 mm, 4,000 fish at 190 mm TL, and 5,000 young of the year fish. Willow Beach NFH will transport 6,000 BONY (average 200 mm TL) to Achii Hanyo in spring 2008. The majority of the 10,000 RASU that were brought on station in FY07 are still growing to target size. The production target for 2008 is a harvest of 4,000 BONY at greater than 300 mm TL. A 3-year agreement was initiated in October 2007 (FY08) to provide an additional \$25,000 annually for utilities and maintenance.

Proposed FY09 Activities: Funding levels are being increased for FY09 and FY10. The goal is to ramp up fish production to reach a production level of 12,000 BONY annually 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). FY09 and FY10 production goals will increase to 6,000 and 8,000 BONY, respectively. During FY09, two new ponds will be developed and an additional backup generator will be purchased and installed on site.

Pertinent Reports: An annual progress report will be posted to the LCR MSCP Web site. Fish production data are being incorporated into the annual *2007 Fish Augmentation Summary Report*.

Work Task B4: Dexter National Fish Hatchery

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$125,000	\$117,699	\$367,327	\$130,000	\$250,000	\$180,000	\$180,000

Contact: Ty Wolters, (702) 293-8463, twolters@lc.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, NM.

Purpose: Operate and maintain fish rearing facility, annually contribute RASU and BONY to the LCR MSCP Fish Augmentaion Program, and maintain BONY brood stock 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 and C11 may be conducted at Dexter NFH.

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

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 2006 a total of 136 RASU have been repatriated to Reach 2, and a total of 2,397 BONY have been stocked into Reach 3 from Dexter NFH into the LCR.

FY07 Accomplishments: Bonytail — USFWS staff hand-stripped eggs and sperm from adult BONY females and males, producing 150,000 fry. A total of 50,000 fry were transferred to Willow Beach NFH, 50,000 were transferred to Uvalde NFH, and the remaining fry were held on station for rearing. The USFWS staff tagged 5,080 BONY (300+ mm TL), which were stocked

into two backwaters along a 40-mile stretch of river below Davis Dam and Lake Havasu proper (Reach 3). The 556 juvenile BONY that were placed into a pond to study PIT-tag retention reached target size and were stocked into the LCR as part of the 2007 stockings.

Razorback Sucker — USFWS staff hand-stripped eggs and sperm from adult RASU females and males, producing 115,000 fry. A total of 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. A total of 794 RASU (average 425 mm TL) were stocked into Reach 3.

FY08 Activities: The BONY brood stock 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 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 Reach 3. The report on PIT-tag retention in BONY is forthcoming.

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 brood stock held on station.

Proposed FY09 Activities: The BONY brood stock will be maintained, up to 75,000 fingerling BONY will be produced for distribution to Willow Beach NFH and Achii Hanyo Fish Rearing Facility, 500 to 1,000 RASU will be reared to 500 mm TL for repatriation to Lake Mohave. Funding increase is requested to begin production increase for BONY from 4,000 to 6000 for expanded research. These fish will be needed for release in FY10 to effect research in FY11. Funding will go toward purchase of a new road grader to help develop three new ponds for BONY production and maintain pond banks and roadways on the property.

Pertinent Reports: The *2007 Fish Augmentation Summary* will be posted to the LCR MSCP Web site. The scope of work is available upon request from the LCR MSCP.

Work Task B5: Bubbling Ponds Fish Hatchery

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$225,000	\$301,360	\$515,377	\$235,000	\$335,000	\$250,000	\$250,000

Contact: Ty Wolters, (702) 293-8463, twolters@lc.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, AZ.

Purpose: Operate and maintain 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 LCR.

Previous Activities: Reclamation and AGFD have cooperatively worked to upgrade and renovate this facility since 1998. Prior to the LCR MSCP, more than 50,000 RASU were successfully reared at this facility and delivered to the LCR as requirements of the 1997 BO. A subsequent BO issued for the SIA in 2001 required the rearing and stocking of another 20,000 RASU into the LCR. The two above requirements have now been met.

For the LCR MSCP Augmentation Program, Bubbling Ponds SFH reared and stocked 4,814 RASU in 2005 and 11,455 RASU in 2006. All fish exceeded 300 mm TL and were stocked into reaches 4-5.

FY07 Accomplishments: A total of 50,000 fry were received from Dexter NFH in April for rearing, and should reach target size in 2009 and 2010. During 2007, a total of 12,174 RASU were harvested, wire-tagged, and stocked into reaches 4 and 5.

In addition to salary and associated costs for fish rearing activities, funds were expended for the following: 1) to design and construct a flume to measure water flows delivered to the hatchery, 2) to add electrical power to outside raceways, 3) to design and install oxygen lines to raceways, 4) to design a settling basin and intensive culture plans for the hatchery, and 5) to cover costs for nets and materials for live-trapping river otters.

FY08 Activities: Bubbling Ponds SFH began 2008 with approximately 74,000 RASU on station. Of this total, 30,000 stem from wild larvae captured in 2005 and 2006 from Lake Mohave. These fish should reach target size and be stocked out in 2008 and 2009. 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 spawned and shipped to Bubbling Ponds SFH in spring 2008.

Designs are underway for new production features 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 2008.

Proposed FY09 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 to reaches 3, 4, and 5 of the lower Colorado River, and annual progress reports will be produced. Construction of production design features will continue. As features are completed, normal fish culture activities will be dovetailed into the new systems.

Funding increases for FY09 and FY10 will accelerate and expand facility capability so to provide additional fish for research during FY11-FY16 as required by the HCP. FY09 funding increases will be split between increased production of RASU and repair/replacement of waterlines and holding troughs at the hatch house.

Pertinent Reports: The *2007 Activity Report* is in preparation and will be posted to the LCR MSCP Web site.

Work Task B6: Lake Mead Fish Hatchery

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$55,000	\$20,654	\$154,367	\$50,000	\$50,000	\$50,000	\$50,000

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

Start Date: FY05

Expected Duration: FY16

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

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

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

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.

FY07 Accomplishments: 4,445 larval RASU (2,500 from Echo Bay and 1,945 from Las Vegas Bay) were collected from Lake Mead during the course of the spawning season and taken to the hatchery for grow-out. To make room for incoming larvae, NDOW delivered and stocked 1,781 juvenile RASU (2005 and 2006 year-classes) into Center Pond at the Overton WMA. Currently 4,221 RASU are being reared at Lake Mead SFH.

FY08 Activities: The NDOW will continue to operate Lake Mead SFH for RASU production. Operation will include rearing of wild-caught larvae from 2008 and grow-out of sub-adult fish from the 2006 and 2007 year classes. The remaining 2006 RASU and a portion of the 2007 year-class will be stocked at the Overton WMA. 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 FY09 Activities: Continued rearing of RASU captured during previous years will occur, and RASU stock will be augmented with 2009 year-class RASU larvae from Lake Mead. Delivery of 2007 year-class RASU to Overton WMA will take place.

Pertinent Reports: Portions of this work are being conducted by NDOW under an agreement that includes activities of B11. The scope of work for this agreement is available upon request from the LCR MSCP.

Work Task B7: Lake-side Rearing Ponds

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY010 Proposed Estimate	FY11 Proposed Estimate
\$150,000	\$136,000	\$571,641	\$175,000	\$175,000	\$175,000	\$150,000

Contact: Jon Nelson, (702) 293-8046, jnelson@lc.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, AZ/NV.

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 and Dexter NFH. 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 NFWG 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 28,000 RASU have been reared and repatriated to Lake Mohave.

FY07 Accomplishments: In an effort to expedite development of RASU brood stock, the Lake Mohave NFWG has requested that the target size for repatriation be increased to 500 mm TL (approximately 20 inches). In response to this request, lakeside ponds received approximately 1,000 large RASU (375-425 mm TL) from Willow Beach NFH in February and March 2007. Fish harvest was conducted in late May and again in October with an overall survival of approximately 60%. Due to reproduction and recruitment in the ponds, only a small percentage of the fish actually reached target size of 500 mm TL. However, most of the fish harvested exceeded 450 mm TL. Results are summarized in Table 1.

Table 1. 2007 Lake Mohave Backwaters Summary

Ponds	# Stocked	Mean Length @ Stocking	# Harvested	Mean Length @ Harvest*	% Harvested
Yuma*	210	419	96	497	46
Nine Mile	50	388	28	424	56
Willow	40	388	58	443	65
Nevada Egg	30	388	20	427	67
Dandy	199	419	169	454	84
Arizona Juvenile	206	419	98	447	48
Nevada Larvae	51	388	35	428	69
N. Chemehueve	204	419	136	460	67
S. Sidewinder	24	388	16	411	67
Total	1,014	402	656	443	63

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

In 2007, 913 volunteer spawn YOY razorback suckers were transferred from other backwaters to Yuma Cove.

FY08 Activities: Lakeside ponds will continue to be used for RASU brood stock maintenance and development.

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

Pertinent Reports: The *2007 Fish Augmentation Summary* is under development and will be posted to the LCR MSCP Web site.

Work Task B8: Fish Tagging Equipment

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$75,000	\$46,711	\$241,043	\$75,000	\$75,000	\$75,000	\$75,000

Contact: Jon Nelson, (702) 293-8046, jnelson@lc.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 within the NFWG to begin use of the newest PIT-tag technology. This requires a change from the old 400-kHz and 125-kHz tags to the new 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 new PIT tags, tag readers, and antennae began in 2006.

FY07 Accomplishments: Additional PIT tags, tagging equipment, and tag readers were purchased as needed to mark fish for monitoring and research. A total of 24,157 RASU and 4,207 BONY were PIT and/or wire tagged and released into the LCR during 2007.

FY08 Activities: PIT tags, tagging equipment, and tag readers will be purchased as needed to mark fish for monitoring and research.

Proposed FY09 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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY010 Proposed Estimate	FY11 Proposed Estimate
\$260,000	\$260,000	\$317,122	\$60,000	\$60,000	\$60,000	\$60,000

Contact: Tom Burke, (702) 293-8310, tburke@lc.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, TX.

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

Project Description: Uvalde NFH is a large warmwater fish culture facility established in southwest Texas in 1934. The facility has 47 ponds totaling more than 50 surface acres for fish production. Water is supplied by two deep wells, which provide 72°F water year-round. A third, undeveloped well (Wilson Well) will be developed to secure the long-term water supply for rearing ponds. The facility was shut down for renovation in 2001 following a major flood event and is now again ready for fish culture activities. Currently, 37 of the 47 ponds are available for fish culture.

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: Prior to being shut down for renovation, Uvalde NFH had 15 years of experience rearing native fishes, including Comanche Springs pupfish, paddlefish, Yaqui catfish, and fountain darters. During the 1990s, as many as six species were being cultured, producing 2.6 million fish (60,000 pounds produced). The facility was put back on line in 2005 following rehabilitation of the Spurgeon Well, one of two deep wells developed on station.

During 2006, young-of-year and yearling 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, the 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. 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.

A total of 2,358 BONY having an average length of 325 mm TL were PIT tagged and transported to the LCR. The fish were stocked into Reach 3 of the LCR at Park Moabi, south of Needles, California.

FY07 Accomplishments: BONY fry that had been received from Dexter NFH in 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.

FY08 Activities: Uvalde NFH will continue rearing of BONY remaining on station from 2007. No new fish will be brought on station. These 2-year-old fish will be subjects for fish research until such time that Uvalde NFH's Class A rating is reinstated. Fish health inspections will be

repeated during the year to assess status of Largemouth Bass Virus. If Uvalde NFH tests positive for Largemouth Bass Virus, this project will be terminated and the fish will be disposed of according to USFWS protocols.

Proposed FY09 Activities: At this time, it is uncertain whether BONY and RASU production and research will continue at Uvalde NFH. The decision to continue with this work will be determined following fish health tests scheduled for July 2008.

Pertinent Reports: The scope of work is available upon request from the LCR MSCP. A production report is under review in USFWS Region 2 and will be posted to the LCR MSCP Web site.

Work Task B11: Overton Wildlife Management Area

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$75,000	\$67,010	\$106,714	\$75,000	\$175,000	\$75,000	\$50,000

Contact: Jim Stolberg, (702) 293-8206, jstolberg@lc.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, NV.

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 task was initiated in April 2006 following approval from the Steering Committee and concurrence by the USFWS. Funds were reallocated from B9. This work is closely related to B6 and C13. Once developed, the rearing ponds 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 SIA BO requirements set out in 2001. Fish will be transferred to Overton WMA ponds from Lake Mead SFH.

After the SIA 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. The majority of materials necessary to complete site improvements were procured and stored at Overton WMA for installation in FY07.

FY07 Accomplishments: Improvements to the water delivery infrastructure for Honeybee and Center ponds were completed. Prior to stocking native fishes, Reclamation assisted with sampling these ponds to determine species composition. Sampling was completed using trammel nets, hoop nets, and electrofishing. A total of 1,781 juvenile RASU (2005 and 2006 year-classes) reared at Lake Mead SFH were delivered and stocked into Center Pond in April. Willow Beach NFH also supplied 6,950 juvenile RASU of both year classes for stocking in Honeybee Pond. Recurrent monitoring of ponds and fish was carried out through the end of FY07.

FY08 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 FY08. Equipment to curtail aquatic vegetation, including a single 14-foot aluminum boat and chemical spray unit, is to be purchased to aid in pond management.

Assessment of rearing and carrying capacity of the ponds will be carried out, along with evaluations of possible improvements such as deepening the ponds, developing boat ramps, and installing water quality and quantity measuring equipment. Depending on determined pond rearing capacities, additional RASU from Willow Beach NFH may be transferred to Overton WMA ponds for rearing.

Proposed FY09 Activities: Repairs to water delivery systems and outlet works will be continue as needed, along with installation of monitoring equipment. Razorback sucker from Lake Mead SFH or Willow Beach NFH may be stocked for grow-out and repatriation to Lake Mead. Monitoring of RASU in Honeybee and Center ponds will continue. Funding increase will provide for pond deepening at Center and Wilson Ponds.

Pertinent Reports: The scope of work and cooperative agreement between Reclamation and NDOW are available upon request from the LCR MSCP.

**WORK TASKS
SECTION C**

SPECIES RESEARCH

Work Task C2: Sticky Buckwheat and Threecorner Milkvetch Conservation

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$11,000	\$10,000	\$20,000	\$11,000	\$11,000	\$11,000	\$11,000

Contact: John Swett, (702) 293-8574, jswett@lc.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, NV.

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 FY06, \$10,000 was provided to the Clark County MSHCP Rare Plant Workgroup via a 5-year agreement between Reclamation and the NPS.

FY07 Accomplishments: 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 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 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.

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-2007* will be posted on the LCR MSCP Web site.

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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$15,000	\$34,848	\$244,140	\$15,000	\$15,000	\$15,000	\$15,000

Contact: John Swett, (702) 293-8574, jswett@lc.usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Species research.

Conservation Measures: AMM1, AMM2, AMM3, AMM5, AMM6, MRM1, MRM2, MRM3, CLRA1, CLRA2, WIFL1, WIFL2, DETO1, DETO2, BONY2, RASU2, WRBA1, WRBA2, WYBA1, WYBA3, DPMO1, CRCR1, CRCR2, YHCR1, YHCR2, LEB11, BLRA1, BLRA2, YBCU1, YBCU2, ELOW1, GIFL1, GIWO1, VEFL1, BEV11, YWAR1, SUTA1, FTFL1, FTFL2, 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 draft 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.

FY07 Accomplishments: Additional staff time was necessary to complete literature searches, literature acquisition, data compilation, and cataloging information in a database. The draft species accounts were completed in FY07.

FY08 Activities: The species accounts will be finalized in FY08. Species accounts will be updated as new information is collected through monitoring and research.

Proposed FY09 Activities: Each year, information gathered from recent literature will be incorporated into the species accounts.

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

Work Task C4: Relict Leopard Frog

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$11,000	\$11,781	\$25,909	\$11,000	\$11,000	\$11,000	\$11,000

Contact: John Swett, (702) 293-8574, jswett@lc.usbr.gov

Start Date: FY06

Expected Duration: FY15

Long-term Goal: Support existing relict leopard frog conservation programs.

Conservation Measures: RLFR1.

Location: Reach 1, NV.

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 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, funds in the amount of \$10,000 were transferred to the NPS through a 5-year agreement.

FY07 Accomplishments: Funds in the amount of \$10,000 were transferred to the NPS through a 5-year agreement. In 2007, a report was generated to document 2006 activities. Major RLFR conservation activities included:

- Egg masses translocated to 4 existing and 2 new sites, resulting in populations being augmented by 230 frogs and 1787 tadpoles
- Diurnal and nocturnal surveys were conducted year-round at established and experimental sites
- Vegetation management activities were conducted at Pupfish Refuge Spring to decrease tamarisk cover
- Relict Leopard Frog Conservation Team met on two occasions

FY08 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 2007 monitoring of experimental and natural populations of relict leopard frogs, and frog rearing and relocation activities in 2008.

Proposed 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 2008 monitoring of experimental and natural populations of relict leopard frogs, and frog rearing and relocation activities in 2009.

Pertinent Reports: The scope of work is available upon request from the LCR MSCP. *Relict Leopard Frog Monitoring, Management, and Research – 2006 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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$90,000	\$47,426	\$56,010	\$90,000	\$90,000	\$90,000	\$90,000

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

Start Date: FY06

Expected Duration: FY11

Long-term Goal: Species Research.

Conservation Measures: WIFL1, WIFL2, YBCU1, YBCU2, GIFL1, GIWO1, VEFL1, BEV11, YWAR1, SUTA1, WRBA2, WYBA3, CLNB2, PTBB2.

Location: Cibola NWR Unit #1, Cibola NWR, AZ; Cibola Valley Conservation Area, AZ; and Beal Lake, Havasu NWR, AZ.

Purpose: 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 by itself 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.

Connections with Other Work Tasks (past and future): Work task C5 developed from the Southwestern Willow Flycatcher Prey Base Study (C20). Work task C20, completed in 2006, identified insects and spiders eaten by the southwestern willow flycatcher. Work task C6 was folded into C5 beginning in FY08. Information obtained in these studies will be used in the design and implementation of future habitat creation projects detailed in Section E.

Project Description: 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 the LCR MSCP habitat creation sites listed above.

Previous Activities: A technique for measuring amounts of nitrogen in plant tissue was developed based on a published method of measuring Total Kjeldahl Nitrogen in plant tissue; the technique was adapted to existing laboratory instrumentation for measuring nitrogen in water samples. Leaf samples were taken from 32 *Atriplex lentiformis* plants at Cibola NWR collected during work conducted under C7. Percent water of each plant was measured. Percent nitrogen (% of dry weight), measured in two samples from each plant, averaged 2.2%. Differences among plants accounted for 62% of variation in percent nitrogen, differences between subsamples accounted for 17% of variation, and interaction between subsamples and plants accounted for 21% of variation. Plant water and nitrogen contents were positively correlated. The procedure developed will enable comparison of plant nitrogen contents with insect abundances in created riparian habitats.

FY07 Accomplishments: Two studies were conducted during FY07 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 demonstration 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.

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 as any increase in insect production was inconsequential as compared to abundant insect populations already present at the site.

FY08 Activities: Examination of the effects of plant water and nitrogen contents on arthropod abundance and mass will be repeated. The uniform irrigation of the restoration plot sampled in FY07 produced trees with uniform plant water contents and prevented detecting an effect on arthropods. Trees at the adjacent Nature Trail restoration site will be sampled during FY08. Irrigation at this site is less uniform and should produce trees with different moistures. Goodding's willow and Fremont cottonwood are established at the site, enabling a comparison of the two species. Nitrogen contents of randomly-selected trees will be increased by hand-applying urea monthly in May, June, and July. Insects will be collected on trees every 2-4 weeks, sorted by guild, counted, and weighed. Branch samples will be taken from trees analyzed for percentages of water and nitrogen. Insect abundances and masses will be compared between tree species and regressed against plant nutrient concentrations.

Proposed FY09 Activities: Additional work examining the effects of plant water and nitrogen contents on insect abundance and diversity may be required depending on the results from FY08.

As a complementary study, the proportion of insects immigrating into restoration sites, rather than developing within sites, will be determined. 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.

Pertinent Reports: The study design is available upon request from the LCR MSCP. The following reports will be available on the LCR MSCP Web site: 2006 and 2007 annual reports for LCR MSCP C5: *Effects of Abiotic Factors on Insect Populations in Riparian Restoration Sites*; 2006 and 2007 annual reports for LCR MSCP C6: *Insect Population Biology in Riparian Restoration Sites*; and Wiesenborn, W.D. and S.L. Heydon, 2007, *Diets of Breeding Southwestern Willow Flycatchers in Different Habitats*, Wilson Journal of Ornithology.

Work Task C6: Insect Population Biology in Riparian Restoration Sites

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$30,000	\$26,676	\$103,551	\$0	\$0	\$0	\$0

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

Start Date: FY06

Expected Duration: Closed in FY07

Long-term Goal: Species research.

Conservation Measures: WIFL1, WIFL2, YBCU1, YBCU2, GIFL1, GIWO1, VEFL1, BEV11, YWAR1, SUTA1, WRBA2, WYBA3, CLNB2, PTBB2.

Location: Topock Marsh, Havasu NWR, AZ; Beal Lake, Havasu NWR, AZ; and Cibola Valley Conservation Area, AZ.

Purpose: 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. Growing plants will not by itself guarantee insect abundances large enough to feed and support bird and bat populations. In addition, earlier work has found that riparian birds feed on insects that have emigrated from non-riparian habitats such as marshland. Providing an adequate food supply for riparian birds and bats will require determining insect sources, developing techniques for increasing insect abundances, and developing methods for monitoring insect populations.

Connections with Other Work Tasks (past and future): This work task developed from Southwestern Willow Flycatcher Prey Base Study (C20). Work task C20, completed in July 2006, identifies insects and spiders eaten by the southwestern willow flycatcher. This work task, C6, parallels work task Effects of Abiotic Factors on Insect Populations in Riparian Restoration Sites (C5).

Project Description: The initial objectives of this project are to: 1) determine sources of insects eaten by LCR MSCP vertebrates, 2) recommend activities for increasing insect abundances, and 3) develop a method for monitoring insect populations. Sources of insects will be determined by sampling and identifying populations. Activities for increasing insect populations will be recommended by locating information on their biological requirements in the literature. A monitoring method will be developed by testing different trap designs at LCR MSCP habitat creation sites, with the objective of developing a monitoring method that is specific to insect species eaten by LCR MSCP-covered birds and bats and is simple to use.

Previous Activities: We identified insects collected from tamarisk (*Tamarix ramosissima*) flowers during FY06 at Topock Marsh, Arizona, where earlier work identified insects eaten by southwestern willow flycatchers. We also estimated specificities of insects to tamarisk flowers by determining proportions of pollen carried comprised of tamarisk pollen. We collected four genera of wasps including sand wasps (*Bembix* spp.) paper wasps (*Polistes fuscatus*), and tiphiid wasps (*Myzinum* spp. and *Paratiphia* spp.), and five genera of bees including halictid bees (*Agapostemon melliventris* and *Lasioglossum* spp.), leaf-cutting bees (*Megachile frugalis*), a native bee species (*Melissodes tepida*), and nonnative western honey bees (*Apis mellifera*). We also collected three genera of flower flies (Syrphidae) including *Palpada alhambra*, *Copestylum pallens*, and *Syrirta pipiens*, a species native to Europe. Flower flies were most-frequently collected followed by western honey bees. All insects collected were specific to tamarisk flowers, with pollen loads comprising greater than 86% tamarisk pollen on leaf-cutting bees and *M. tepida*, and greater than 95% on other insects. Larvae of insects collected are dependent on a variety of food. Immatures of collected wasps eat other insects, and larvae of collected bees eat pollen and nectar. Immatures of collected flower flies eat detritus, most likely rotting cattails. Although western honey bees were abundant on tamarisk flowers, they are not eaten by southwestern willow flycatchers, probably due to their stings. Flycatchers at Topock Marsh eat flower flies that develop as larvae on rotting marsh plants and are maintained as adults by tamarisk flower nectar.

FY07 Accomplishments: The FY06 Annual Report, summarized above, was rewritten and accepted for publication in the Journal of the Kansas Entomological Society. The paper is coauthored by Steve Heydon and Ken Lorenzen at the Bohart Entomology Museum, U.C. Davis, and is scheduled to be published in January 2008. The study is titled, *Pollen Loads on Adult Insects from Tamarisk Flowers and Inferences about Larval Habitats at Topock Marsh, Arizona*.

FY08 Activities: Closed in FY07. Activities in this work task during FY08 will be transferred to Work Task C5: Effects of Abiotic Factors on Insect Populations in Riparian Restoration Sites.

Proposed FY09 Activities: Closed in FY07.

Pertinent Reports: 2006 Annual Report for LCR MSCP Work Task C6: Insect Population Biology in Riparian Restoration Sites; and Wiesenborn, W.D. and S.L. Heydon, 2007, *Diets of Breeding Southwestern Willow Flycatchers in Different Habitats*, Wilson Journal of Ornithology, In press.

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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$160,000	\$80,818	\$270,607	\$160,000	\$145,000	\$90,000	\$0

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

Start Date: FY06

Expected Duration: FY10

Long-term Goal: Species research.

Conservation Measures: MNSW1 and MNSW2.

Location: Floodplain of entire LCR, dependent on permission by landowners.

Purpose: The purpose of this work task is to survey the MacNeill's sootywing distribution along the LCR 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.

Project Description: The butterfly and its host plant, quailbush, will be surveyed within the LCR MSCP boundaries. Annual surveys will cover one third of the flood plain. In 2006, Parker Dam to Imperial Dam was surveyed, in 2007 Imperial Dam to SIB was surveyed, and in 2008 Lake Mead to Parker Dam will be surveyed. 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). Sootywings will be digitally photographed and their GPS coordinates will be recorded. Densities, recorded as individuals of each life stage per plant or plant area, will be estimated.

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:

- a. plant water and nitrogen content
- b. plant species used as nectar sources
- c. availability of nearby nectar sources (distances, amounts)
- d. area of *A. lentiformis* stands
- e. elevation and latitude

Previous Activities: Surveys during FY06 were conducted for host plants and sootywing eggs, larvae, or adults from Parker Dam to the northern boundary of Imperial NWR, excluding the CRIT Reservation. Stands of host plants were found at 29 localities and GPS coordinates were entered into a Geographic Information System (GIS). Sootywings were found on host plants at 13 of the host plant localities. Numbers of adults and their behaviors (nectaring, oviposition, etc.) were counted on eight dates monthly from April to October at Cibola NWR. 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. Females were more likely to oviposit on hostplants with higher water content. However, oviposition did not increase on acceptable plants as water content increased (i.e., plants were either acceptable or unacceptable to ovipositing female sootywings).

FY07 Accomplishments: We continued to locate host plants and eggs, larvae, and adults of MacNeill's sootywing by surveying the LCR between the northern boundary of Imperial NWR and the Southerly International Boundary with Mexico. Stands of host plants were found at 21 additional sites that were entered onto Reclamation's Regional GIS. Sootywings were found at 11 of these localities.

We continued observing plant species used by sootywings for nectar. A seventh plant species used for nectar was identified: the weedy succulent *Portulaca oleracea* (Portulacaceae). We also compared frequencies of nectaring on potted *Heliotropium curassavicum* (Boraginaceae) and *Sesuvium verrucosum* (Aizoaceae), two species observed as nectar sources during 2006. Nectarings per plant did not differ between plant species. Nectarings per flower were greater on *S. verrucosum*, the species with fewer flowers per plant.

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.

Initial project planning anticipated a 3-year cooperative agreement to evaluate sootywing habitat requirements. Funding for the first two years was obligated using FY06 funds, so FY07 costs were less than anticipated.

FY08 Activities: Surveys will be conducted from Lake Mead NRA south to Parker Dam. We also will be conducting two field studies on the sootywing's nectar requirements. First, additional work will be performed examining nectaring on potted plants (see FY07 Accomplishments). Second, nectaring by sootywings in relation to the quantity of nectar in flowers will be studied at Cibola NWR. These two studies will help us determine the plant species most-important to sootywings as a nectar source. A small laboratory study will be conducted examining the

importance of plant moisture in stimulating adult emergence in the spring. If plant moisture is important, habitat-creation sites may need late-winter irrigation to ensure sootywing emergence.

Proposed FY09 Activities: Field work determining the sootywing's habitat requirements will be completed by examining: 1) survival of sootywing eggs and larvae on quailbrush, including predation and parasitism, 2) sootywing dispersion in relation to patch size, and 3) further work on the sootywing's requirement for shade. The laboratory study on spring-emergence described above will be completed.

Pertinent Reports: Study plans are available upon request from the LCR MSCP. 2006 and 2007 annual reports for LCR MSCP Work Task C7: *Survey and Habitat Characterization for MacNeill's Sootywing*, will be available on the LCR MSCP Web site.

Work Task C8: Razorback Sucker Survival Studies

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$190,000	\$180,752	\$606,705	\$205,000	\$25,000	\$0	\$0

Contact: Tom Burke, (702) 293-8310, tburke@lc.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 90,000 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: Reclamation was required under the 1997 BO from USFWS to rear and stock 50,000 RASU into the Colorado River downstream of Parker Dam. During ESA consultations in 2002 aimed at extending the regulatory relief of the 1997 BO, Reclamation agreed to assess the survival of released fish. This study began in 2002, prior to implementation of the LCR MSCP. Results from work accomplished in 2002-2004 are summarized in a final report on file with Reclamation. An additional requirement to stock 20,000 RASU stemmed from a 2001 BO for SIA. And during from 2005 to present, an additional 20,000 plus fish have been released, bringing the total number of RASU released below Parker Dam to more than 90,000.

Activities since 2005 are included as LCR MSCP accomplishments and reported in this document.

FY07 Accomplishments: Lower Colorado River survey monitoring resulted in contact with 10,941 fish representing 19 species and including 875 RASU captures. All RASU were assumed to originate as stocked fish. 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, and tags were injected into all unmarked fish. Growth of marked fish was rapid, and similar to that recorded for RASU of similar size at other locations including Lake Mohave.

In December and January, seven RASU longer than 50 cm were tagged with external radio transmitters in an attempt to locate active spawning sites. Contact was made in February with six fish outside A-7 backwater, where they were originally captured. This was the last contact despite monitoring efforts into late March.

Data 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 in A-7 and A-10 backwaters at 8-12 established stations during the summer. Readings were taken at substrate, middle, and surface depths, and sampling stations were chosen to represent a diversity of habitats. The sampling included both early morning hours when dissolved oxygen is often at its lowest point and afternoon hours when dissolved oxygen levels are typically their highest. Most dissolved oxygen values were greater than 4 ppm, but occasional near-anoxic conditions occurred near bottom. In general, each 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 from 2003 to 2006 showed that greater than 21% of fish handled had wounds suggesting attacks by birds. On numerous occasions field crews observed recently released RASU swimming near the surface in groups. These two observations were thought to be related (i.e. RASU swimming near the surface drew attacks from predaceous birds). It was possible that surface feeding during the rearing process may have trained the RASU to come to the surface in search of food. An investigation on surface imprinting due to surface feeding in the hatchery was initiated. Two hatchery ponds containing similar quantities and sizes of razorback sucker were fed at the surface and subsurface. Fish were fed for approximately 90 days, harvested, released into A-10 backwater in January 2007, and monitored. A second replicate was initiated in April 2007, and fed for 180 days, with stocking in October 2007. Final results and recommendations from both replicates will be available in FY08.

To assess the role of fish predators, investigations were initiated to assess the predator load in A-7 and A-10 backwaters. A mark-recapture survey for largemouth bass was performed in A-10 backwater in March and April 2007 to investigate their potential for predation on stocked RASU.

A population estimate was 459 (95% CI 205-1,147), 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. 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 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 in spring 2007.

FY08 Activities: Routine site monitoring and associated evaluations (characterization of dispersal, abundance estimations, larval collections) will continue. Radio tags will be used to identify spawning sites, and will expand to include the Parker Strip. All sub-projects will be completed including assessment of long-term post-stocking RASU survival. A project final report will be processed not later than January 2009 (FY09), which will include an overall assessment of the success of the lower river RASU stocking program and specific recommendations to continue the program or to implement programmatic changes.

Proposed FY09 Activities: A project completion report will be processed, which will include an overall assessment of the success of the lower river RASU stocking program and specific recommendations to modify the program or to implement programmatic changes. Once accepted by Reclamation, 50 copies of the report will be produced and distributed. Formal oral presentation will be made by the contractor to the LCR MSCP Steering Committee or to a subgroup designated by that committee.

Pertinent Reports: An annual report for 2007 is under development and will be posted to the LCR MSP Web site when finalized. The annual reports for 2005 and for 2006 are already available on the Web site.

Work Task C9: Razorback Sucker and Bonytail Pen Rearing Tests

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$35,000	\$38,786	\$111,040	\$0	\$0	\$0	\$0

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

Start Date: FY05

Expected Duration: Closed in FY07

Long-term Goal: Continuously seek measures to improve quantity and quality of fish reared and released under the Fish Augmentation Program.

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

Location: Reach 2, Lower Colorado River at Willow Beach, AZ.

Purpose: Assess utility of pen-rearing of RASU and BONY in the LCR at Willow Beach NFH to increase rearing capability at the hatchery and as a means of conditioning fish to the river environment prior to release.

Connections with Other Work Tasks (past and future): The work is connected to B2, as work is being accomplished at Willow Beach NFH using fish reared at that facility.

Project Description: This project had two main objectives: 1) to determine whether juvenile and sub-adult RASU and BONY will continue to grow if placed into net pens in the Colorado River adjacent to Willow Beach NFH, and 2) to assess use of net pens to acclimate fish to ambient river conditions (temperature and flow) prior to release into Lake Mohave. This program constructed rearing pens in the river at Willow Beach NFH for the purpose of evaluating both of these objectives.

Previous Activities: Net pens and docking materials were purchased and delivered to Willow Beach NFH. The four-pen design was selected to provide long-term stocking space and structural stability in the river. Local purchases for miscellaneous hardware and materials (cement, cables, eyebolts, etc.) were made. Dive inspections of the river bottom for assessment of anchor placements and test installations of docking materials were accomplished by the Reclamation Dive Team.

Assembly and installation was completed and 2,500 RASU with an average of 340 mm TL were placed into the nets pens in April. Growth and survival were monitored between April and October. A subsample of 600 RASU was measured for growth at the end of June, and all RASU were measured at the end of October. In general, growth was poor, with an average growth of

only 10.3 mm over the 6-month period. Survival was high, greater than 95%, and the fish were in excellent physical condition at the end of the test period. The fish were subsequently stocked at locations within Reach 3 on the LCR.

FY07 Accomplishments: Lack of significant growth of net-penned fish during 2006 was sufficiently conclusive to terminate further growth studies, and no further research on net pens was conducted during 2007. Net pens, however, were used for holding fish for short-term research on tag retention and for holding fish prior to stocking. Remaining funds for this work task were reassigned to B2 and used for any costs associated with operation and maintenance of the net pens and for repair of the water intake system damaged by the October 2006 thunderstorms (See B2). The net pens and docking materials were not be disassembled; however, they were used to support activities at the hatchery in association with B2 and will continue as such over the life of the program. Net pens are still providing areas for acclimation of native fish to the river prior to final distribution to Lake Mohave.

FY08 Activities: None, this project is closed.

Pertinent Reports: A brief study report is in review, and will be available upon request from the LCR MSCP.

Work Task C10: Razorback Sucker Growth Studies

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$125,000	\$106,383	\$169,901	\$125,000	\$125,000	\$125,000	\$125,000

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

Start Date: FY06

Expected Duration: FY11

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, which 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 fish that are 250-300 mm TL 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 NFWG.

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. As a final 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 riverine populations, 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 recongnized, 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 included site visits to facilities acitvely culturing RASU to document successes and failures. Inquiries were made to field biologists and technicians to document behavior of fish in the wild (i.e., daily activities such as feeding, resting, and use of cover in wild habitat). Ideas and hypotheses are being formulated into numerous small experiments, testing one variable at a time.

FY07 Accomplishments: Reclamation is working cooperatively with AGFD to study factors affecting growth of RASU. A report was submitted by AGFD titled, *Factors Affecting Growth of RASU in Captivity: Literature Review and Knowledge Assessment*. This report is a compilation of information regarding RASU rearing techniques in both hatcheries and natural rearing areas. 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. A Native Fish Culture Workshop was held in August 2007, which focused on RASU and BONY culturing practices and shared results of summary studies on existing culture techniques for RASU and BONY. Testing-apparatus designs were reviewed for installation at Bubbling Ponds SFH.

FY08 Activities: A new agreement was signed early in FY08 between Reclamation and USFWS testing the feasibility of polyculture for RASU and BONY in the same ponds. RASU and BONY that had been polycultured were harvested in December 2007, and BONY reach 300+ mm TL and RASU grew to be 400+ mm TL. 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. Preliminary results from these studies will be written into reports in FY08.

Proposed FY09 Activities: Research investigations from a priority list of research needs developed at the fish culture workshop will be designed and conducted.

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

Work Task C11: Bonytail Rearing Studies

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$165,000	\$142,661	\$237,962	\$165,000	\$165,000	\$165,000	\$165,000

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

Start Date: FY06

Expected Duration: FY11

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 hatchery.

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 scheduled for fish culturists to review survey findings and prioritize research actions. Research hypotheses will be formulated for study designs and investigations will be 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. They 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.

FY07 Accomplishments: A workshop was held in August among fish culturists to review final reports and survey findings, prioritize research needs, obtain expert advice on how to optimize hatchery production, and produce preliminary designs and a planning process for field and laboratory experiments to test hypotheses for BONY and RASU (C10). Research investigations from a priority list of research needs developed at the fish culture workshop are being formulated

into study designs and investigations are being carried out. Findings and results will be documented and reported. Arizona State University shared results of the comprehensive review for BONY through a PowerPoint presentation at the workshop. This presentation became part of a CD containing all materials presented and formulated at the workshop and made available to all attendees.

Preliminary findings of the multi-year-class production for BONY, conducted at Dexter NFH, show little differences in length gained but significant differences in weight gained between ponds with multiple year classes and those without. Weight gain in ponds without adults present was significantly greater than those with adults present. Dexter NFH staff spawned adult BONY and prepared ponds for fry production, and 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. Data are being analyzed for growth indices, survival, size, and variation, and a report is expected this spring.

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*.

Investigations into handling stressors in BONY continued at Achii Hanyo. Blood samples have been taken and are being analyzed in the laboratory.

FY08 Activities: A new agreement was signed in FY08 between Reclamation and Dexter NFH to investigate and formulate a species-specific diet for BONY. Dexter NFH will continue the investigation into multi-year class production. Staff will prepare four ponds for production fish. The BONY brood stock will be split between two ponds with a 1:1 ratio of male to female, and five pairs of fish will be held back from each pond to induce spawning. The larval BONY will be combined and each of the four ponds will be stocked with 5,000 larval BONY. The ponds will be monitored daily for water quality and sampled monthly for length and weight gain. The ponds will then be harvested and the brood stock combined into one pond. The larval BONY will be placed into a raceway for a final growth assessment. Data will be compiled and an annual report will be written.

Investigations into handling stressors in BONY will continue at Achii Hanyo. Field samples are expected to be complete by March and laboratory work is expected to be complete by May. A report is expected in FY08.

Proposed FY09 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 for contracted studies are available upon request from the LCR MSCP.

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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY010 Proposed Estimate	FY11 Proposed Estimate
\$185,000	\$184,686	\$358,262	\$215,000	\$200,000	\$200,000	\$200,000

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

Start Date: FY06

Expected Duration: FY11

Long-term Goal: Species research.

Conservation Measures: RASU5.

Location: Reach 2, Lake Mohave, AZ/NV.

Purpose: Assess population structure for repatriated RASU, and develop a population demographic model for predicting survival and replacement rates to maintain brood stock for 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 3,000 fish. The study will assess causes for poor survival of stocked RASU and make recommendations for corrective actions.

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

Initially planned as a 3-year study, findings in FY06 and FY07 showed that the 300-mm size RASU being released by the LCR MSCP were being eaten by predators immediately after stocking with less than 20% of the fish surviving the first 90 days. This prompted a need to evaluate stocking of adult size RASU (500 mm fish). Rearing of these larger fish has taken longer than expected. Only a few hundred fish were available for research subjects during fall 2007. Upwards of 1,000 fish should be available for controlled release tests scheduled for fall 2008, and a second group of large fish should be available for release in FY09. These fish will be

monitored and their relative survival assessed for 18 to 24 months. Field studies are now expected to be completed at the end of FY10, with a final completion report available in FY11.

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 repatriate distribution. 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.

FY07 Activities: A sonic telemetry study was completed to assess post-stocking mortality factors for subadult RASU in Lake Mohave. Mortality began immediately after stocking and continued throughout the study. Weekly survival was 92% (95% CL, 87 to 95%). Only 3 of 19 (16%) fish remained active at the conclusion of the study, and mortality likely was due to predation by piscivorous nonnative fishes.

In conjunction with the telemetry study approximately 500 subadult RASU were stocked at Fortune Cove. Large-mesh gill nets set for three days during and after the release event captured no fish of any species. Direct underwater observations of the releases indicated that most stocked fish dispersed shoreward and fewer than 30% of fish moved toward open water.

As a quality control check, and to assure that mortalities in test fish were not a result of implant surgery, transmitters were also implanted into RASU held in a raceway at Willow Beach NFH. All fish remained healthy throughout the experiment and there were no shed transmitters.

Annual monitoring for repatriated and wild RASE has continued with sampling trips in November 2006 and March and May 2007. Capture data as well as mark-recapture estimates of population size have continued to show a decline in wild abundance and a nearly stable but low abundance of repatriated fish despite continued stockings.

Progress in ecological modeling has included acquiring specific location data for catch records where location records are incomplete or too general to maximize the number of fish included in a multi-site analysis. Multi-site mark-recapture analysis of Native Fish Work Group data from Lake Mohave dating back to 1991 has been restricted to March roundup data.

FY08 Activities: Activities during FY08 will continue investigations initiated in FY07, including determining survival of target fish released throughout Lake Mohave. Additional tasks will be determined on the basis of results obtained during the second year of the study. Population demographic modeling will continue. Year-around mark-recapture analysis, restricted to the last 3-4 years, will be conducted in FY08.

Additional sonic telemetry studies will be conducted using large size RASU. If available, study lots of 500 or more fish of 50 cm TL will be released along with the sonic tagged fish. Survival of these fish will be assessed over a 2-year period (preferably covering two spawning periods).

Proposed FY09 Activities: Work will focus on continued monitoring of larger RASU stocked during FY08 to refine the relationship between survival and total length at time of release. Monitoring will be expanded to assess relative contribution of larger fish reared in off-channel areas such as Beal Lake and Yuma Cove.

Pertinent Reports: An annual report will be posted to the LCR MSCP Web site. The study plan is available upon request from the LCR MSCP.

Work Task C13: Lake Mead Razorback Sucker Study

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$300,000	\$302,066	\$665,687	\$150,000	\$150,000	\$150,000	\$150,000

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

Start Date: FY05

Expected Duration: FY11

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

Conservation Measures: RASU7.

Location: Reach 1, Lake Mead, NV/AZ.

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. Resolve any remaining questions about the location of populations of RASU in Lake Mead from the lower Grand Canyon area downstream to Hoover Dam.
2. Document use and availability of spawning areas at various water elevations.
3. Clarify substrate requirements for spawning.
4. Monitor potential nursery areas.
5. Continue aging of captured RASU.
6. 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. Reclamation proposes that the current studies be completed in FY07, and then a reduced monitoring effort be initiated in FY08. However, this final decision on level of future monitoring activities has not been determined.

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 nonnative fish populations.

FY07 Accomplishments: 2007 was the eleventh year of this cooperative study. Trammel netting surveys during the spawning season resulted in the capture of 88 RASU (16 from the Muddy River/Virgin River inflow area, 33 from Echo Bay, and 39 from Las Vegas Bay), 50 of which were recaptures. This is the highest number of RASU contacted in a single season since the beginning of this study. Aging and growth data were again collected, and evaluation of captured fish suggests continued, recent recruitment in Lake Mead. RASU larvae 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.

FY08 Activities: A document summarizing the first 10 years of research is available from the LCR MSCP. Reclamation has initiated a Lake Mead RASU monitoring program based on information supplied by the 10-year summary report. Program goals will include observation and identification of population trends, annual observations of spawning area use at known spawning sites, and continued confirmation of recruitment. Additional monies that do not count toward the LCR MSCP cost share will be received from SNWA to accomplish Lake Mead RASU activities.

An interagency team will be convened that will utilize the 10-year review to determine future need for management activities.

Proposed FY09 Activities: Limited 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.

Pertinent Reports: The *Annual Lake Mead Razorback Sucker Study* report for 2006-2007 has been posted to the LCR MSCP Web site. A 10-year comprehensive report, *Razorback Sucker Studies on Lake Mead, Nevada and Arizona 1996-2007*, is currently available.

Work Task C14: Humpback Chub Program Support

FY07 Estimates	FY07 Actual*	Cumulative Accomplishment Through FY07	FY08 Approved Estimate*	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$10,000	\$68	\$38,297	\$10,000	\$200,000	\$0	\$0

*Funds were transferred as part of 3-year agreement in FY06.

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

Start Date: FY 05

Expected Duration: FY 55

Long-term Goal: Provide \$10,000 per year to support humpback chub (HUCH) conservation.

Conservation Measures: HUCH1.

Location: Grand Canyon, AZ; Willow Beach, AZ.

Purpose: Provide financial 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 as money will be transferred to USFWS through an agreement for activities at Willow Beach NFH.

Project Description: The LCR MSCP will provide \$10,000 per year for 50 years to the Glen Canyon Dam AMP, or other entity approved by USFWS, to support implementation of planned, but unfunded species conservation measures.

Previous Activities: Based upon recommendations from the Glen Canyon Dam Adaptive Management Program, funds were provided to USFWS at Willow Beach NFH in FY06 to support care of HUCH from the Little Colorado River held on station. To reduce overhead and eliminate repetitive administrative costs, funds were provided for a 3-year period (FY06-08).

FY07 Accomplishments: Monitored progress on agreement with USFWS.

FY08 Activities: Monitor progress on agreement with USFWS, and hold coordination meeting with Glen Canyon AMP to identify new work tasks for FY09.

Proposed FY09 Activities: Develop and implement multi-year strategy to support HUCH recovery based on coordination meeting with Glen Canyon AMP.

Pertinent Reports: At the end of the 3-year period a report will be developed and will be available upon request from the LCR MSCP.

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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$80,000	\$92,893	\$242,918	\$80,000	\$80,000	\$80,000	\$25,000

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

Start Date: FY05

Expected Duration: FY11

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

Conservation Measures: FLSU2 and FLSU3.

Location: Reach 3, AZ/NV/CA.

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): Since FY06, the FLSU work is now being done under C15 and the RASU portion of the work has been included under D8.

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 will conduct FLSU research efforts in Reach 3 below Davis Dam to determine habitat use, habitat preferences, and recruitment, and support decisions on habitat management activities for river channel and backwater habitats in Reach 3. Research support will be provided for 5 years (FY06-10). 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 (scheduled for FY11).

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: 6 larvae, 4 juveniles, and 350 adults. This produced a population estimate of 2,437 adults. Fyke netting proved ineffective and was

discontinued; the results of this are included in the FY06 annual report. 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 with regards to dispersal, and habitat use.

FY07 Accomplishments: Numerous sampling events were conducted throughout the year, the majority of which were from March through July. These trips focused primarily on FLSU spawning aggregations and the young fish that resulted. Sampling consisted of small meshed trammel netting, backpack and boat electrofishing, seining, snorkeling, larval light trapping, and DIDSON camera surveys. These resulted in the capture of 104 adults, 7 juvenile, and 19 larvae; additionally, numerous schools of young fish (25-60mm) were visually identified and numbered in the hundreds. A population estimate of 2,471 adult FLSU was generated based on the mark recapture data from the electrofishing and trammel netting.

An additional 20 adult FLSU were surgically implanted with 36-month sonic tags; 10 were females and 10 were males. There were also eight sonic tags still active from the 2006 field season, which provided valuable data with regards to habitat use, site fidelity, and home ranges. Sonic fish were tracked at least monthly throughout the year; this totaled 127 detections by manual tracking. These contacts allowed for the collection of specific habitat data that will be used to determine habitat preferences and availability. The use of submersible ultrasonic receivers (SURs) was increased this year with a particular focus on backwater use.

FY08 Activities: Continuation of sampling is planned, using larval nets, electrofishing, and trammel netting with smaller meshed nets to increase contacts with juvenile life stages. Beach seining and backpack electro-shocking will be expanded to assess the numbers, distribution, and dispersal of juvenile life stages. Telemetry work will continue, and additional habitat data will be collected and incorporated into maps of available habitats. Sampling trips will occur throughout the year to provide data on seasonality of habitat use. We will also begin aging this population to develop population modeling and structure.

Proposed FY09 Activities: Monitoring and research actions from FY08 will be continued, and model criteria will be developed and modified as data are compiled and analyzed. Stomach content analyses and macroinvertebrate sampling from known habitats where FLSU have been observed over the course of the study will be incorporated throughout the year.

Pertinent Reports: The annual report for FY07 has been posted to the LCR MSCP Web site and is currently available.

Work Task C16: Evaluation of Past Bonytail Stockings

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$60,000	\$55,333	\$55,333	\$0	\$0	\$0	\$0

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

Start Date: FY07

Expected Duration: FY08

Long-term Goal: Adaptively manage bonytail augmentation stockings.

Conservation Measures: BONY5.

Location: Entire Colorado River Basin.

Purpose: Develop an understanding of past bonytail (BONY) stockings in the Colorado River Basin.

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

Project Description: This project is a review of past stockings of BONY throughout the Colorado River Basin. The study will document the size of fish released, locations stocked, physical and chemical conditions of receiving waters, results of post-stocking assessments, and related parameters that help determine the relative success of these events. There are only six facilities actively rearing BONY: Dexter NFH, Willow Beach NFH, Achii Hanyo NFF (CRIT), Wahweap SFH (Utah Division of Wildlife), Mumma SFH (Colorado), and Ouray NFH. It is expected that all facilities will be visited during this research.

Previous Activities: This is a new start in FY07.

FY07 Accomplishments: All available BONY stocking records were reviewed for waters throughout the Colorado River Basin. This information is summarized for marked or tagged and unmarked fish by stocking location and number and size of fish released.

All release and capture data for PIT-tagged fish from lakes Mohave and Havasu, and from the lower river below Parker Dam, were statistically evaluated. Average total length at release of captured fish within each reservoir-release site was compared to the parametric value. Capture success data for the upper Colorado River basin will be summarized, but paired release-capture date were unavailable for statistical analysis.

Data on physical and chemical characteristics of receiving waters where BONY stockings occurred were gathered from the USGS at <http://waterdata.usgs.gov>. This information was evaluated relative to BONY stocking success.

FY08 Activities: The work was contracted on a calendar year basis, so final data analyses and report writing is presently underway. Available release and capture information is being analyzed to identify common elements associated with stocking success. The project final report will be processed not later than February 2008 and will include an overall assessment of the success of the lower river BONY stocking program and specific recommendations for follow-up research and management investigation.

No additional funds are required for project completion.

FY09 Activities: None, project to be closed.

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

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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$145,000	\$138,945	\$138,945	\$145,000	\$60,000	\$0	\$0

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

Start Date: FY07

Expected Duration: FY08

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, AZ, NV, and CA.

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

Connections with Other Work Tasks (past and future): This work migrated out of G3. This work task may determine future PIT-tag equipment purchases in B8.

Project Description: This is a 2-year evaluation of native fish monitoring equipment. Reclamation will purchase and 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 weir-type guided as well as non-guided systems for the detection of PIT-tagged fish at spawning areas, and methods for collecting, storing, and retrieving contact data. 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.

Previous Activities: This was a new start for 2007.

FY07 Accomplishments: 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 Activities: Expanded field testing of remote detection equipment at known RASU and BONY spawning sites will be conducted. Currently, there are four, 2-channel remote sensing units to be deployed as free-floating or shore-based stations with a maximum antennae depth of 5 meters and battery life of up to 12 hours. PIT-tag data of adult RASU will be collected in conjunction with RASU larvae collection at known spawning sites. A final report will be developed documenting results of the 2-year evaluation.

Proposed FY09 Activities: Field testing will continue into fall 2008 in association with fish harvest from lake-side ponds (B7). Harvest numbers from the ponds will be used to back-check population estimates made with remote sensing equipment. A final report will be prepared.

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

Work Task C24: Avian Species Habitat Requirements

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$0	\$0	\$0	\$150,000	\$375,000	\$375,000	\$375,000

Contact: John Swett, (702) 293-8574, jswett@lc.usbr.gov

Start Date: FY08

Expected Duration: FY12

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

Conservation Measures: AMM1, AMM3, MRM1, MRM2, CLRA1, CLRA2, LEBI1, BLRA1, BLRA2, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1.

Location: System-wide.

Purpose: Determine habitat requirements for covered marsh and riparian bird species, including Yuma clapper rail (CLRA), western least bittern (LEBI), California black rail (BLRA), 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 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. Created habitat must 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. Habitat creation projects must provide habitat requirements for multiple covered species to effectively and efficiently complete these conservation measures.

Previous Activities: N/A

FY07 Accomplishments: This is a new start in FY08.

FY08 Activities: Data is being collected during avian system monitoring, pre-development monitoring, and post-development monitoring under D6 and F2. These data will be analyzed and evaluated, in conjunction with habitat data collected at each monitoring site and information gathered during the formulation of species accounts (C3), to begin defining required habitat characteristics for covered avian species that utilize riparian habitats.

In FY08, two additional studies are anticipated to occur under Work Task G3 to further define habitat requirements for covered avian species. A 3-year study will be initiated to determine marsh habitat characteristics to provide a habitat mosaic design for three covered marsh bird species. In addition, a 3-year study will be initiated to determine water requirements and habitat response to varying irrigation regimes designed to provide habitat characteristics for covered riparian obligate avian species.

Proposed FY09 Activities: Data collected during avian system monitoring, pre-development monitoring, and post-development monitoring will be used, in conjunction with existing information gathered during the formulation of species accounts (C3), to define required habitat characteristics. These data will be used to develop habitat suitability index models for covered avian species. Habitat suitability index models will help define limiting factors and required habitat characteristics. Information will be used to develop habitat mosaics for habitat creation and to direct future research. Models will be validated through monitoring accomplished under D6 and F2. Further monitoring and research will refine these models through the adaptive management process.

Studies on the interrelationship between habitat requirements of covered marsh bird species and water requirements necessary to provide habitat requirements for riparian obligate avian covered species, begun in FY08 under Work Task G3, will continue in FY09.

Pertinent Reports: Study plans are available upon request.

Work Task C25: Imperial Ponds Native Fish Research

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$0	\$0	\$0	\$225,000	\$225,000	\$225,000	\$225,000

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

Start Date: FY08

Expected Duration: FY11

Long-term Goal: Species research, backwater restoration.

Conservation Measures: RASU2, BONY2.

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

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.

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.

FY07 Accomplishments: N/A

FY08 Activities: This task was a new start for FY08. Preliminary monitoring of pond temperature, conductivity, pH, and dissolved oxygen began in September (FY07) and will continue at fixed water quality stations within each pond on a monthly basis in FY08. Two ponds will be stocked with RASU in November 2007 and two ponds will be stocked with BONY in December 2007. Preliminary trials of various fish monitoring techniques will be conducted in FY08 including but not limited to imaging sonar, swimming transects, hoop netting, and remote PIT-tag scanning. Monitoring of spawning activity and larval collecting will be conducted in the spring, and the first abundance estimate will be made using a mark-recapture event in the autumn.

Proposed FY09 Activities: Research activities begun in FY08 will continue.

Pertinent Reports: A progress report will be developed annually and will be posted to the LCR MSCP Web site. The study plan is available upon request.

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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$0	\$0	\$0	\$100,000	\$100,000	\$100,000	\$0

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

Start Date: FY08

Expected Duration: FY10

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 Achi 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).

FY07 Accomplishments: N/A.

FY08 Activities: Meetings were held at Lake Mead SFH to evaluate physical conditions of raceways. A study proposal to rear and condition RASU over the summer when warm water becomes available is in its final design. Test apparatus will be developed in April, with field tests to begin in May. Because RASU is an endangered species, only limited field testing with RASU is anticipated during summer 2008. Physical and chemical measurements will be conducted first to evaluate the testing apparatus (assess available ranges in flow and temperature).

Proposed FY09 Activities: Conduct rearing trials for juvenile and subadult RASU in flow-through raceways to evaluate such parameters as growth rate, condition factor, and food conversion efficiency.

Pertinent Reports: A final study plan will be available in June 2008.

Work Task C27: Small Mammal Population Studies

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$0	\$0	\$0	\$65,000	\$65,000	\$65,000	\$0

Contact: Chris Dodge, (702) 293-8115, cdodge@lc.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: MRM2, DPMO1, CRCR2, and YHCR2.

Location: System-wide along the Lower Colorado River below Hoover Dam.

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 sub-species 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.

FY07 Accomplishments: Previous work conducted on these studies was associated with presence/absence surveys completed under Work Task D10.

FY08 Activities: 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 will be made to identify cotton rat populations, including sampling known populations along the LCR. Genetic sequencing of collected samples will continue and data collected in 2007 and 2008 will be used to focus trapping efforts in 2009.

Proposed FY09 Activities: Trapping efforts will continue in 2009 and data will be compiled for a full genetic analysis in 2010.

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

Work Task C28: Nest Predation Effects on Riparian Bird Species

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$0	\$0	\$0	\$0	\$145,000	\$25,000	\$0

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

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

Purpose: Predation rates for open cup nesting passerines is one of the main reasons for nest failure (SWCA 2003-2007). 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 will be 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: New start in FY08 under G3.

FY07 Accomplishments: None.

FY08 Activities: See G3.

Proposed 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. A final report will be due in March of 2010.

Pertinent Reports: Study plan is available upon request.

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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$0	\$0	\$0	\$0	\$125,000	\$125,000	\$0

Contact: Jeff Lantow, (702) 293-8557, jlantow@lc.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, CA, and Laughlin, NV, 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, CA. 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.

BioWest, Inc. developed a non-lethal technique to remove fin-ray sections from the pectoral fin of RASU and to then age the fish under microscopic examination of the sections. The technique has been used on RASU from Lake Mead with more than 132 fish successfully aged so far.

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. (For example, did summer stockings show better survival than winter stockings? Did fish stocked near Parker Dam show better survival than fish stocked near Davis Dam?) 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.

FY07 Accomplishments: None.

FY08 Activities: See G3.

Proposed FY09 Activities: Field activities to capture RASU at spawning sites in Reach 3, removal of fin-ray sections, analyses of sections in laboratory, compilation of RASU stocking data for the Lake Havasu Fishery Improvement Project, and preparation of annual progress report.

Pertinent Reports: Study plan in preparation, to be available July 2008.

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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$0	\$0	\$0	\$0	\$100,000	\$100,000	\$100,000

Contact: Ty Wolters, (702) 293-8463, twolters@lc.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, NV; Willow Beach, AZ; Cornville, AZ.

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 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: New start in FY08 under G3.

FY07 Accomplishments: None.

FY08 Activities: See G3.

Proposed FY09 Activities: Develop testing apparatus and conduct initial tests of various treatments to prevent transport of quagga mussel larvae and adults.

Pertinent Reports: Study plan in preparation.

Work Task C31: Razorback Sucker Genetic Diversity Assessment

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$0	\$0	\$0	\$0	\$125,000	\$125,000	\$125,000

Contact: Tom Burke, (702) 293-8310, tburke@lc.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, AZ.

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 restorations sites (for example, E14).

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 has been wholly funded by Reclamation through research grants awarded to ASU in 2001 and again in 2004. A sum of \$200,701 was obligated in August 2004 for data analyses through September 30, 2007. Not all of the funds were expended during this period, so a no-cost extension was awarded in summer 2007 to extend the period of work through FY08 (to September 30, 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.

FY07 Accomplishments: Subsamples of all larval RASU were provided to ASU under FY04 agreement.

FY08 Activities: Continue to provide subsamples of larval RASU collections to ASU to be analyzed under FY04 agreement.

Proposed FY09 Activities: Collect larvae RASU from all spawning areas within the LCR MSCP area and provide to ASU. This includes river reaches, reservoirs, and off-channel habitats.

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

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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$0	\$0	\$0	\$0	\$85,000	\$100,000	\$150,000

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

Location: Native Fish Laboratory, Boulder City, NV.

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: Work began in FY07 under G3.

FY07 Accomplishments: Initial studies were conducted on RASU eggs and larvae survival versus salinity levels in holding waters. See G3 for summary of this work.

FY08 Activities: Under G3, studies will continue to refine threshold levels for RASU eggs and larvae; study designs will be developed to assess salinity thresholds for fingerling fish.

Proposed FY09 Activities: Proposed work for FY09 includes developing apparatus to test oxygen tolerances, to evaluate salinity tolerances of fingerling RASU, and to develop a study design to evaluate salinity thresholds for BONY eggs and larvae. Future work will build on these findings, evaluate temperature limits, and test composite stress levels for various combinations of salinity, temperature, and dissolved oxygen.

Pertinent Reports: A progress report for the 2007 research is in production.

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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$0	\$0	\$0	\$0	\$75,000	\$125,000	\$125,000

Contact: Jeff Lantow, (702) 293-8557, jlantow@lc.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, 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 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+ 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) from these off-channel habitats.

Previous Activities: None specific to this work task. More than 13,000 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 stocking distribution is: 5,125 to Laughlin Lagoon, 3,048 to Needles Dredge Yard pond, 2,243 to Park Moabi, and 2,918 to Bill Williams River and Bay at Bill Williams River NWR.

FY07 Accomplishments: N/A.

FY08 Activities: Under work task G3, funds will be used to support capture and harvest of 500-mm TL RASU from off-channel habitats and release these fish into Reach 3. Subsets of the 6,000 RASU (300 mm TL) scheduled for release within Reach 3 will be PIT tagged and stocked into mainstem river sections as research subjects, and subsets of these fish will be stocked into Beal Lake, Office Cove, and other off-channel habitats for potential grow-out to 500 mm TL.

Proposed FY09 Activities: Proposed work for FY09 includes continued harvest of large RASU (>500 mm TL) from off-channel habitats, continued PIT tagging of RASU >300 mm TL released into Reach 3, and final design of field investigations for FY10-13.

Pertinent Reports: N/A.

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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$0	\$0	\$0	\$0	\$60,000	\$60,000	\$0

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

Start Date: FY09

Expected Duration: FY10

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.

FY07 Accomplishments: None, new start FY09.

FY08 Activities: Preliminary samples will be collected from lakeside ponds under B7 to develop a reference collection of common cladocerans, copepods, and rotifers, and to refine budget estimates. Final study design will be developed using funds from G3.

Proposed FY09 Activities: Analyze quarterly zooplankton samples collected from approximately 25 sites.

These sites may include but are not limited to:

- Two ponds from Overton WMA (B11, Reach 1)
- Eight ponds from Lake Mohave lakeside ponds (B7, Reach 2)
- Two Needles Golf Course ponds, Beal Lake, and Office Cove (Reach 3)
- Six ponds at Achii Hanyo Fish Rearing Station and Parker Dam Pond (Reach 4)
- Six ponds at Imperial NWR (Reach 5)

Pertinent Reports: N/A.

WORK TASKS SECTION D

SYSTEM MONITORING

Work Task D1: Marsh Bird Surveys

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$25,000	\$18,767	\$98,684	\$35,000	\$35,000	\$35,000	\$35,000

Contact: John Swett, (702) 293-8574, jswett@lc.usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: System monitoring for marsh birds.

Conservation Measures: AMM1, AMM3, AMM6, MRM1, CLRA2, and BLRA2.

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 between the I-40 bridge near Needles, California, and Lake Havasu to track detections of covered species utilizing the multi-species protocol.

Previous Activities: Reclamation has monitored CLRA within Topock Gorge since 1995.

FY07 Accomplishments: Marsh bird surveys were conducted during March, April, and May 2007. Total CLRA detections ranged from 17 to 61 individuals per survey period. The 61 CLRA detected during the April survey represented the highest number of CLRA detections since May 2004 for this survey area. Total LEBI detections ranged from 5 in March to 22 during the April survey period. Two BLRA were detected during these surveys, which represent the first two BLRA detections recorded in this section of Reach 3. Data was compiled and sent to the USFWS in August 2007.

FY08 Activities: Marsh bird surveys are being conducted 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 FY09 Activities: Marsh bird surveys will be conducted 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 on the LCR MSCP Web site.

Work Task D2: Southwestern Willow Flycatcher Presence/Absence Surveys

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$925,000	\$915,331	\$2,548,430	\$575,000	\$690,000	\$690,000	\$700,000

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

Start Date: FY05

Expected Duration: FY55

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

Conservation Measures: AMM1, AMM2, AMM3, AMM5, AMM6, MRM1, MRM2, MRM4, and WIFL2.

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: Reclamation has been conducting extensive SWFL surveys and studies along the LCR since 1996, in accordance with the 1997 and 2001 BOs. In 2003, Reclamation entered into a 5-year contract to conduct presence/absence surveys 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, and conduct life history and cowbird control studies at four known population areas. In 2008, a new 5-year contract was initiated.

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

FY07 Accomplishments: Presence/absence surveys were conducted at 101 sites along the LCR and its tributaries in 2007. Life history studies were conducted at four sites, including: Pahranaagat NWR, Nevada; Mesquite, Nevada; Mormon Mesa, Nevada; and Topock Marsh,

Arizona. Studies included banding, nest monitoring, extensive vegetation analysis, and microclimate analysis. Brown-headed cowbird trapping studies were also continued.

Willow flycatchers were detected on at least one occasion at 73 sites. Resident, breeding SWFLs were detected at 11 sites within the following seven study areas: Pahrnagat NWR, Mesquite, Mormon Mesa, Muddy River, Grand Canyon, Topock Marsh, and Bill Williams. No flycatcher detections were recorded at any sites south of Bill Williams after June 20, 2007.

A total of 53 adult flycatchers were captured in 2007; 30 were new captures, and 23 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. A total of 55 nestlings from 25 nests were banded; 11 previously unbanded fledglings were also banded. A total of 77 territories were recorded in these areas with 58 territories consisting of paired flycatchers and 19 consisting of unpaired individuals. Of the 96 adult flycatchers identified to individuals in 2006, 55 (57%) were located in 2007. Of the 64 banded juveniles from 2006, 9 were recaptured and identified in 2007.

Nest success was calculated for 60 SWFL nests observed at the four life history study sites, Muddy River, Grand Canyon, and Bill Williams. Twenty-seven (45%) nests were successful and fledged young, and 33 (55%) failed. Depredation was the major cause of nest failure, accounting for 35% of all failed nests and 45% of nests that failed after flycatcher eggs were laid. Brown-headed cowbird brood parasitism was observed in 10 of 55 nests (18%). Trapping occurred at three life history sites, as access and placement problems excluded Mormon Mesa. The proportion of flycatcher nests parasitized during the pre-trapping and post-trapping periods did not statistically decline at Topock Marsh or Mesquite, but a significant decline was shown at Pahrnagat NWR after 5 years with a zero parasitism rate.

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 2007, a 5-year summary report was drafted for work conducted from 2003 to 2007. Survey and study results were compiled and management recommendations were discussed. The final 5-year summary report will be available in 2008.

FY08 Activities: Presence/absence SWFL surveys will be conducted at approximately 100-120 sites, in 15 study areas, along the Virgin River, Pahrnagat NWR, Grand Canyon below Separation Canyon (excluding Hualapai tribal lands), and the LCR to the Southerly International Boundary. 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. Reclamation has a new contract that extends through FY12. After discussions with species experts, changes to survey protocol and life history studies have been implemented in this new contract, resulting in a decrease in costs expended during the previous contract period.

Proposed FY09 Activities: Reclamation will continue to conduct presence/absence SWFL surveys along the Virgin River, Pahranaagat NWR, Grand Canyon below Separation Canyon (excluding Hualapai tribal lands), and the LCR to the SIB utilizing the 5-survey method supported by the USFWS.

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 will be discontinued and post-trap data will be collected and analyzed.

Pertinent Reports: *Southwestern Willow Flycatcher Surveys, Demography, and Ecology along the LCR and Tributaries, 2007* 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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$90,000	\$72,363	\$306,678	\$90,000	\$90,000	\$90,000	\$95,000

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

Start Date: FY05

Expected Duration: Five years after implementation of all water transfers covered under the SIA BO.

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: AMM1, AMM3, MRM1, MRM2, and WIFL 2.

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.

FY07 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. Analyses of groundwater data indicate a strong correlation between well levels and releases from Parker Dam. Data did not show strong correlations between well water levels and soil moisture. Most microclimatic variables at the habitat monitoring sites differed from those at Topock Marsh, with Topock Marsh being cooler and exhibiting higher relative humidity. Comparisons between 2006 and 2007 at the habitat monitoring sites indicated generally hotter and drier conditions in 2007. These differences existed at both the control and test sites, and could be caused by variation in regional climatic conditions.

FY08 Activities: To allow comparison of data, 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 2008 annual SWFL report.

Proposed 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 included in an annual report.

Pertinent Reports: *Southwestern Willow Flycatcher Surveys, Demography, and Ecology along the LCR and Tributaries, 2007* 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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$76,000	\$71,105	\$201,808	\$78,000	\$0	\$0	\$0

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

Start Date: FY05

Expected Duration: FY08

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

Conservation Measures: AMM1, AMM3, MRM1, MRM2, and WIFL2.

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, as well as providing data to the system monitoring program.

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

FY07 Accomplishments: The Hualapai Tribe surveyed 12 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 26, 2007. A single singing male was found at Bradley Bay, a new site on the Lake Mead delta, on the third survey (June 5, 2007). The individual was singing intermittently, but banding status was unknown, and this bird was not

encountered during subsequent surveys. No other birds were located in 2007. 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, remained in good condition.

FY08 Activities: Hualapai Tribal biologists will conduct presence/absence surveys on sensitive Hualapai tribal lands below Separation Canyon. The current agreement between Reclamation and the Hualapai Tribe extends through 2008. Reclamation will re-evaluate the need for future studies and surveys.

Proposed FY09 Activities: After the 2008 field season, Reclamation and the Hualapai Tribe will determine whether further SWFL surveys are required on Tribal lands within the Grand Canyon. Habitat degradation and recent survey results may preclude the need for additional surveys in FY09. Surveys may be initiated again in future years as conditions change or additional data is required.

Pertinent Reports: *Southwestern Willow Flycatcher Surveys in Lower Grand Canyon, FY2007* is available upon request from the LCR MSCP.

Work Task D5: Monitoring Avian Productivity and Survivorship

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$300,000	\$238,685	\$777,735	\$300,000	\$300,000	\$300,000	\$300,000

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

Start Date: FY05

Expected Duration: FY55

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

Conservation Measures: MRM1 and MRM2.

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 can not 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.

FY07 Accomplishments: During the winter, banding was conducted at Cibola NWR and at Havasu NWR, for 2 days a month, from October to March. Banding was conducted for 6 hours a day, and twelve, 12-meter nets were operated at each site. During the summer, banding was conducted at both sites using MAPS protocol. Banding was conducted once every 10-day period, at each site, for a total of 10 days of banding. Banding was conducted for 5 hours a day, beginning a half-hour before sunrise. During the winter banding period, 249 individuals were captured at the Cibola site and 132 individuals were captured at the Havasu site. During the breeding season, there were a total of 203 captures at the Cibola site and 239 total captures at the Havasu site. At the Cibola site, ash-throated flycatcher, Lucy's warbler, and Bullock's oriole were the most commonly captured species, while at the Havasu site, common yellowthroat, Bewick's wren, and Bullock's oriole were the most commonly captured species. Four LCR MSCP listed species were captured, including Gila woodpecker (two captures at the Havasu site), summer tanager (one capture at the Havasu site), willow flycatcher (undetermined subspecies; seven captures at Cibola), and yellow warbler (one capture at Cibola, and four captures at the Havasu site).

FY08 Activities: Winter banding will be continued in 2008 at the Cibola Nature Trail and Havasu NWR sites. The MAPS banding stations will be continued at both sites during the 2008 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 FY09 Activities: Intensive winter and breeding season monitoring will continue in 2008. 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, 2007, and Operation of Two Winter Banding Stations along the LCR, 2006-7* will be posted to the LCR MSCP Web site.

Work Task D6: System Monitoring for Riparian Obligate Avian Species

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY06	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$100,000	\$177,773	\$336,734	\$135,000	\$135,000	\$135,000	\$135,000

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

Start Date: FY06

Expected Duration: FY55

Long-term Goal: System monitoring for avian covered species.

Conservation Measures: MRM1 and MRM2.

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.

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 with other entities, including GBBO, USGS, and other state and federal agencies. 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.

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.

FY07 Accomplishments: After reviewing data collected during the 2005-06 breeding seasons, a monitoring plan was finalized in 2007. A double sampling rapid/intensive area search protocol was utilized. 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 were surveyed once in May. Fifteen intensive survey plots were randomly selected from the rapid survey plots. All fifteen plots were surveyed once per week throughout June. Habitat measurements were taken in the intensive plots, with points being evenly distributed in a grid pattern throughout each plot. At each point, the substrate (including the herbaceous layer) and up to three 1-meter diameter vertical zones were described. Habitat data was collected at 650 points on 15 plots.

During rapid surveys, 4,720 individuals, comprising 137 species, were recorded. During intensive surveys, 697 individuals, from 49 species, were recorded. The overall detection rate was calculated at 1.03. Rates for individual species varied widely but statistical analysis indicated that differences could have been caused by sampling error alone. Population sizes were estimated for focal species and other common species in the LCR study area. Population densities were estimated for each covered species encountered, including Gila woodpecker (90 birds/km²) Bell's vireo (462 birds/km²), summer tanagers (73 birds/km²), and yellow warbler (432 birds/km²). A draft report was written for the 2007 system-wide riparian bird surveys.

In FY07, costs for this project exceeded anticipated costs due to increased costs associated with intensive surveys protocols and analysis. In FY08, an agreement has been signed with Great Basin Bird Observatory to combine system monitoring, post-development monitoring, and habitat suitability modeling to more efficiently manage avian monitoring programs.

FY08 Activities: The draft 2007 annual report for system-wide bird surveys along the LCR was finalized in February 2008. The second year of system monitoring for avian species will begin in May 2008. One hundred and sixty rapid area search plots have been selected using a stratified random design. Rapid area searches on all 160 plots will be completed in May. Each intensive area search plot will be surveyed 1-2 times per week in June. Habitat measurements within covered species territories will be collected and analyzed. Data will be entered in a database and analyzed, and a draft report completed.

Proposed FY09 Activities: Rapid and intensive area search surveys and habitat surveys will begin in May 2009. Data will be entered in a database, analyzed, and a draft report on 2009 system avian monitoring will be completed.

Pertinent Reports: The study design is available upon request from the LCR MSCP. The 2007 annual report will be posted on the LCR MSCP Web site.

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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$500,000	\$450,165	\$904,940	\$500,000	\$540,000	\$550,000	\$550,000

Contact: Barbara Raulston, (702) 293-8396, braulston@lc.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: AMM1, AMM2, AMM3, AMM6, MRM1, MRM2, and YBCU2.

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 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.

Project Description: Yellow-billed cuckoo utilize mature 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 enables Reclamation 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: This project was a new start for FY06. Surveys were conducted at 55 sites within 17 areas. Biologists recorded 180 YBCU detections during the 2006 breeding season. Five breeding events were confirmed.

FY07 Accomplishments: Yellow-billed cuckoo surveys were conducted at 40 sites, within 14 geographic areas, between June 11 and September 9, 2007. In 2007, field biologists conducted 169 visits and recorded 163 YBCU detections. Cuckoos were detected at 25 of the 40 sites. The majority of detections (139) were at the Bill Williams River NWR. There were no detections at

the Grand Canyon National Park/Lake Mead NRA sites in 2007, compared to 29 detections in 2006 (Table 1).

Table 1. Yellow-billed Cuckoo Detections, 2006 and 2007

Geographic Area	2006	2007
Pahrnagat NWR	1	0
Overton WMA	7	0
Grand Canyon/LMNRA	29	0
Havasu NWR	1	3
Bill Williams River NWR	123	139
'Ahakhav Tribal Preserve	N/S	2
Cibola NWR	3	7
Picacho SRA	1	0
Imperial NWR	3	3
Mittry Lake WMA	0	0
Gila/Colorado River	9	2
Yuma West Wetlands	0	0
Limitrophe Division	6	2
Quigley Pond WMA	1	5

In 2007, all seven confirmed breeding sites were located on the Bill Williams River NWR. These observations included nesting observations, fledgling sightings, nest-building activities, food carrying, and copulations.

Methods for vegetation data collection were refined in 2007 to more accurately represent the general vegetation characteristics of YBCU habitat and at the nest location. In general, habitat occupied by YBCU had higher canopies, denser cover in the upper canopy layers, and sparse shrub layers compared to unoccupied sites. The upper canopy was typically dominated by native tree species in both occupied and unoccupied habitats, while the sub-canopy was either saltcedar or Goodding's willow. A distinct shrub/sapling layer was rare at occupied sites, but if present, it was typically native arrowweed or seep-willow. The dominant shrub layer within unoccupied sites was saltcedar.

Microclimate variables (temperature, relative humidity, soil moisture) were measured at occupied and unoccupied sites in both 2006 and 2007. Based largely on data from the Bill Williams River NWR for occupied sites (67%) and Grand Canyon NP/Lake Mead NRA (50%), results indicate that occupied sites are cooler during the day and more humid day and night than unoccupied sites across the entire study area. Diurnal temperatures at the Bill Williams River NWR averaged 88.9-92.5°F and minimum relative humidity was 45% and 56% for diurnal and nocturnal periods, respectively. Diurnal temperatures in occupied habitats at Havasu NWR, Cibola NWR and the Yuma Restoration Sites ranged from 98.6 to 107.6°F, and minimum diurnal humidity ranged from 25 to 38%. No apparent relationship was found between soil moisture and cuckoo occupancy. There was also no relationship detected between mean canopy cover and mean diurnal temperature or mean soil moisture. These results are based on only 2 years of data and more information is needed to make any firm conclusions about microclimate and use of habitat by cuckoos.

FY08 Activities: Activities in 2008 will include, but are not limited to, presence/absence surveys, vegetation monitoring, and microclimate data collection for the LCR in general and at habitat creation sites. Reclamation will award a new 5-year contract for YBCU surveys and life history studies for FY08-12.

Proposed FY09 Activities: Activities in 2009 will include, but are not limited to, 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. Survey effort, protocols, and studies will be modified following FY08 evaluation.

Pertinent Reports: *Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use along the Lower Colorado and Gila Rivers — 2007 Annual Report*, will be posted to the LCR MSCP Web site.

Work Task D8: Razorback Sucker and Bonytail Stock Assessment

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$325,000	\$332,621	\$805,245	\$300,000	\$350,000	\$400,000	\$400,000

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

FY07 Accomplishments: Accomplishments for this work task have been summarized by river reach for clarity.

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 (133.6 net nights) and electro-fishing (24,902 seconds), and resulted in the capture of a single RASU. Collections of larval RASU took place at all major spawning sites over the course

of the spawning season and yielded a total of 4,445 larvae. Larvae were subsequently delivered to Lake Mead SFH for rearing (B6). Species research on the Lake Mead RASU population (C13) also continued with promising results. A total of 88 RASU including 10 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 1,283 RASU into Lake Mohave in 2007. This is considerably less than in 2006 because fish are being held in grow out facilities to attain a larger size than previous years (500 mm TL versus 300 mm TL).

Lakewide surveys for native fish were conducted monthly and included both trammel netting (95 total net nights) and electro-fishing (19,086 seconds), which resulted in the capture of 71 and 67 RASU, respectively. All native fish capture data were provided to ASU for analysis and used to derive the current population estimate of 1,679 adult RASU (C12). Reclamation also assisted with stocking and tracking sonic-tagged RASU for the second year of an ASU 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, and NPS. Biweekly helicopter surveys to verify presence of RASU on known spawning beds and to search for new spawning congregations were completed during the spawning season. A total of 20,568 RASU larvae were collected and delivered to Willow Beach NFH for rearing (B2).

Reach 3 (Davis Dam to Parker Dam or Lake Havasu): Reclamation participated in the ongoing multi-agency native fish round-up, and collected data from spring and fall electrofishing surveys by LCR MSCP partners. An additional electrofishing survey was conducted by Reclamation from Needles, California, down through Topock Gorge to look for young-of-year native fishes. During this last survey, RASU, which had been stocked only weeks earlier at both Laughlin Lagoon near Davis Dam and at Bill Williams River near Parker Dam, were captured at the Needles Dredgeyard backwater in Needles. These fish had moved 30 miles downstream and 50 miles upstream, respectively, in a 2-week period.

Under the Fish Augmentation Program, 7,080 RASU and 5,118 BONY were stocked into Reach 3 during calendar year 2007. For both species, this is slightly more than the annual targets (6,000 RASU and 4,000 BONY).

The second field season of FLSU surveys associated with C15 was completed, and the RASU population was monitored through Work Task G3. Data were collected using dive surveys, seines, trammel nets, hoop nets, and electrofishing. Electrofishing proved most effective in sampling riverine populations of native suckers and will provide increased accuracy in the development of mark/recapture population estimates in 2008.

The FLSU population estimate based on netting and electrofishing was 2,471, calculated based on more than 100 contacts between Davis Dam and RM 257. The RASU population was congregated near Needles during the spawning months and a population estimate of 1,200 fish was calculated based on more than 500 contacts. The majority of the 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 84,000 seconds of electro-fishing resulted in capture of 336 RASU. Trammel netting effort was for 300 net-nights and resulted in 539 RASU captured. A radio telemetry study was initiated to examine post-stocking dispersal. Studies were initiated to determine possible effects of RASU that imprint on surface feeding and remain near the surface after stocking.

During calendar year 2007, Reclamation stocked 12,750 RASU and 4,019 BONY into the Colorado River within Reach 4/5.

Native fish ponds were completed at Imperial Refuge and four ponds were stocked with adult RASU and BONY (see C25).

FY08 Activities: Monitoring will continue with effort similar to 2007. An agreement was reached with CRIT whereby Reclamation and USFWS will conduct surveys along the lower river near Parker, Arizona. This area has not been efficiently surveyed for more than 10 years. As requested by the USFWS, and to assess the amount the total amount of netting, electrofishing, and/or similar activities directed toward these species, a table of field activities for monitoring RASU, BONY, and FLSU will be developed.

Proposed FY09 Activities: Monitoring data will be collected for reaches 1 through 5.

Pertinent Reports: The status report for RASU and BONY in the LCR MSCP area through the end of calendar year 2007 is in preparation and will be posted to the LCR MSCP Web site.

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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$100,000	\$89,832	\$244,719	\$100,000	\$130,000	\$130,000	\$130,000

Contact: Theresa Olson, (702) 293-8127, toloson@lc.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: AMM1, AMM6, MRM1, WRBA1, WYBA1, CLNB1, PTBB1, WRBA2, and WYBA3.

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.

FY07 Accomplishments: Through coordination with state and Federal resource agencies and other interested parties, an LCR system-wide distribution and demography monitoring plan and protocol was developed for the LCR MSCP covered bat species.

A grant was awarded to AGFD for coordinating the collection and analysis of acoustic bat data for system-wide monitoring of the LCR. The geographic distribution and habitat use by the four bat species will be evaluated and the success of cottonwood-willow restoration efforts for these species will be assessed. Recommendations for habitat creation projects will be made to accomplish objectives.

Out-flight counts were conducted in January and May 2007 on several mines including Stonehouse, Mountaineer, Californian, Islander, Pilot Rock, Jackpot, Gold Dome, Eureka, Golden Dream, 3C, and Heart mines. The cave *Myotis* maternity colony has accepted the gates at the Stonehouse Mine, as have the male California leaf-nosed bats. However, the majority of the female California leaf-nosed bats were using the upper shafts on the other side of the canyon. A harp trap was placed at the Mountaineer mine to determine breeding status. No female cave *Myotis* were captured at the Mountaineer Mine. However, three lactating Townsend's big-eared bats were caught, along with several lactating big brown bats and pallid bats. Male cave *Myotis*, Yuma *Myotis*, pallid bats, California leaf-nosed bats, big brown bats, and a Mexican free-tailed bat were also captured.

Mist netting of bats was accomplished at several sites including Bill Williams River NWR, Havasu NWR, Cibola Nature Trail, and Imperial NWR. At Bill Williams River NWR, two male California *Myotis*, one lactating Yuma *Myotis*, one male pallid bat, and two male and three lactating western pipistrelles were captured. At Cibola NWR, we caught a male California leaf-nosed bat, a male California *Myotis*, and one male and one pregnant female pallid bat. No bats were captured at Havasu NWR or Imperial NWR due to weather.

FY08 Activities: Acoustic surveys will continue for covered bat species along the LCR. 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). Permanent Anabat monitoring stations will be placed—one in each of LCR MSCP reaches 3 through 6, along the river, coupled with weather recorders, to ensure that migration pulses along the river are detected and to help identify any differential use of the various river reaches by the four covered and evaluation bat species.

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. Because of the number of cooperators involved with monitoring along the LCR, there is a need for a centralized database where acoustic bat files can be stored and accessed. The AGFD will incorporate this capability into the existing AGFD bat database, which was developed to store and analyze other types of bat data collected throughout the state by AGFD and external cooperators. The AGFD database was intended to allow access

by the external cooperators for input, storage, and analysis and would be a logical place to centralize the acoustic data gathered under the LCR MSCP. These data will be linked to the LCR MSCP database.

Proposed FY09 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: No reports were completed in 2007 as the system-wide surveys are just beginning, and a final mine survey summary report for years 2004-2008 will be prepared in 2008.

Work Task D10: System Monitoring and Studies on Small Mammal Populations

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$65,000	\$27,484	\$46,828	\$0	\$0	\$0	\$0

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

Start Date: FY06

Expected Duration: Closed FY07

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

Conservation Measures: MRM2, DPMO1, CRCR2, and YHCR2.

Location: System-wide along the Lower Colorado River below Hoover Dam.

Purpose: Implement distribution, habitat, and genetics studies for system monitoring of LCR MSCP covered small mammal species. These studies are being conducted to determine geographic range limits of the Yuma hispid cotton rat and the Colorado River cotton rat, and to determine habitat characteristics utilized by these species. Data will be used in 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. Studies on genetics, distribution, and habitat requirements were moved to Work Task C27 in FY08.

Project Description: Studies will be designed to determine the habitat usage, population status, genetic differentiation, and distributional range of two covered small mammal species: the Colorado River cotton rat and the Yuma hispid cotton rat. Reclamation will trap in various habitat types along the LCR to collect genetic samples from these species. Samples will be sent to a genetics laboratory for DNA analysis to determine the species of each animal sampled. Genetic differentiation data for animals captured along the LCR may 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. In conjunction with this work, Reclamation will also initiate a 3-year study to determine the general distribution and habitat usage of these species along the LCR. The 3-year study will better define the habitat characteristics utilized by the two species of cotton rats, and will be used to design future habitat creation projects.

Previous Activities: Cotton rats have been captured at the Pratt Agricultural and at the Cibola Nature Trail site in previous years during presence/absence surveys.

FY07 Accomplishments: After completion of species accounts (C3), data gaps were identified for Colorado River cotton rat and Yuma hispid cotton rat. Initial work tasks focused on determining species genetic differentiation (C27). A study design was completed to determine species genetic differentiation in FY07. This study was initiated in FY07 utilizing funds from this work task. Presence/absence surveys were conducted at several sites to gather data on distribution and to refine protocols.

FY08 Activities: Moved to C27.

Proposed FY09 Activities: Moved to C27.

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

**WORK TASKS
SECTION E**

**CONSERVATION AREA DEVELOPMENT
AND MANAGEMENT**

Work Task E1: Beal Lake Riparian Restoration

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate*	FY11 Proposed Estimate*
\$358,000	\$198,890	\$2,096,535	\$150,000	\$180,000	\$180,000	\$180,000

*These estimates, which reflect continued management, will be revised to reflect decisions made in FY09.

Contact: Gail Iglitz, (702) 293-8138, giglitz@lc.usbr.gov

Start Date: FY04

Expected Duration: FY09 decision point

Long-term Goal: Restoration research.

Conservation Measures: WIFL 1, WRBA 2, WYBA 3, CRCR 2, YBCU 1, ELOW 1, GIFL1, GIWO 1, VEFL 1, BEVI 1, YWAR 1, SUTA 1, MNSW 2.

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 amounts 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. Monitoring will determine if these methods can produce the desired results:

1. Produce densities of cottonwood and willow high enough to shade out competing nonnative vegetation and provide habitat for SWFL.
2. Provide habitat for other LCR MSCP targeted species.

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.

FY07 Accomplishments:

Maintenance/Restoration/Management: During FY 07, 107 acres were irrigated using an average of 17 af/ac water. An irrigation schedule and further details on management will be available in the *Beal Riparian and Marsh Restoration Annual Report, 2007*.

Irrigation and maintenance activities were greatly enhanced through an interagency agreement between the USFWS and Reclamation to fund a term position at Havasu NWR through FY09. This employee is dedicated to the project full time and is responsible for all irrigation activities, maintenance of berms, weed control, pump maintenance, and other miscellaneous duties associated with Reclamation’s LCR MSCP activities on Havasu NWR.

Management included extensive irrigation (at least once per week) at the center of the site to encourage growth of recently planted vegetation and utilization by SWFL as the habitat progresses from cottonwood-willow (CW) III and IV to CW I and II. Water retention features installed to maintain wet or moist soils within these areas are still in place in Field K and most are holding moisture post-irrigation longer than surrounding soils.

During FY 2007, high mortality of coyote willow was observed. The site may be too sandy to retain the moisture needed for coyote willow if it is planted too far from the irrigation valves. Coyote willow directly adjacent to the valves is thriving. Goodding’s willow in some of the outer fields is also experiencing high mortality. Soil testing has been conducted and results do not indicate this is due to an increase in soil salinity. The cottonwoods have grown vigorously and do not appear to be impacted.

Plant materials collected at the project site were used for restoration activities at the Colorado River Indian Tribes' 'Ahakhav Tribal Preserve (E3), Palo Verde Ecological Reserve (E4), Cibola Valley Conservation Area (E5), and the Needles-Topock bankline stabilization project (E19).

Habitat Monitoring: Five permanent vegetation monitoring plots were established at the project in fields A (mesquite monthly watering), B (cottonwood monthly watering), D (cottonwood willow monthly watering), P (cottonwood weekly watering), and Q (cottonwood willow weekly watering).

The overstory was comprised of screwbean mesquite, Fremont cottonwood, and Goodding's willow. Overstory tree densities ranged from 567 trees/ac (Field A) to 1,431 trees/ac (Field P). Total canopy cover ranged from 43-78%. The shrub layer was comprised of Goodding's willow, coyote willow, screwbean mesquite, saltcedar, arrowweed, and *Baccharis*. Shrub densities ranged from approximately 500 shrubs/ac (Field B) to over 60,000 shrubs/ac (Field A).

Ten permanent HOBO data logger stations were established in July 2007 to record micro-climate data; data was downloaded every 3 months. Groundwater level measurements were measured every month at 14 locations.

Avian Monitoring: Post-development avian monitoring was conducted utilizing the double sampling intensive and rapid area search method during the breeding season (May-July). The project site was divided into four plots. Two rapid area search surveys were conducted in each plot and seven intensive area search surveys were conducted in two of the plots. Approximately 53 birds/ac, comprising 24 species, were detected. The most abundant species detected were the great-tailed grackle, house finch, red-winged blackbird, and mourning dove. Two LCR-MSCP species, Arizona Bell's vireo and yellow warbler, were detected in low densities (0.5 birds/ac).

Tape playback surveys for the southwestern willow flycatcher were conducted. Two willow flycatchers were detected; however, neither of these individuals were seen nesting nor were located after June 21, 2007 and were assumed to be migrants. There were no tape playback surveys conducted in FY07 for the yellow-billed cuckoo; however, one bird was detected during general bird surveys.

Mammal Monitoring: Small mammal monitoring was implemented during the spring and fall. A total of 81 individuals, comprising seven species, were captured. No LCR MSCP covered species were captured. The cactus mouse was the most abundant species captured.

Bat Monitoring: Acoustic bat surveys were conducted at four locations quarterly (January, April, July, and November). Two nights were sampled at each location per quarter. Mist-netting surveys were conducted in July. The most minutes of bat activity were recorded for the 45-55 Khz species group (California *Myotis*, Yuma *Myotis*, western pipstrelle), 25-30 Khz species group (big brown bat, Brazilian free-tailed bat, pallid bat), and the western pipstrelle. LCR MSCP covered species detected included the western red bat and the western yellow bat. LCR MSCP evaluation species detected included the pale Townsend's big-eared bat and the California leaf-nosed bat. Four Yuma *Myotis* were caught during mist-netting surveys.

Insect Monitoring: Insect monitoring was conducted during one 24-hour period in May. Three Malaise traps were placed within cell K where several artificial pools had been installed. One trap was placed above a pool, one trap was placed between two pools, and one trap was placed away from pools. A total of 1,275 spiders and insects, comprising nine orders, were captured during the 24-hour period. The most abundant order captured was flies and gnats. The traps atop a pool and away from pools caught more bees and wasps and fewer flies and gnats than average. The trap between pools caught more flies and gnats and fewer bees and wasps than average.

FY 08 Activities:

Management/Maintenance: During the breeding season, the field in the interior of the site will be irrigated at least once per week to provide moist microclimate conditions that may encourage SWFL use. Irrigation of the surrounding habitat will be based on the results of soil testing to determine salinity buildup, and on the age and species of the trees. The habitat will be evaluated through monitoring to determine irrigation impacts, and whether additional management is required, such as weed control and replanting. Cover crops that have been planted will be replanted and irrigated as needed. Saltcedar and other weed control may be conducted. This site may also be used as a source for plant material for restoration at other LCR MSCP sites.

Saltcedar control and replanting specific areas with cottonwood and willow is scheduled to be conducted in January-February 2008.

Monitoring: Post-development monitoring of abiotic and biotic habitat characteristics will be conducted in accordance with the Development and Monitoring Plan. Microclimate, including temperature and relative humidity, will be monitored throughout the year. Water depth at 14 wells will be measured once per month throughout the year. Land cover type will be classified using the Anderson and Ohmart classification system. Post-development monitoring for avian, small mammal, and bat species will be conducted. Tape playback surveys for the southwestern flycatcher and the yellow-billed cuckoo will be conducted during the breeding season.

Proposed FY09 Activities:

Management/Maintenance: Management through irrigation, weed control, and cover crop maintenance will continue as in FY08. 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: Post-development monitoring for habitat, avian species, small mammal species, and bats will continue. Data will be obtained, analyzed, and utilized to make on-site management decisions.

The project is scheduled to be re-evaluated to determine future actions in FY09.

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 in review prior to posting on the Web site.

Work Task E2: Beal Lake Native Fish

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$100,000	\$91,325	\$576,737	\$50,000	\$70,000	\$50,000	\$50,000

Contact: Gregg Garnett, (702) 293-8644, ggarnett@lc.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 and 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 keep up with evaporative losses in Beal Lake), Reclamation decided to test a new technology that would supplement water flow into Beal Lake and would be effective in excluding 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 have been 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 has been 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.

FY07 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. Fish and water quality monitoring protocols specific to Beal Lake were determined and are covered in Work Task F5. Future management actions at Beal Lake will be guided by information acquired through these monitoring activities. No additional construction activities were pursued during FY07.

Other expenditures included regular cleaning and maintenance of the screen system and control structures. In addition, part of the FY07 funding 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. The system's water level sensors were replaced and the Web site for real-time data was upgraded. Results from previous research studies of the screen system at Beal Lake were presented at the Bioengineering Symposium section of the American Fisheries Society's annual national meeting. A manuscript with this research is currently in preparation and is expected to be submitted for peer review and publication in FY08.

FY08 Activities: No major construction projects are anticipated for Beal Lake in FY08. Restoration activities covered under this work task will be limited to continued coordination with USFWS regarding fisheries management and maintenance of the features in place at Beal Lake.

Other expenditures in FY08 will include continuation of the restoration research component at Beal Lake. A portion of funding for restoration research in FY08 will be supported by G3 (Adaptive Management Research Projects). This includes continuation of long-term monitoring

of the screen system at Beal Lake to determine long-term effectiveness and maintenance requirements and costs. In addition, a final third-phase in-situ evaluation of this technology's effectiveness will be conducted to determine exclusion potential and entrainment rates in a real-world application.

Proposed FY09 Activities: Coordination with resource agencies will continue to determine future operations and maintenance of existing features at Beal Lake. 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.

In FY09 the screens may be removed for inspection, cleaning, replacement of hardware, and cleaning of the screen culvert pipes. The proposed FY09 funding estimate reflects these additional tasks. Water quality and fisheries monitoring activities will be coordinated with USFWS and are covered under F5.

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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY010 Proposed Estimate	FY11 Proposed Estimate*
\$60,000	\$94,431	\$1,229,730	\$145,000	\$145,000	\$145,000	\$145,000

*These estimates, which reflect continued management, will be revised to reflect decisions made in FY09.

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

Start Date: FY04

Expected Duration: FY09 Decision Point

Long-term Goal: Restoration research.

Conservation Measures: CLRA, WIFL1, WRBA2, WYBA-3, CRCR2, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, and MNSW2.

Location: Reach 4, Colorado River Indian Tribes, river miles 173-174, AZ.

Purpose: This demonstration project is designed to test planting, maintenance, and irrigation methods on fallow agricultural fields while developing more than 200 acres of cottonwood, willow, and mesquite.

Connections with Other Work Tasks (past and future): Vegetation and species monitoring are being addressed in F1-F4.

Project Description: In September 2004, Reclamation finalized a 5-year agreement with CRIT to conduct habitat restoration at the ‘Ahakhav Tribal Preserve (Preserve), located just south of Parker, Arizona. This agreement expires in FY09 at which point a decision will be made to continue restoration activities, manage created land cover types for the 50-year term of the LCR MSCP, or discontinue funding.

In 1995, CRIT established the Preserve to protect fish, wildlife, and plants in the riparian areas along the river. Reclamation began assisting the Preserve with restoration activities in 2003, prior to implementation of the LCR MSCP. A variety of methods and techniques such as seeding and planting cuttings of various sizes are being used to create approximately 200 acres of cottonwood-willow and mesquite land cover types on out-of-production agricultural areas dominated by tumbleweed and sparse saltcedar. All work is done in an effort to evaluate efficient and cost-effective methods for various revegetation projects. Maintenance and management of approximately 154 acres of riparian land cover types created since 2003 is ongoing, and an additional 88 acres of restoration are planned.

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 the process.

FY07 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 af/ac 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 cleared of all debris and leveled in preparation for development. A 2000-ft irrigation ditch with three gates and 20 ports on each side was completed. A weir box and pump platform were installed adjacent to the main canal to pump water into the ditch for irrigation. A draft development or study plan for CRIT 10 is in preparation.

A topographical survey was conducted on CRIT 10 and CRIT 11 (30 acres) in March. In September, a malfunction in a gate on the main canal occurred, spilling water across the agricultural fields and through CRIT 11 before flowing into the backwater below CRIT 11. This washed out an area approximately 1 acre in size, and in places, more than 7 feet deep and 35 feet wide. This area may be incorporated into design plans for CRIT 11, taking advantage of the 1-acre area that is now 7 feet closer to the water table.

Reclamation and CRIT are in discussions regarding a future 50-year land use agreement. This agreement will solidify which areas on the Preserve will be included in the LCR MSCP, roles and responsibilities of each partner, and management plans for all created habitat.

Habitat Monitoring: Overstory cottonwood-willow tree density averaged 146 trees/ac. Overstory trees averaged 43 feet tall and 6.7 inches DBH. Average canopy cover was 55%. Average shrub density was 24 shrubs/acre within the cottonwood-willow stands. In the mesquite dominated habitat, average canopy cover was 90%, shrub density was 20 per acre, and tree density was 161 per acre. Mesquite trees averaged 22 ft in height. Depending on plot location, shrubs consisted of coyote willow, screwbean mesquite, honey mesquite, and *Baccharis* spp.

Avian Monitoring: In 2007, a double sampling area search protocol was used to monitor avian species. Rapid area search surveys and intensive territory mapping surveys were conducted at the site to estimate abundance and detection ratios. Total bird density detected was approximately 71 birds/acre, comprising 23 species. Two LCR MSCP covered species, the summer tanager and the vermilion flycatcher, were detected at very low densities. No willow flycatchers were detected using playback surveys. One yellow-billed cuckoo was detected during June, but none were detected in follow-up visits.

Bats Monitoring: During two nights of mist netting, 26 bats, comprising 7-8 species, were captured, including California *Myotis*, cave *Myotis*, Brazilian free-tailed bat, California leaf-nosed bat, Yuma *Myotis*, pallid bat, and western yellow bat.

FY08 Activities:

Maintenance/Restoration/Management: Reclamation is assisting CRIT with management plans for CRIT 9. Recently replanted vegetation immediately adjacent to the irrigation ditches will be flooded approximately once per week during the SWFL breeding season to determine if a moist, humid microclimate is possible at this site.

Once irrigation testing occurs in CRIT 10, a cover crop of alfalfa will be planted to stabilize the group prior to riparian vegetation or conducting a research project. Drafting and posting of the CRIT 10 development plan in FY08 will describe both the development and monitoring techniques to be used on CRIT 10. Reclamation will continue to work with CRIT to finalize a Land and Water Use Agreement in 2008.

Monitoring: Pre-development monitoring will be implemented in CRIT 11. Post-development monitoring of abiotic and biotic habitat characteristics will continue in CRIT 9. The created land cover types will be classified by using the Ohmart and Anderson vegetation classification system. Post-development monitoring for avian species will be conducted in 2008.

Proposed FY09 Activities:

Maintenance/Restoration/Management: CRIT 9 and 10 will continue to be irrigated and maintenance activities will be implemented as needed.

Options for restoration of CRIT 11 are being evaluated, but would not be implemented until a restoration development and monitoring plan has been drafted and development of CRIT 10 is complete. Topography at CRIT 11 could be used to simulate a natural tiered riparian corridor. Installation of irrigation infrastructure and planting of an appropriate cover crop maybe implemented at CRIT 11 in FY08. CRIT 11 may be planted with appropriate vegetation, based on soil sampling and irrigation capabilities determined through site preparation and planning.

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.

For CRIT 9, before or in FY09, a determination will be made between the CRIT and the MSCP to determine the long-term commitments of each party. This agreement is anticipated to take the form of a land use agreement. Concurrently, future actions and commitments for CRIT 10 and 11 will also be re-evaluated.

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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$976,000	\$782,488	\$1,439,719	\$1,185,000	\$1,250,000	\$1,800,000	\$1,800,000

Contact: Gail Iglitz, (702) 293-8138, giglitz@lc.usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Habitat creation.

Conservation Measures: CLRA1, WIFL1, WRBA2, WYBA3, CRCR2, YHCR2, LEBI1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, and MNSW2.

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 C6.

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.

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

It is 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 by methods of planting used. Mesquite trees are generally planted by the use of 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. However, standing or saturated soil areas for covered species may need to be created or amended, and managed throughout the term of the program.

Previous Activities: PVER is being developed in phases over a number of fiscal year. Through FY06, Phase 1 was planted and created a 31-acre native plant nursery. Additional information, including restoration development and monitoring plans are available online.

FY07 Accomplishments: *The Palo Verde Ecological Reserve Development Plan: Phase 3* document was reviewed and approved by CDFG.

In the spring of 2007, Phase 2 was implemented when more than 128,000 coyote willow, Goodding's willow, *Baccharis*, and Fremont cottonwood were mass transplanted on 55 acres in 3 days, along with a 1-acre area of saltgrass. An additional 20 acres were hand planted with approximately 20,000 coyote willow, Goodding's willow, and Fremont cottonwood for a total of 75 planted acres of cottonwood-willow land cover type. To limit the invasion of weeds, a dense cover crop of ryegrass and alfalfa was seeded 5 days prior to the mass transplanting.

In October, over 900 honey mesquite trees and 2,700 *Atriplex* plants were planted in check 1, covering approximately 7 acres. The alfalfa-ryegrass cover crop was mowed for ease of planting. The mesquite trees were hand planted, while the *Atriplex* was planted using dibble bars. Fall planting was completed in 5 hours.

Throughout the 2007 growing season, minimal weed infestations were identified and controlled with manual techniques (removing by hand) or applying chemicals such as Roundup. In July the cottonwood trees in the nursery became infested with lace bugs. An aerial application of a pesticide was completed and within 5 days the trees showed a remarkable recovery.

A wind storm came through the area in October damaging over 50 nursery trees; however, no damage was apparent to the younger trees in Phase 2. The damaged trees suffered breakage at ground level and some were topped. We plan to leave the trees as is because removal is not necessary or cost effective at this time. It is quite probable that most trees will recover and stump sprout next spring. The remaining trees within the nursery have grown substantially and will allow the trees to be utilized for cuttings intended for 2008 plantings at restoration sites. Collection of plant material by the contractor occurred in November and December 2007.

Vegetation Monitoring: During the spring 2007 planting, species composition was 44% coyote willow, 36% Goodding's willow, 13% cottonwood, and 7% *Baccharis*. Initial survivorship of trees 4 months after planting was 99%.

Vegetation monitoring plots were established in the Nursery and Phase 2. The nursery, planted in March 2006, was classified as CW II. The average height of cottonwood trees in the nursery was 20 ft and average willow height was 22 ft. The understory consisted largely of alfalfa, which had been planted as a cover crop prior to nursery establishment. Phase 2, which was planted in March 2007, was classified as CW VI. After the first growing season, the average height of cottonwood trees was 7.2 ft. Bermuda grass was the dominant groundcover/understory.

Bird Monitoring: Point counts surveys were conducted for pre-development monitoring. Area search protocol was used to conduct post-development monitoring. Red-winged blackbirds were the most abundant species detected during both surveys. No LCR MSCP avian covered species were detected.

Small Mammal Monitoring: During March 2007, pre-development trapping for small mammals was conducted in Phase 2, resulting in the capture of one species, the deer mouse. Small mammal diversity increased somewhat post-development with the capture of *Mus musculus*, cactus mouse, and desert pocket mouse in November 2007. In the nursery, only nonnative house mice were captured during post-development trapping. House mice were the most abundant species captured in both the nursery and Phase 2.

Bat Monitoring: Several bat species were detected at PVER during quarterly surveys. Activity was highest in July, followed by November, April, and January. Species recorded included western pipistrelle, pocketed free-tailed bat, cave *Myotis*, hoary bat, California leaf-nosed bat, western red bat, mastiff bat, western yellow bat and silver-haired bat.

FY08 Activities: The development of Phase 3 (80 acres) is the focus in FY08. The ground will be prepped for Phase 3 planting, which includes disking, laser leveling, and plowing as needed to mass transplant the trees and shrubs. Since the dense matting of cover crop was successful with reducing weed infestations in Phase 2, this method will be utilized in Phase 3. In the checks planted with cottonwood-willow land cover types, alfalfa and ryegrass will be seeded as a cover crop. Mass transplanting of approximately 80 acres of riparian species (approximately 120,000 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. Honey mesquite will be hand planted in the fall. 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 the flexibility to rework the borders if needed, without disturbing the trees and shrubs.

Weeds will be managed with the application of a pre-emergent herbicide, manual removal where possible, and target herbicides. Visual monitoring for destructive insects will continue and when applicable pesticides may be used.

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

The plan and design for Phase 4 development of approximately 108 acres will be drafted. In Phase 4, cottonwood-willow land cover type will be established to provide habitat for SWFL.

Monitoring will be conducted in accordance with the posted development plans. Vegetation monitoring will occur annually for the next several years as the stands change quickly as they mature. Pre- and post-development monitoring for avian, bat, and small mammal species will continue.

Proposed FY09 Activities: Field preparation and planting of Phase 4 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 108 acres will be conducted. The plan and design will be developed for continued expansion of riparian habitat and will be included in Phase 5.

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, and the *Palo Verde Ecological Reserve Restoration Development Plan: Phase 3*, which described the restoration activities planned for FY08 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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$2,656,000	\$3,397,386	\$4,808,031	\$1,703,000	\$1,000,000	\$1,100,000	\$1,200,000

*Actual expenditures include securing all 1,309 acres of land and 1,300 acre-feet of water.

Contact: Bill Singleton, (702) 293-8159, wsingleton@lc.usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Habitat creation.

Conservation Measures: CLRA1, WIFL1, WRBA2, WYBA3, CRCR2, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1 and MNSW2.

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 (ADFG) acquired the CVCA in September 2007 through a multi-organization agreement involving the ADFG, Reclamation, the Mohave County Water Authority, and The Conservation Fund.

Through the agreement, the ADFG acquired the fee title to the property subject to an existing long-term lease of the land and water rights to Reclamation, expiring April 5, 2055, as part of the Lower Colorado River Multi-Species Conservation Program. Short-term leases of the land to farmers for crop production also exist on portions of the acquired land. The primary purpose of the LCR MSCP at the CVCA is to replace existing agricultural fields with native riparian cottonwood, willow, and mesquite land cover types that would be managed as habitats for LCR MSCP covered species.

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 LCR and a remnant oxbow on the west side of the river (Palo Verde Oxbow). It is farmed primarily for cotton and alfalfa. It is bordered to the south by Cibola NWR and on the east by unimproved land under the jurisdiction of BLM. The river forms the north and west boundaries, except for the Palo Verde Oxbow, from river miles 98.8 to 104.9.

Reclamation has exercised their option to secure up to 1,300 acre feet per year from the MCWA and up to 1,500 acre feet per year from the Hopi Tribe. The one-time fee to secure this fourth-priority Colorado River Water is \$1,690 per acre feet adjusted for inflation. In addition, Reclamation already maintains a fourth-priority entitlement of 118.94 acre feet per year at CVCA.

Research is continuing with the University of Arizona exploring the relationships between soil water supply and tree physiological response. The project will conclude in February 2009.

Previous Activities: CVCA is being developed in phases over a number of fiscal year. Through FY06, Phase 1 has been planted. Phase 1 consisted of a 22-acre native plant nursery and approximately 64 acres of cottonwood-willow land cover. This nursery was established initially as an on-site native plant nursery for future plant stock collection and may be managed for habitat after other nurseries have been developed for the LCR MSCP. Additional information, including restoration development and monitoring plans are available online.

FY07 Accomplishments: The *Cibola Valley Conservation Area Restoration Development Plan: Overview, Phase 1, Phase 2, and Phase 3* were completed and posted on the LCR MSCP Web site. Planning for development and creation of habitat on CVCA continued.

Ivyleaf morning-glory once again invaded the fields in both Phase 1 and to a smaller degree, in Phase 3. The invasion was not as widespread as in the previous year. Several herbicides, such as Caparol and Roundup, were tried unsuccessfully in control areas to control this aggressive plant. The decision was made to utilize a 36-inch DR® field and brush mower to help remove the morning-glory by cutting it without damaging the existing tree crop.

A chemical drift problem (2,4-D amine) was detected this summer in the CVCA area. The State of Arizona investigated chemical drift complaints that were affecting the health of these trees and other farmers' crops. The source of the chemical was never determined; however, some areas in Phase 1 were affected.

Phase 1 had a total of 15.1 acres of cottonwood and willow trees replanted in March 2007. This area was previously mowed/swathed due to damage caused by morning glory in 2006. Additionally, Field B-2 consisting of 4.8 acres was planted due to an original plant shortage in 2006.

The University of Arizona continued to conduct irrigation regime research in Phase 1 to gather soil moisture and irrigation data for future sites. This 3-year field experiment will evaluate the response of three native tree species to two different surface irrigation regimes and fertilization. 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 measured monthly.

Acting on advice from the local farm advisory board and the contract farmer, Phase 2 was left fallow during 2007 in an attempt to reduce the morning glory seed bank in the soil. The advisory board was formed to address farming issues, tap into local resources, and provide information to

the local communities. The acreage was irrigated monthly to encourage morning-glory propagation, then was disked to remove morning-glory plants.

Phase 3, a 105-acre parcel, was planted in March 2007 in accordance with the Phase 3 restoration development plan with approximately 217,000 coyote willow, Goodding's willow, and Fremont cottonwood. A cover crop was not planted in this phase. Instead, a preemergent, Prowl®, was applied prior to planting, to control invasives. This created 92.3 acres of cottonwood-willow land cover.

In October 2007, approximately 800 honey mesquites and 4,300 *Atriplex* were planted in check 3-9 of Phase 3 (7.6 acres). The mesquite trees were hand planted in holes initially augered by Bobcat loader. The *Atriplex* was hand planted using dibble bars.

Habitat Monitoring: Pre- and post-development habitat monitoring was conducted at Phase 1, Phase 2, Phase 3, and at the control site on CVCA. Soil samples were analyzed. Most nutrients and salinity levels were within normal parameters. Nitrogen was low on Phase 3 and fertilizer was added. Vegetation data was collected at Phase 1 and Phase 3. Both of these locations were typed as cottonwood-willow vegetation types. However, the structural types are different, as related to stand age. Phase 1 was classified as CWII and Phase 3 was classified as a CWIII/CWIV structural type. Average total overstory tree height for Phase 1 Field C was 19.3 ft. Stem density was estimated at 1,717 stems/ac. Canopy closure was estimated by spherical densiometer at 84.5%. Both Goodding's willow and Fremont cottonwood were measured in Phase 3. Stem density was estimated at 2,679 stems/ac. Average overstory tree height was 13 ft. Cottonwood trees averaged 15.7 ft tall and 1.0 in DBH. Goodding's willow averaged 10.8 ft tall and 0.6 in DBH. Canopy closure was estimated at 68.6%.

Avian Monitoring: Avian monitoring was conducted on Phase 1, Phase 2, Phase 3, and the control site. Approximately 24 species were observed at all the sites with the control site having greatest species diversity, but Phase 3 having greatest species richness. There were no LCR MSCP covered species detected at CVCA in 2007. The most abundant species detected were the red-winged blackbird (*Agelaius phoeniceus*), cliff swallow (*Petrochelidon pyrrhonota*), horned lark (*Eremophila alpestris*), and the brown-headed cowbird (*Molothrus ater*).

Small Mammal Monitoring: Small mammal trapping was conducted on Phase 1, Phase, 3 and the control site. In February-March, no small mammals were captured on Phase 1; 1 deer mouse (*Peromyscus maniculatus*) was captured on Phase 3; and 2 deer mice and 1 Merriam's kangaroo rat (*Dipodomys merriami*) were captured at the control site. In November, 31 small mammals were captured on Phase 1, 4 on Phase 3, and 0 on the control site.

Bat Monitoring: Acoustic bat surveys were conducted using Anabat II bat detectors coupled to zero-crossing analysis interface modules (ZCAIMs). A total of 42 detector nights were completed for six CVCA sites. A total of 3,052 call files were obtained, edited, and identified to species or species group. Three LCR MSCP covered and evaluation species were detected at CVCA, including western red bat, Townsend's big-eared bat, and California leaf-nosed bat.

Expenditures in FY07 were greater than estimated due to the opportunity for the one-time purchase of all 1,300 acre feet of water from MCWA. The estimated FY07 budget reflected only a portion of the purchase of 1,300 ac-ft of water secured.

FY08 Activities: Phase 2 (80 acres), originally scheduled for planting in FY07, was postponed due to morning-glory concerns and will be planted in FY08. The agricultural fields will be mechanically disked, laser leveled, and plowed as needed to prepare the ground for mass transplanting the trees and shrubs. The irrigation infrastructure for phases 1 and 2 will be repaired as needed to provide irrigation water. Main access roads will be graveled with Type-II base to control dust, in accordance with local regulations.

The plants will be planted in furrows with a plant in-line spacing of 5 feet and a furrow row spacing of 40 inches. The site will be divided into 10 checks, with 9 of the checks planted with cottonwood-willow land cover types. One check will be planted with mesquite and *Atriplex*. Mass transplanting approximately 80 acres of riparian species (approximately 177,000 of cottonwood, willows, *Atriplex*, and *Baccharis*) will occur in March. The approximately 220 mesquite will be hand planted in the fall, due to the length of time it takes to grow 1-gallon plants.

Weeds will be controlled with the application of preemergents and by mechanically cultivating the furrows during the first year of growth. Specific herbicides may be used as necessary to target certain locations. A cover crop will not be applied as done in Phase 1. The cover crop, usually alfalfa, was used to create a dense mat, hindering the growth of invasive nuisance plants. Utilizing a cultivator should keep the furrows weed free. After the first growing season, when the trees are too tall for a tractor and cultivator to clear, a cover crop may be applied to create this dense ground mat.

A consultant may be utilized to take soil samples, and recommend irrigation schedules and fertilizer applications. During the growing season, the consultant may track plant vigor by sampling and analyzing plant tissue for nitrogen levels and other nutrients as necessary.

Irrigation research conducted by the University of Arizona will continue in the Phase 1 location to gather data for future sites. Soil moisture content, drainage, and tree response will be measured with distance from the irrigation ditch in single plots of each irrigation-treatment tree/species combination. Measurements at varying distances from the irrigation ditch allow for monitoring along gradients of water availability. Additional sub-plots will receive periodic nitrogen fertilization, and plant response will be measured. By measuring soil water content in near real-time and measuring tree response to irrigation treatments on several temporal scales, the study will determine tree response to irrigation. Soil/water content, drainage, and plant response are being measured for three growing seasons. The research and results will allow estimation of an appropriate irrigation regime for successful habitat restoration.

A document titled, *Cibola Valley Conservation Area Restoration Development Plan: Phase 4*, will be drafted that includes design and planting plan of Phase 4 that would be established in FY09. Approximately 64 acres of honey mesquite will be planted.

Pre- and post-development monitoring will continue on phases 1-4 and the control site at CVCA. Habitat, avian, small mammal, and bat monitoring will continue.

Proposed FY09 Activities: Planting and field preparation of Phase 4 is scheduled for FY09, and is designed to create 64 acres of honey mesquite land cover type located north of Phase 3. All the previous phases will be developed, maintained, monitored, and adaptively managed created riparian habitat for targeted species.

Upon receipt of 1,500 ac-ft of fourth-priority water from the Hopi Tribe, stabilization of buffer areas within CVCA will be initiated.

A document titled, *Cibola Valley Conservation Area Restoration Development Plan: Phase 5*, will be drafted that includes design and planting plan of Phase 5 that would be established in FY10. Approximately 72 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; and Cibola Valley Conservation Area Annual Report, 2007* will be available on the LCR MSCP Web site.

Work Task E6: Cottonwood Genetics Study

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate*	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$15,000	\$16,036	\$259,405	\$15,000	\$0	\$0	\$0

*Costs for operation and maintenance are now captured under Work Task E24.

Contact: Gregg Garnett, (702) 293-8644, ggarnett@lc.usbr.gov

Start Date: FY04

Expected Duration: Closed in FY07

Long-term Goal: Restoration research.

Conservation Measures: WIFL1, WRBA2, WYBA3, CRCR2, YHCR2, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, and SUTA1.

Location: Reach 4, Cibola National Wildlife Refuge, one-half mile east of River Mile 97, AZ.

Purpose: This research project is designed by Northern Arizona University (NAU) to determine the relative levels of genetic diversity in remaining stands of Fremont cottonwood across the Southwest, and investigate the influence of this genetic diversity and local genetic adaptations on community diversity in the context of habitat restoration. The expression of these genetic adaptations may manifest in trees possessing superior traits with respect to growth, reproduction, survival, and the habitat quality they influence. Previous research indicates that diversity in cottonwoods can have a direct effect on associated trophic communities and can lead to increases in wildlife diversity. A benefit of genetically diverse stands of trees in dominant riparian communities is increased plasticity to varying environmental perturbation including disease, insect outbreaks, and climate change. Reclamation will use the information gained from this study to increase knowledge and success in creating functional wildlife habitat, and to insure that adequate genetic diversity of dominant riparian plants are included in habitat creation projects.

Connections with Other Work Tasks (past and future): All work tasks in Section E that target cottonwood-willow habitat. Starting in FY08, operation and maintenance costs for E6 will be included in Cibola NWR Unit 1 (E24).

Project Description: Information is lacking regarding the relative levels of genetic diversity within the remaining cottonwoods along the LCR and the impact of this genetic diversity as it pertains to community structures and ultimately, wildlife diversity within restoration sites. In an effort to increase knowledge and success in creating functional wildlife habitat, Reclamation solicited the scientific community for proposals to investigate these relationships. The NAU was awarded a cooperative agreement and contributed matching funds from a National Science Foundation grant to undertake these investigations. The project includes genetically screening

remaining stocks of Fremont cottonwood trees in stands throughout the Southwest and selecting genetically distinct trees, representative of these locations, to be planted in an experimental garden with a replicated design. The experimental garden will be monitored to observe how these genetic differences may be expressed in terms of growth, reproduction, and survival in a typical restoration site, and genetic traits that influence superior habitat quality (including those that may support LCR MSCP covered species). These genetic traits will likely be important for long-term survival and for maintaining habitat quality and health throughout the life of the program. Sampling will be conducted to indicate species diversity and richness at multiple trophic levels with respect to soil microbes, invertebrates, and vertebrate communities associated with specific cottonwood genotypes. The experimental garden will be located at Cibola NWR on agricultural land with water and irrigation infrastructure.

Previous Activities: The cottonwood genetics garden was established and monitored in FY06, but due to high mortality was selected for replanting in FY07.

FY07 Accomplishments: The cottonwood genetics experimental garden was replanted in spring of FY07. The design and composition of the garden planted was identical to the original garden as detailed in the study plan. Reclamation assisted with field preparation and personnel for planting; however, the majority of the replanting and labor costs (recollection, propagation, transportation, and planting) were assumed by NAU.

Over the first growing season, establishment was initially high; however, tremendous competition from weeds (particularly sunflowers and Johnson grass) and inconsistent delivery of water to all parts of the fields resulted in relatively high location-specific mortality. Total survival was recorded at around 50%; however, NAU may replant a number of the critical blocks for this experiment in future years.

Due to the difficulties in establishment experienced in these fields, research results are limited at this time. However, a number of interesting patterns of survival have begun to emerge with respect to genotype and field location. A few of the genotypes exhibited poor propagation success in the greenhouse, specifically, poor rooting success, which translated to poor survival in the fields. In addition, patterns of mortality were attributed to the way water was distributed across the fields. In many places, irrigation water was not able to reach trees, due to soil textures or field topography resulting in areas of higher mortality. Monitoring of vegetation and arthropod communities in the experimental garden continued throughout FY07.

FY08 Activities: Operation and maintenance of the site will be included under E24, thereby closing Work Task E7.

Proposed FY09 Activities: N/A

Pertinent Reports: *Nature Reviews*, July 2006; *Science Daily*, July 2006; U.S. Dept of State *Washington File*, August 2006; and Ecological Society of America *Frontiers in Ecology and the Environment*, October 2006, are posted on the LCR MSCP Web site.

Work Task E7: Mass Transplanting Demonstration

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate*	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$15,000	\$5,516	\$324,825	\$15,000	\$0	\$0	\$0

*Costs for operation and maintenance are now captured under Work Task E24.

Contact: Gail Iglitz, (702) 293-8138, giglitz@lc.usbr.gov

Start Date: FY05

Expected Duration: Closed in FY07

Long-term Goal: Restoration research.

Conservation Measures: WIFL1, WRBA2, WYBA3, CRCR2, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, and SUTA1,

Location: Reach 4, Cibola NWR, one-half mile east of River Mile 97, AZ.

Purpose: This project evaluates mass transplanting techniques for cottonwood and willow using commercially available mechanized transplanting equipment. To meet the requirement to create 5,940 acres of cottonwood-willow land cover type habitat, a significant number of native trees will need to be established each year. Mass transplanting is an approach used successfully by commercial growers. If mass transplanting of native species proves effective, it is expected to provide a useful cost-effective tool in the creation of future habitat.

Connections with Other Work Tasks (past and future): Beginning in FY08, operation and maintenance costs for this work task will be included in Cibola NWR Unit 1 (E24).

Project Description: Reclamation has entered into a 5-year land use agreement with the USFWS to conduct restoration research in Unit 1 at Cibola NWR. This work task demonstrates automated mass transplanting techniques using native riparian species. The intent is to investigate the feasibility and effectiveness of using this technique for creation of land cover types in existing agricultural fields. The cost benefit of this method will be evaluated along with its effectiveness and appropriateness in the creation of native habitat to meet LCR MSCP goals. The technique involves mechanized, rapid, dense planting of up to 4,500 seedlings per acre to inhibit growth of nonnative plant species and to achieve dense growth of native tree species. Up to 36 acres of cottonwood-willow land cover type may be created as a result of the demonstration.

Previous Activities: A simplified acquisition was generated, and contractors competed in the demonstration of mass transplanting of cottonwood and willow. The contract required the utilization of commercially available equipment and was awarded to two contractors. Each

contractor was provided with an agricultural field and required to provide their approach to mass transplanting cottonwood and willow trees. The intent was to demonstrate and compare the respective techniques. Each technique was evaluated for the effectiveness of creating quality land cover at a reasonable cost (currently, mass transplanting methods are being utilized in the agriculture industry to produce high quality fruits and vegetables at a reasonable cost). Additional information about the mass transplanting demonstration that was completed in FY05 can be found on the LCR MSCP Web site.

FY07 Accomplishments: The cottonwood and willow trees for the mass transplanting demonstration are now 2 and 3 years old and appear quite healthy. Volunteer *Baccharis* and grasses have begun to move into the area forming an understory of vegetation. Significant growth has occurred in all the trees, which now can provide another site for plant material collection for other restoration sites. Collections of plant material by the contractor will take place in November and December for plantings in the spring of 2008.

In anticipation of this site becoming part of E24, post-development avian and bat monitoring were conducted. During acoustic bat surveys, 5 call minutes from the California leaf-nosed bat were recorded. No other LCR MSCP species was identified utilizing the site.

Activities have scaled back on this project, leaving the contract farmer's only task to irrigate and manage weeds. As a result of reduced activities, general operations and maintenance will be included in the E24 work plan

FY08 Activities: Operation and maintenance of the site will be included under E24, thereby closing Work Task E7.

Pertinent Reports: The final report, *Work Task E7: Mass Transplanting Demonstration, Final Report, Cibola National Wildlife Refuge: 2005 & 2006* has been posted to the LCR MSCP Web site.

Work Task E8: Seed Feasibility Study

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$160,000	\$71,382	\$563,992	\$65,000	\$210,000	\$0	\$0

Contact: Gregg Garnett, (702) 293-8644, ggarnett@lc.usbr.gov

Start Date: FY05

Expected Duration: FY10

Long-term Goal: Restoration research.

Conservation Measures: WIFL1, WRBA2, WYBA3, CRCR2, YHCR2, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, and SUTA1.

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 FY06, which was the first year of the three year contract, seed collection and testing was completed and is discussed in the FY07 accomplishment section.

FY07 Accomplishments:

Laboratory and Greenhouse Results: Viability of seed from cottonwood and both species of willow that had been frozen since May 2006 remained greater than 80% during 2007, and

monthly testing will continue until 2-year viability results are final. Although cleaning seed did not affect seed viability, germination on soils continues to be higher for frozen, cleaned seed than for frozen uncleaned seed.

Tests comparing the effect of long-term storage of cottonwood and willow seed on germination and growth were completed. No significant differences were observed between seeds collected in 2006 and kept frozen and seeds collected in 2007. Seed collection year did not result in decreased plant growth, crown cover, species count, dry plant mass, or plant height.

In greenhouse tests of honey and screwbean mesquite, although counts of both species were comparable, honey mesquite dominated crown cover and biomass, indicating the seeds of these species should not be planted together. Mesquite stem counts were unaffected by soil type; however, biomass, height, and total root mass decreased progressively from loose soil to compacted soil to sand. Mesquite height decreased from low to high seeding rate, indicating a lower seed rate is best for maximal growth of trees.

In greenhouse tests of Emory's *Baccharis*, counts were higher and biomass was larger for seeds planted in loose soils rather than in compacted soils or sand. Further results for greenhouse tests can be found in the 2007 Annual Report.

Small-Scale Field Studies at CNWR: Variables tested in the field in 2007 included presence or absence of early sprinkler irrigation, seed cleaning (yes or no), seeding method (broadcast, hydroseeded), surface irrigation method (furrow or border strip), plot placement, and seeding rate. Target species indicators measured included crown cover, canopy cover, stems/m², average height, maximum height, biomass/m², and biomass/stem.

Goodding's and coyote willow had low establishment and results were not conclusive. Tests will be repeated in 2008 using only willow seed. Willow appears to be unable to compete when planted with cottonwood or when saltcedar and grasses are present within the plots. In 2008, extensive weed control and removal of cottonwood from the experiments will determine if this is the case.

Crown cover, average height, maximum height and biomass were greater for cottonwoods in plots that did not receive early-time sprinkler irrigation than ones that did. Un-cleaned hydroseeding resulted in the highest canopy cover, stem density and biomass for all three seeded species. Furrow irrigation had better results than border strip irrigation on all target species indicators except cottonwood cover, which did not differ. Seeding rate was directly correlated with cottonwood plant establishment and biomass, but other relationships did not show significant differences.

Cottonwood stem counts ranged from 0 to 59 per m², with an average stem density of 18 per m². Maximum cottonwood, Goodding's willow, and coyote willow biomass was 220.3 g, 5.6 g, and 1.9 g per m², respectively. Goodding's willow was observed in only 12 of the 36 plots and coyote willow in only 6 plots. Saltcedar stem counts ranged from 2 to 70 per m², with an average of 21.5 per m², and maximum biomass was 93.5g per m², with an average of 21.5 per m².

Average crown cover and tree height was greater for cottonwood than for saltcedar in most treatments and saltcedar generally decreased in number or vigor where cottonwood establishment was dense. Results of the seed treatments indicates that hydroseeding may have the same effect as cleaning the seeds prior to planting. Further results can be found in the Fiscal Year 2007 Accomplishment Report (Annual Report).

FY08 Activities: Based on results from the 2007 annual report, a contract modification will be required 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 this species may not compete well against cottonwood and other plants. To determine the feasibility of willow establishment using seed, an additional small plot study will be conducted using only Goodding's willow seed and using more timely applications of weed herbicides. These small plot studies will be conducted in the same field, adjacent to the 2007 small-plot study. The 2007 small-plot studies where cottonwood dominated the vegetation structure will continue to be 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 include greenhouse pot studies to determine best protocols for *Baccharis* establishment and the continuation of seed storage viability testing up to the 2-year-frozen mark.

Proposed FY09 Activities: Fiscal Year 2009 activities will be dependant upon 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 2009.

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*, will be posted to the LCR MSCP Web site.

Work Task E9: Hart Mine Marsh

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Proposed Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$125,000	\$85,085	\$255,944	\$250,000	\$3,125,000	\$3,100,000	\$300,000

Contact: Gregg Garnett, (702) 293-8644, ggarnett@lc.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.

To refine the cost estimates and project the quantity of created habitat, a detailed topographic survey will be necessary. The survey will allow estimates of the amount of material to be excavated and determine the acreage that can be flooded and managed for rail species. The cost

of these improvements, estimated from the topographic survey and conceptual design, would then be used to decide if habitat creation is cost effective. To determine the long-term water commitment from the USFWS, information is needed to understand how the site currently functions hydraulically and the amount of additional water that will be required for maintaining successful marsh habitat.

Upon completion of the final design, a restoration development plan will be prepared and posted on the LCR MSCP Web site. The cost of construction and expected acreage of created habitat will be refined in FY08 and included in the FY09 Work Plan, prior to implementation. Prior to beginning construction, a land use agreement between USFWS and Reclamation securing land and water resources will be prepared.

Previous Activities: Through FY06, NEPA compliance activities, cultural surveys, topographic surveys, pre-development surveys for marsh birds and riparian obligate birds have been conducted.

FY07 Accomplishments: The Interagency Agreement between Reclamation and USFWS was modified to allow for additional baseline data to be collected during part of the irrigation season. A final draft of the Hart Mine Marsh Existing Conditions report with these data was furnished to Reclamation in April 2007. This change in timeline also allowed for a USFWS sponsored wetland review workshop to be held prior to the finalization of the Comprehensive Conceptual Restoration Plan (CCRP). With participation from wetland scientists from many disciplines and agencies as well as input from resources managers and environmental regulators, the CCRP for Hart Mine Marsh was completed and the final draft was submitted in September.

After reviewing the CCRP, both Reclamation and USFWS determined that there were no conflicts with development goals of Cibola NWR and the development of portions Hart Mine Marsh under the discretion of the LCR MSCP. Because this decision was made late in FY07, preliminary engineering designs did not commence until September of FY07; this schedule change is reflected in the unspent portion of the FY07 budget.

In FY07, pre-development monitoring surveys for marsh birds were conducted twice in April and once in May. Three least bitterns (*Ixobrychus exilis*) were detected during the first survey. No other MSCP covered marsh bird species were found.

Southwestern willow flycatcher surveys were conducted using tape playback methods as part of the system-wide effort. No SWFL were detected.

FY08 Activities: Engineering designs will be finalized and a Restoration Development Plan will be drafted during FY08 that will include the phased approach for development of the site. In addition, an exhibit to the Land Use Agreement with Cibola NWR is being prepared to secure the land and water and define specific roles and responsibilities of the partners for this project for the life of the program. A section 401/404 permit will be applied for based on the final restoration design. Pre-development monitoring is ongoing based on established marsh species monitoring protocols.

Proposed FY09 Activities: Completion of the final designs and successful ACOE permitting of the project will allow construction of Phase 1 to begin early in FY09. The first phase of development will include the removal of approximately 50 acres of saltcedar, dredging and contouring, and installation of a number of new control structures at the southern end of the Hart Mine Marsh. Because of construction, marsh bird monitoring will not be conducted in FY09.

Pertinent Reports: *Hart Mine Marsh, Existing Conditions Report; Comprehensive Conceptual Restoration Plan.*

Work Task E12: Butler Lake

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$120,000	\$11,633	\$121,350	\$0	\$0	\$0	\$0

Contact: Nathan Lenon, (702) 293-8015, nlenon@lc.usbr.gov

Start Date: FY04

Expected Duration: Closed in FY07

Long-term Goal: Restoration research.

Conservation Measures: BONY2, RASU2, LEBI1, CLRA1.

Location: Reach 5, Imperial NWR, River Mile 61, AZ.

Purpose: Evaluate potential lower-cost alternatives to dredging such as aeration, in situ bioremediation, or temporarily opening the backwater to the river, while meeting the needs of the LCR MSCP to provide habitat for covered native fish.

Connections with Other Work Tasks (past and future): This work task was previously included in the FY04 Work Tasks as Butler Lake, Imperial National Wildlife Refuge (D5). Species monitoring is being addressed under F2 and F4.

Project Description: Backwaters are an expensive land cover type to create. Studies were conducted on this backwater to develop technology to effectively restore existing backwaters to suitable habitat. Butler Lake, and other existing backwaters, contain many of the components required to sustain native fish, but suffer from poor water quality. This research project evaluated the water quality of the lake by conducting seasonal sampling, identified options to improve water quality in the eutrophic backwater, and developed a range of alternatives for improving water quality.

Located on Imperial NWR, Butler Lake is a 43-acre disconnected floodplain lake with an approximate mean depth of 3 ft. This backwater is seepage-driven, with no known surface connection to the Colorado River, or any other body of water. The lack of freshwater flushing has caused the lake to become hypereutrophic (an advanced state of nutrient enrichment) to the extent that, in its present condition, Butler Lake provides little benefit to fish or wildlife.

During FY06, the U of A initiated a limnological assessment of Butler Lake. The purpose of this assessment was to address the uncertainty related to restoring a eutrophic backwater system and identify whether any of the alternatives to dredging would be feasible in this situation. This agreement was executed at the end of FY05; therefore, all the work funded out of FY05 was completed during FY06.

Previous Activities: In FY05, Reclamation completed a preliminary assessment report, based on limited data collection during FY04, which evaluated conditions at Butler Lake, and proposed various restoration alternatives. Because of the uncertainty related to experimental treatments, Reclamation, in consultation with Imperial NWR, decided to collect additional data prior to selecting a restoration approach (see description of U of A limnological assessment in previous paragraph.)

A monitoring protocol was developed to address the concerns regarding uncertainty and includes data collection on major and minor ions, nutrients, metals, sediment chemistries, algal toxins, zooplankton, and macro-invertebrates. This will provide Reclamation with an increased understanding of the ecological dynamics of the system, as well as a solid baseline from which to measure the effectiveness of any proposed restoration activities.

Three sampling trips in FY06 were conducted and a preliminary report of initial impressions after the first site visit was submitted.

FY07 Accomplishments: A full year of quarterly sampling trips was completed. The year-end report included recommendations for the best course of action to restore the backwater for native fish. Preliminary findings indicated that only through large-scale restoration could Butler Lake be made suitable for native fish.

Because a large-scale restoration technique such as dredging or excavation of an inlet/outlet channel is likely to be required, Reclamation will evaluate this site relative to all other candidates included in the Backwater Site Selection (E15) for reaches 5 and 6. Under this scenario, no further activity would occur under this work plan in FY07, which would reduce expenditures for FY07 below the current estimate.

Proposed FY08 Activities: Closed in FY07. At this time, no site-specific activities are planned at Butler Lake in FY08. This site will be evaluated relative to all other candidates included in the Backwater Site Selection (E15) for reaches 5 and 6.

Pertinent Reports: *Butler Lake Native Fish Refugium, Preliminary Assessment* is posted to the LCR MSCP Web site. *Limnological Survey and Assessment of Butler and McAllister Lakes* will be posted to the LCR MSCP Web site.

Work Task E13: McAllister Lake

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$50,000	\$18,876	\$172,364	\$0	\$0	\$0	\$0

Contact: Nathan Lenon, (702) 293-8015, nlenon@lc.usbr.gov

Start Date: FY05

Expected Duration: Closed in FY07

Long-term Goal: Habitat creation.

Conservation Measures: BONY2, RASU2, and LEBI1.

Location: Reach 5, Imperial NWR, River Mile 61, AZ.

Purpose: Evaluate a method of water quality improvement by dewatering the lake and inducing groundwater recharge to dilute the lake's existing high salt concentrations.

Connections with Other Work Tasks (past and future): Species monitoring is being addressed under F2 and F4.

Project Description: Located on Imperial NWR, McAllister Lake is a shallow 32-acre isolated floodplain lake with no known surface connection to the LCR. The lack of freshwater flushing has caused the lake to become highly saline, to the extent that it provides limited fish and wildlife value. Because backwaters are expected to be the most expensive land cover type to create under the LCR MSCP, Reclamation has been, through the restoration of existing backwaters, developing the technology to more effectively create sustainable backwater habitat. The purpose of this ongoing investigation is to determine whether this experimental method of pumping water out of the lake, followed by induced groundwater recharge from the river aquifer, may be a sustainable method of improving water quality in isolated backwaters with high salinity levels on the LCR. Potentially, this method provides a high degree of safety against intrusion by nonnative fish species by eliminating the need for engineered fish barriers.

Previous Activities: Reclamation initiated a series of experimental pump-tests during FY03 and FY04, which dewatered the lake to about one-fourth of its normal volume. Before, during, and after these tests, a variety of environmental data were collected to measure the lake's response to the pumping and the consistency of the groundwater supply through the river aquifer. This monitoring included groundwater and surface water levels, and water quality measurements of the river and lake. These pump tests were conducted from December 2002 through March 2004, during the fall and winter months only, to avoid potential impacts to Yuma clapper rails.

The lake was left unmanaged during FY05. Monitoring was continued to determine how quickly the lake's water quality would degrade if pumping is stopped, so that Reclamation may decide whether the lake can be maintained in a manner that is cost effective.

An agreement was executed to initiate limnological investigations at McAllister Lake. This effort will evaluate the sustainability of maintaining McAllister Lake as a backwater for native fish, and provide recommendations to Reclamation as to how to best manage the site.

FY07 Accomplishments: A report detailing the methodology and results of all experimental dewatering conducted from FY03 to FY05 was finalized and posted to the LCR MSCP Web site. The report documents all five pump tests between FY03 and FY04, as well as the degradation of water quality, which occurred during FY05 while the site was left unmanaged.

A full year of quarterly water quality sampling events has been completed. A final report documenting the quarterly sampling and recommendations on practices for long-term management of the lake for native fish was completed in FY07.

Activities in FY07 were limited to the discussion of the alternatives listed in the report, a review of available water data, and the determination by the fisheries group as to the value and intended use of McAllister Lake. All decisions will be made in consultation with Imperial NWR. Therefore, expenditures in FY07 were less than approved.

Proposed FY08 Activities: Closed in FY07. At this time, no activities are planned for FY08 pending the results of research projects such as C32: Determination of Salinity, Temperature, and Oxygen Limits for Bonytail and Razorback Sucker. In the future, the decision on whether to continue the management of McAllister Lake under the LCR MSCP will be made. If the decision is made to continue management of this site, Reclamation will prepare a land use agreement securing the necessary land and water interests for the duration of the LCR MSCP. A restoration plan will be prepared and posted to the LCR MSCP Web site for review.

Pertinent Reports: *Experimental Design Plan for McAllister Lake Study; Hydrologic Characterization of McAllister Lake, Arizona;* and the study plan are available upon request from the LCR MSCP. *Induced Recharge in McAllister Lake, Arizona to Reduce Salinity for the Possible Introduction of Native Fish Species* is posted on the LCR MSCP Web site. *Limnological Survey and Assessment of Butler and McAllister Lakes* will be posted to the LCR MSCP Web site.

Work Task E14: Imperial Ponds Conservation Area

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$2,070,000	\$3,190,255	\$5,409,432	\$974,000	\$483,000	\$465,000	\$255,000

Contact: Nathan Lenon, (702) 293-8015, nlenon@lc.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: The Imperial Ponds Conservation Area is an integrated mosaic of native land cover types, including isolated backwaters, cottonwood-willow and marsh. It is situated within the "Intensive Management Area" of the Imperial National Wildlife Refuge, an area of focused management for sensitive wildlife species including native fish, marsh birds, neo-tropical migratory birds, and migratory waterfowl. By partnering with Imperial NWR to implement this project within an area already so rich in biodiversity, the LCR MSCP is creating a unique native landscape like no other found on the LCR.

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: 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 channel, supporting native wetland and riparian plants.

An existing 4-acre cottonwood nursery on the refuge will be expanded by 34 acres, using materials excavated from the ponds to be developed into cottonwood-willow land cover for

yellow-billed cuckoo. This material was spread over approximately 100 acres; the acreage not used for cottonwood-willow will be managed for migratory waterfowl. Both 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 new area are scheduled to be completed in FY08; tree planting will occur in FY10.

A 12-acre marsh unit is being created at Field 18 in the refuge's southeast corner. This field was cleared in the winter of 2007-2008, and is being 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: Before construction began, the ponds were surveyed for clapper rails (*Rallus longirostris*) by refuge personnel and several clapper rails were detected annually within the cattail (*Typha latifolia*) habitat found in ponds 4 and 5 and at times in fringing marsh habitat found around other ponds.

In 2006, Anabat acoustic bat surveys were conducted at the ponds and one LCR MSCP evaluation species, the California leaf-nosed bat (*Macrotus californicus*), was detected in the interior of the nursery site. A point-count survey bird of the area to be planted with cottonwood and willow was also attempted, but was hindered by construction work being conducted at the site. The survey was incomplete due to ongoing construction but yellow warbler (*Dendrochia petechia*) and summer tanager (*Piranga rubra*) were detected in the nursery site adjacent to the creation site.

FY07 Accomplishments: During FY07, excavation and construction of all six ponds, the service roads, and the water supply and drainage piping system was completed. Materials were procured, and construction of the pump platform, fish screen, and airburst system was initiated. By the end of FY07, nearly all of the construction activities related to completion of the ponds and associated infrastructure were completed. Initial system testing and monitoring was performed to evaluate performance of the new pump, screen, and airburst systems.

Creation of the ponds resulted in the excavation of approximately 600,000 cubic yards of earthen materials, which were hauled and placed over some 100 acres of agricultural fields, raising the elevation by 2-3 feet. This area was redesigned into a more water-efficient configuration, which will tie into the existing irrigation infrastructure within the adjacent fields. During FY07, the existing irrigation pump that services these fields was rebuilt and upgraded to provide for increased capacity.

Incidental detections of clapper rail, least bittern (*Ixobrychus exilis*), and American bittern (*Botarus lentiginosus*) have been made by Reclamation and USFWS personnel at several of the ponds during the summer and fall of 2007. The vegetation surveys are to be carried out at the same time as the marsh bird surveys, at the same points. Because construction of the ponds had just finished, vegetation surveys were not carried out in 2007. Areas in the center of ponds 5 and 6 that already had pre-existing cattail habitat were originally slated to be removed during the

construction efforts; however, removal of these areas was avoided and the net gain of marsh habitat at the ponds due to construction efforts will be greater than what was originally projected. Small, isolated patches of common reed (*Phragmites australis*) have established themselves at the margins of several ponds, but otherwise no significant vegetative communities have yet established along the edges of the ponds.

Anabat acoustic surveys were conducted in 2007 at Pond 1, Pond 2, Field 18, and at the Nursery Site adjacent to the future cottonwood-willow creation site. Two LCR MSCP listed species were detected; the western red bat (*Lasiurus blossevilli*) was detected at pond 1 and field 18, and the western yellow bat (*Lasiurus xanthinus*) was detected at ponds 1 and 2. Two LCR MSCP evaluation species were also detected. The pale Townsend's big-eared bat (*Corynorhinus townsendi*) was detected at the cottonwood nursery, and the California leaf-nosed bat was detected at ponds 1 and 2.

An avian survey was conducted at the area that will be planted with cottonwood-willow land cover type. This area was bare ground in the summer of 2007 and no birds were present. The adjacent cottonwood nursery and a thin strip cottonwoods and willows planted on the west side were also surveyed as these areas may serve as sources for bird populations that may colonize the cottonwood-willow site, when planted. In these areas, four LCR MSCP listed bird species were detected, including summer tanager (1 detected), yellow-billed cuckoo (*Coccyzus americanus*) (1 detected), Gila woodpecker (*Melanerpes uropygialis*) (1 detected), and yellow warbler (1 detected).

Small mammal monitoring occurred in the habitat surrounding the fields that will be planted with cottonwood-willow land cover type, Field 18, and other marsh fields. Six Yuma hispid cotton rats (*Sigmodon hispidus*) were captured. Tissue samples were collected from these individuals and laboratory analysis confirmed the species identification of these six individuals.

FY08 Activities: The remaining construction activities related to completion of the ponds and associated infrastructure was completed. Additional system testing and monitoring was performed on the pumping and drainage system, to evaluate performance of the new pump, screen, and airburst systems.

The following work items remain to be completed during FY08: a Standard Operating Procedures manual is in development to assist field personnel in operating the system, the hummocks will be planted with wetland plant species to create favorable conditions for covered marsh species, and final as-built surveys.

Reclamation has awarded a contract to complete the construction of the new fields and new irrigation system, and construction is nearing completion. Once complete, a cover crop will be established to stabilize and condition the soils.

Reclamation completed a topographic survey, design, and grading plan to convert the 12-acre Field 18 into a marsh. Reclamation has completed vegetation clearing and contouring, and plans to plant this area with native wetland plant species in the summer of FY08.

Permanent marshbird survey points and photo points will be established at each pond and at Field 18. Marshbird surveys will be conducted at these points, at least twice a year, using the multi-species marshbird protocol. A bird survey will be conducted at the site to be planted with cottonwood-willow land cover type and the surrounding areas. Anabat acoustic surveys will be conducted at Pond 1, 2, and at Field 18. Small mammal trapping will continue in areas adjacent to the cottonwood-willow creation site.

FY09 Activities: Reclamation intends to contract for labor and plant materials for establishing 34 acres of cottonwood-willow land cover, perform minor maintenance to boat ramps and other structures, upgrade the electrical control panel for the existing irrigation pump, and support site operations and maintenance.

Annual monitoring efforts will continue in 2009 in the same manner as detailed in the 2008 activities.

Pertinent Reports: *Imperial National Wildlife Refuge, Imperial Native Fish Habitat Reconstruction; Design Workshop Final Report; and Clean Water Act, Section 404 Permit – Final Site Plan* have been posted to LCR MSCP Web site. *Imperial Ponds Restoration Development and Monitoring Plan* is posted to the LCR MSCP Web site.

Work Task E15: Backwater Site Selection

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$430,000	\$421,635	\$687,132	\$387,000	\$209,000	\$443,000	\$388,500

Contact: Nathan Lenon, (702) 293-8015, nlenon@lc.usbr.gov

Start Date: FY06

Expected Duration: FY11

Long-term Goal: Habitat creation.

Conservation Measures: BONY2, RASU2, and FLSU1.

Location: Reaches 3-6, CA and NV; river miles 22-276, AZ, CA, and NV.

Purpose: To establish and validate a consistent standardized technique for evaluating and selecting backwaters with the highest probability of success, based on biological and physical attributes, as well as other program considerations (e.g., cost, land ownership, and feasibility). The technique will then be used to inventory backwaters in reaches 3-6. This inventory is expected to identify potential backwater creation sites, develop conceptual restoration approaches, estimate the relative cost of habitat creation, and estimate the habitat credit potential of the backwater. This would generate a list of potential sites to be developed as habitat, which would be sequenced into the work plan process based on habitat creation goals and budget constraints.

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: Reclamation has developed a standardized technique for evaluating and selecting backwaters for habitat creation, considering biological attributes and other program considerations (e.g., cost, land ownership, and feasibility). The backwater inventory process is being completed in two phases. The first phase, which started in FY06 and is scheduled to be completed in FY08, is the inventory and evaluation of backwaters in reaches 5 and 6. The second phase, which began in FY07 and is scheduled to be completed in FY11, is the inventory and evaluation of backwaters in reaches 3 and 4. Upon completion of the inventory and evaluation, backwaters selected for restoration will be addressed under site-specific work tasks. An additional effort may be undertaken in the future, specific to flannelmouth suckers in Reach 3, as additional information becomes available on life history and habitat creation requirements.

For planning purposes, each phase of the backwater inventory process is divided into five steps. The first step is the inventory of existing backwaters. Basic information that can be obtained

without visiting the sites is used to make these determinations. This information includes backwater size and connectedness to the river, and willingness of the landowner/manager to participate in the program. The end result of the inventory is a list of approximately 25 candidate backwater sites to move forward in the selection process.

During the second step, the candidate backwater sites are visited during the summer, with one site visit to each backwater. Physical and biological data are collected to generate biological ranking scores and habitat opportunity rankings as described in the Draft Final Guidelines for the Screening and Evaluation of Potential Conservation Areas. Trip reports are completed for review by the LCR MSCP Program Manager and a Technical Work Group. The estimated cost for the initial site visit, sampling effort, and bathymetry is \$10,000 per backwater. In the fourth step, habitat assessments are completed for the four or five sites with the final highest priority, which includes four quarterly monitoring trips. At the conclusion of these assessments, final reports will be completed and reviewed by the Technical Work Group. The estimated cost for 1 year of quarterly sampling is \$40,000 per backwater.

Previous Activities: The *Draft Guidelines for the Screening and Evaluation of Potential Conservation Areas* has been drafted, and includes guidelines specific to selecting backwaters. Through FY06, step 1 for Reaches 5 and 6 backwaters has been completed.

FY07 Accomplishments: During FY07, the *Final Model Evaluation Report* was completed and is posted on the LCR MSCP Web site. The final report updated the parameters and values for generating the biological rating for backwaters.

Step 1 of the backwater site selection process for reaches 5 and 6, creating a list of 25 candidate backwater sites to move forward in the process, was completed. Activities in support of Step 1 included: a helicopter survey of reaches 5 and 6 during winter low-flows to determine the degree of permanence of the candidate backwater sites, meetings with land owners and resource management agencies, and securing special use permits for gaining site access for further evaluations. During the summer of FY07, site visits (Step 2) were conducted at each of the 25 candidate backwater sites. Trip reports (Step 3) for these site visits are being completed during FY08.

The initial backwater inventory data review (Step 1) of Reach 3 and Reach 4 backwaters was initiated. During FY07, the data review of Reach 3 and Reach 4 backwaters and an initial list of candidate backwater sites to be evaluated during a helicopter survey in FY08 during winter low-flows was completed.

FY08 Activities: Trip reports (Step 3) for reaches 5 and 6 were discussed with the Technical Work Group of the Steering Committee in February of 2008.

During FY08, four to five sites in reaches 5 and 6 will be selected to undergo quarterly sampling (Step 4). At the completion of this sampling, habitat assessments will be prepared, which will include conceptual designs for habitat development and preliminary cost estimates. Completion of these reports is anticipated during FY09, after which time sites will be selected and prioritized for implementation, based on program needs and budgetary constraints. As discussed with the

Technical Work Group, two sites (Headquarters and Secret Lakes) have already been selected to be “fast tracked” to the next stage in the selection process (Step 4). Reclamation is planning to implement one of these two sites in FY10.

During FY08, Step 1 of the backwater site selection process for reaches 3 and 4, which will generate a list of 25 candidate backwater sites to move forward in the process, will be initiated. A helicopter survey has already been completed during winter low-flows. The final report will be posted to the LCR MSCP Web site.

Proposed FY09 Activities: During FY09, coordination with land owners in reaches 3 and 4 to secure access for completing site visits at approximately 25 candidate backwater sites is anticipated. Because many more land owners manage backwaters in reaches 3 and 4 than in reaches 5 and 6, additional time will be required to gain the necessary site access/permits. Site visits to reach 3 and 4 backwaters is planned for summer of FY10.

Pertinent Reports: *Draft Guidelines for the Screening and Evaluation of Potential Conservation Areas; Colorado River Backwaters Restoration Final Model Evaluation Report; and Backwater Inventory: Reaches 5 & 6, Step 1: Identification of Backwaters for Screening and Evaluation* are posted to the LCR MSCP Web site.

Work Task E16: Conservation Area Site Selection

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$50,000	\$102,883	\$396,027	\$200,000	\$200,000	\$200,000	\$200,000

Contact: Jed Blake, (702) 293-8165, jblake@lc.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: None.

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. Currently Reclamation initiates appraisals with the ASD-National Business Center, which coordinates the scope of work and selection of an appraiser in the local geographical vicinity of the subject property. The cost of appraisal services is captured in Work Task E16.

As new sites are evaluated and prioritized, each new site will be presented to the Steering Committee either through the annual work plan 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.

FY07 Accomplishments: In November of 2006, the screening criteria were applied to four locations along the LCR. The first area was identified in response to a recent fire on Cibola NWR and targeted honey mesquite land cover type. The second area was also on Cibola NWR and targeted cottonwood-willow land cover type as an expansion of activities already funded by the LCR MSCP. The third area was an existing backwater and adjacent lands near Laughlin, Nevada. The final area included active agricultural lands being assessed by the Metropolitan Water District in the Palo Verde Irrigation District, and if secured, would target cottonwood-willow, honey mesquite, and marsh land cover types. Site-specific information can be found in the trip report, which is posted on the LCR MSCP Web site. As discussed in the FY06 accomplishments, obligations for a modification to the draft guidelines were not incurred until FY07, and therefore were higher than anticipated.

FY08 Activities: 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 geared towards the additional habitat creation cover types.

Applicants will be 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. After initial ranking, site visits and trip reports will be developed documenting resources available and restoration potential at the site. Trip reports and site evaluations will be posted on the LCR MSCP Web site, and preliminary findings will be discussed at the Technical Work Group meeting in May.

Two appraisals have been initiated in FY08 and are anticipated to be completed prior to the end of the fiscal year. The first is estimating the cost for securing land and water for Work Task E21: Planet Ranch. The second appraisal is for Work Task E25: Big Bend Conservation Area. Once these values have been determined, the cost-benefit of the acquisition will be presented to the Steering Committee.

Proposed FY09 Activities: In accordance with the draft guidelines, site assessments will be conducted on projects identified in the FY08 RFPs.

Commencing in 2009, Reclamation is expected to announce the second round of RFPs. This solicitation will be geared towards meeting the four land cover type goals located throughout all reaches of the LCR MSCP planning area. Applicants will be evaluated on their relevance based on Step 1 of the *Draft Final Guidelines for the Screening and Evaluation of Potential Conservation Areas* and RFP criterion to be announced. After initial ranking, site visits and trip reports will be developed documenting resources available and restoration potential at the site. Trip reports and site rankings will be posted on the LCR MSCP Web site.

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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$70,000	\$4,757	\$5,884	\$5,000	\$5,000	\$5,000	\$70,000

Contact: Terry Murphy, (702) 293-8140, tmurphy@lc.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 in review.

FY07 Accomplishments: The specific actions required to satisfy AMM2 have not been determined at this time. Therefore, expenditures were less than anticipated. However, in FY07, the *Final Havasu National Wildlife Refuge Water Management Plan* was posted to the LCR MSCP Web site.

FY08 Activities: Discussion of the technical reviews, water accounting issues, and feasibility of implementation are anticipated. After a decision is reached, the commitments or obligations of the LCR MSCP will be determined.

Proposed FY09 Activities: Funding has been reduced 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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$75,000	\$2,376	\$2,376	\$25,000	\$200,000	\$200,000	\$200,000

Contact: Terry Murphy, (702) 293-8140, tmurphy@lc.usbr.gov

Start Date: FY06

Expected Duration: FY55

Long-term Goal: Created habitat protection.

Conservation Measures: CMM1.

Location: Reaches 1-7.

Purpose: Provide law enforcement and fire suppression in support of habitat created under the LCR MSCP.

Connections with Other Work Tasks (past and future): Law enforcement and fire suppression are anticipated to be integral management components for all habitats created through Section E work tasks.

Project Description: 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 (lands that were not already in public ownership). There is a need to develop a comprehensive approach to address these issues along the LCR.

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.

FY07 Accomplishments: Limited funds were expended during this fiscal year until discussions are completed with local agencies, which is anticipated in FY08.

FY08 Activities: Options are being evaluated for system-wide, site-specific law enforcement and fire suppression. A strategy will be developed that will form the basis for future law enforcement and fire suppression activities for the LCR MSCP. The USFWS is updating the fire management plan for the LCR refuges. Reclamation is providing site-specific information and drawing sets for conservation areas being developed on the refuges.

Proposed FY09 Activities: Funding has been increased to allow sufficient resources to draft, review, and sign agreements to implement the law enforcement and fire suppression strategies. The agreements are anticipated to be implemented in FY09.

Pertinent Reports: N/A

Work Task E24: Cibola NWR Unit #1

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$120,000	\$55,957	\$55,957	\$1,213,000	\$1,072,000	\$1,236,000	\$1,700,000

Contact: Gregg Garnett, (702) 293-8347, ggarnett@lc.usbr.gov

Start Date: FY07

Expected Duration: FY55

Long-term Goal: Habitat creation.

Conservation Measures: WIFL1, WRBA2, WYBA3, CRCR2, YHCR2, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, and SUTA1.

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 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 include restoration research and demonstrations 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 900 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 (180 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 313 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 100 and 146 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, 147 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: This work task is a new start in FY07.

FY07 Accomplishments: A land use agreement securing land and water resources for the life of the program was drafted and a Conservation Area Development Plan was completed. The development plan is posted on the MSCP Web site.

Regular water delivery, invasive plant mitigation, cover crop establishment, and site maintenance continued through FY07 through the use of contracted farming services. In addition, new irrigation supply turnouts were installed in the Crane Roost to allow for proper irrigation of those fields. Other capital expenditures were restricted to activities that were necessary to ensure development timelines until the Land Use Agreement was signed and Cibola NWR Unit #1 was made a conservation area of LCR MSCP. This fiscal conservation is reflected in the unspent portion of the FY07 budget.

Post-development monitoring was conducted at the Nature Trail and Mass Transplanting sections of Unit #1. Vegetation monitoring was conducted at the Nature Trail. Avian surveys were conducted at the Nature Trail and Mass Transplanting areas. No MSCP covered species were found breeding in the Mass Transplanting area. Twenty-three species were found using the Nature Trail. The Arizona Bell's vireo was the only MSCP covered species utilizing the site.

Presence/absence surveys using tape-playback were conducted for the southwestern willow flycatcher (*Empidonax traillii extimus*) and yellow-billed cuckoo (*Coccyzus americanus*) at the Nature Trail. Neither species was found breeding at the site.

Small mammal trapping was conducted at the Nature Trail, the Mass Transplanting area, the northern edge of the Crane Roost area, and the edges of the Arnett Ditch, west of the Mass Transplanting area. The Nature Trail was the only site trapped in the spring, with 7 individuals, comprising 4 species, being captured, including 1 cotton rat (*Sigmodon* spp.). During fall trapping at the Nature Trail, 20 individuals, comprising 5 species, were captured, including 12

cotton rats. At the Mass Transplanting area, 2 individuals, comprising 2 species, were captured. At the Crane Roost, 14 individuals, comprising 4 species, were captured. At Arnett Ditch, 12 individuals, comprising 3 species, were captured. Cotton rats were only captured at the Nature Trail site.

Acoustic bat monitoring was conducted at the Nature Trail and Mass Transplanting areas in November 2006, January 2007, and July 2007 using Anabat bat detectors. The California leaf-nosed bat (*Macrotus californicus*) was the only LCR MSCP covered species recorded, which occurred in November and July.

Bat mist-netting was conducted for 1 night at the Nature Trail and Mass Transplanting sites in July 2007. Four individuals, comprising 3 species were captured at the Nature Trail site, including 1 California leaf-nosed bat.

For the fifth consecutive year, a bird-banding station was operated at the Nature Trail. The station was operated in the winter for 2 consecutive days each month from October 2006 to March 2007. The station was operated in the summer approximately once every 10 days from May to August 2007.

FY08 Activities: The land use agreement was signed by USFWS and Reclamation in December. A service agreement is in place to perform road maintenance and clear the Arnett Ditch on a portion of Unit #1 as prioritized by the development schedule. These improvements will allow access for mass transplanting of trees in the Crane Roost in FY09 and will improve drainage in the Hippy Fire fields. Trees, primarily willow and cottonwood, will be ordered for mass transplanting of Crane Roost (150 acres). Regular irrigation cycles, cover crop, and soil management practices, invasive weed control, and general maintenance activities will continue in FY08.

Pre- and post-development monitoring will continue for vegetation, avian species, small mammals, and bats. The bird banding station will continue at the Nature Trail.

Proposed FY09 Activities: Additional infrastructure upgrades will continue in FY09, primarily consisting of road work and drainage improvements. Other improvements may also include assistance in repair or upgrades to the water measuring device(s) on the irrigation canal that supplies Unit #1. Overall site maintenance will also continue including regular watering and field maintenance of all the established fields within the Conservation Area's portion of Unit #1.

In FY09, approximately 150 acres of cottonwood-willow land cover will be planted in the Crane Roost fields of Unit #1. In addition, cottonwood-willow trees will be ordered for planting approximately one-half of the Hippy Fire fields (approximately 100 acres) in FY10. Planting plans, tree species used, and development phasing are covered in the Cibola NWR Unit Conservation Area Development Plan Overview.

Pre-development soil monitoring will take place before trees are planted. Post-development monitoring of vegetation, avian, small mammals, and bats will continue at the Nature Trail and Mass Transplanting areas, and will begin after planting at the Crane Roost fields. The bird banding station will continue at the Nature Trail.

Pertinent Reports: *Cibola NWR Unit #1 Trip Report, November 2006* and *Cibola NWR Unit Conservation Area Development and Monitoring Plan Overview, 2007* are posted to the LCR MSCP Web site.

Work Task E25: Big Bend Conservation Area

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$0	\$0	\$0	\$0	\$80,000	\$580,000	\$580,000

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

Start Date: FY08

Expected Duration: FY55

Long-term Goal: Habitat creation.

Conservation Measures: BONY2, RASU2, and FLSU1.

Location: Reaches 3, NV, River Mile 266.5.

Purpose: Protection of an existing backwater from development. Several life stages of all three LCR MSCP covered native fish species (flannelmouth sucker, razorback sucker, and bonytail) have been contacted in and around the backwater. Due to the limited number of available backwaters within Reach 3 and increasing urban development in the surrounding areas, securing this property for native fishes is a priority of the LCR MSCP.

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*.

Project Description: Reach 3 maintains the only self-sustaining population of flannelmouth sucker and has very few undeveloped backwaters, which make protection of the existing backwater a priority for the LCR MSCP. The Colorado River and Reach 3 in particular are experiencing extensive urban development. The Boy Scout Camp property with its access to the river via the adjacent backwater would make the area a likely candidate for development. Current urban developments along the river include housing, casinos, and marinas. 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.

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 to be enhanced for education and outreach purposes 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.

Previous Activities: N/A.

FY07 Accomplishments: This is a new start in FY08.

FY08 Activities: Site visits by Reclamation and SNWA technical staff occurred in January to familiarize stakeholders with the property and potential restoration activities. A federal appraisal is being conducted ascertaining the value of the property. A Steering Committee site visit was conducted to introduce members to the benefits of securing the property for the LCR MSCP. A land and water resolution will be presented at the October Steering Committee meeting. Nevada Parties will collaborate in drafting a long-term Land Use Agreement describing the potential restoration activities and the responsibilities of each party involved.

Proposed FY09 Activities: A finalized Land Use Agreement among NDOW, Nevada State Parks, SNWA, and Reclamation is anticipated, subject to Steering Committee approval. Drafting of a restoration and monitoring plan for the backwater being protected is also scheduled for FY09. Reclamation will be working with SNWA to identify potential funding sources for additional restoration, education, and outreach opportunities.

Pertinent Reports: The *November 2006 Trip Report* is posted on the LCR MSCP Web site.

Work Task E26: Headquarters Lake

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$0	\$0	\$0	\$0	\$265,000	*\$750,000	*\$255,000

*The estimated construction costs for FY10-11 will be revised after the final design and compliance activities are completed in FY09.

Contact: Nathan Lenon, (702) 293-8015, nlenon@lc.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: Work Task E15: Backwater Site Selection process has identified and prioritized a range of potential backwaters to fulfill the LCR MSCP's backwater habitat creation objectives throughout reaches 5 and 6. This process is expected to result in the selection of 4-5 sites to undergo quarterly sampling efforts, after which site assessments and conceptual designs will be prepared.

During the drafting of the Site Selection Guidelines, the Technical Work Group agreed to accelerate development of one backwater project, to commence construction in FY10. This work task addresses this need, by selecting Headquarters Lake in Reach 5 to be developed during FY10. The selection of Headquarters Lake was discussed with the Technical Work Group in February of 2008.

Connections with Other Work Tasks (past and future): This work task addresses development of one potential backwater that was identified under the backwater site selection process (E15).

Project Description: Reclamation has completed an initial backwater inventory (Step 1) of LCR MSCP reaches 5 and 6. This inventory identified over 768 backwaters over the two reaches, which ranged in size from less than 1 acre to greater than 40 acres. Of these, 201 were in California, and 160 were in Arizona. The sites ranged from very remote and virtually inaccessible except by helicopter, to easily accessible from the river by boat and/or motor vehicle. Of these sites, 25 were selected to undergo brief site visits and habitat ratings under the revised backwater rating system. This process yielded biological suitability ratings and habitat creation opportunity ratings, which are being used to prioritize and sequence development of future backwater projects.

This work task addresses the development of the first backwater to be selected from this process. For estimating purposes, Headquarters Lake has been selected. Headquarters Lake is a connected backwater on Imperial NWR, which was surveyed during the summer of FY07. Headquarters Lake was chosen for accelerated implementation based on site characteristics, which decrease risk factors involved in fast-tracking a backwater creation project. First, the site scored in the moderate suitability range, although this rating could be improved through minor excavation and other habitat enhancements. Second, the site is currently closed to public access and can be accessed easily by land-based equipment, which is anticipated to decrease construction costs. Finally, the land and water resources would be provided by Imperial NWR under their existing entitlement.

Previous Activities: This work task is a new start in FY09.

FY07 Accomplishments: This work task is a new start in FY09.

FY08 Activities: This work task is a new start in FY09.

FY09 Activities: During FY09, Reclamation intends to complete site surveys, final design and construction documents, required environmental compliance activities, and procurement of heavy equipment and materials to begin construction in FY10 and be completed in FY11.

Pertinent Reports: *Draft Final Guidelines for the Screening and Evaluation of Potential Conservation Areas; Colorado River Backwaters Restoration, Final Model Evaluation Report; and Backwater Inventory: Reaches 5 & 6, Step 1: Identification of Backwaters for Screening and Evaluation.*

**WORK TASKS
SECTION F**

POST-DEVELOPMENT MONITORING

Work Task F1: Habitat Monitoring

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$275,000	\$286,184	\$661,654	\$325,000	\$350,000	\$390,000	\$425,000

Contact: John Swett, (702) 293-8574, jswett@lc.usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Post-development monitoring.

Conservation Measures: MRM2, CLRA1, WIFL1, WRBA2, WYBA3, CRCR2, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, and MNSW2.

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: 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), and post-development monitoring will occur through the LCR MSCP time period. These 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.

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: To implement the adaptive management program, habitat creation projects must be monitored to determine whether necessary habitat components have been provided to qualify as habitat as described in the LCR MSCP. Monitoring the biotic components (vegetation) and abiotic components (e.g., soil moisture) will provide data to incorporate into future habitat creation efforts. Prior to the development of each proposed habitat creation site, monitoring plans will be written in conjunction with restoration plan development, and pre-development monitoring will be conducted, when necessary, to document baseline conditions to evaluate change in site conditions.

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 restoration site.

FY07 Accomplishments: Monitoring plans were written for habitat creation projects listed in Section E, including CVCA, PVER, Imperial Ponds, Beal Lake, and 'Ahakhav Tribal Preserve. Pre-development habitat monitoring at planned habitat creation sites was not necessary in 2007. Habitat restoration demonstration sites were monitored using established protocols, including 'Ahakhav Tribal Preserve, Beal Lake, and Cibola Nature Trail. Post-development monitoring of habitat creation sites was conducted at CVCA and PVER. Specific data for each habitat creation site are reported in Section E of this report.

Vegetation monitoring occurs mainly after the onset of dormancy in September/October. In 2006, monitoring was delayed until late October due to other project needs. These staff costs are reflected in FY07.

FY08 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, and PVER. Monitoring plans will be created for new habitat creation sites.

Proposed 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. 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 'Ahakav Tribal Preserve. Annual reports for Beal Lake, 'Ahakav 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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$150,000	\$143,493	\$249,588	\$150,000	\$150,000	\$150,000	\$150,000

Contact: John Swett, (702) 293-8574, jswett@lc.usbr.gov

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Conduct pre- and post-development monitoring for avian species.

Conservation Measures: AMM1, AMM3, MRM1, MRM2, CLRA1, WIFL1, LEB11, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI, YWAR1, SUTA1, and CMM2.

Location: Beal Lake, Havasu NWR, AZ; 'Ahakav 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 FY06, post-development monitoring for avian covered species occurred at four restoration demonstration or habitat creation sites: Cibola NWR Unit #1, 'Ahakav Tribal Preserve, Beal Lake, and CVCA Phase 1. Avian pre-development monitoring was conducted at three restoration sites: CVCA Phase 2 and Control, PVER, and Hart Mine Marsh. Avian use was summarized and evaluated for each site and compared between sites.

When possible, pre- and post-development avian monitoring was conducted in conjunction with other monitoring activities, including system monitoring, small mammal monitoring, and bat monitoring. In the future, habitat suitability models may reduce pre-development monitoring in non-riparian areas, such as agricultural fields.

FY07 Accomplishments: Pre-development monitoring was conducted at habitat creation sites identified in Section E, including CVCA, PVER, and Hart Mine Marsh. Post-development monitoring was conducted at existing restoration demonstration and habitat creation sites, including Beal Lake, Cibola NWR Unit #1, CVCA, PVER, and 'Ahakav Tribal Preserve. Surveys for SWFL were conducted under D2 at 'Ahakav Tribal Preserve, Beal Lake, and Cibola NWR Unit #1. Surveys for YBCU were conducted under D7 at 'Ahakav Tribal Preserve and Beal Lake. Marsh bird presence/absence surveys were conducted at Imperial Ponds, Butler Lake, McAllister Lake, and Hart Mine Marsh.

Post-development surveys at Beal Lake detected two pairs of yellow warblers and one pair of Bell's vireos, both LCR MSCP covered species. One yellow warbler nest and one Bell's vireo nest were located. Two willow flycatchers were detected during surveys conducted in June; however, subsequent surveys did not detect these birds. One yellow-billed cuckoo was observed during area searches conducted in late June. Habitat generalists, including great-tailed grackle, house finch, red-winged blackbird, and Gambel's quail, were the most abundant species detected during 2007.

Surveys conducted at 'Ahakav Tribal Preserve detected summer tanagers and vermilion flycatchers in low densities during the breeding season. One willow flycatcher and one yellow-billed cuckoo were detected in early surveys but not during subsequent surveys. Approximately 70 birds per acre (mean density), comprising 23 species, were detected during area searches conducted during May-June. Surveys at the Cibola Nature Trail site detected similar species richness but at lower densities. Bell's vireos and willow flycatchers were detected in low densities during May-June surveys.

Pre- and post-development surveys were conducted on various phases at CVCA and PVER. Habitat generalists, especially red-winged blackbirds, were the predominant species detected at each site.

FY08 Activities: Pre-development monitoring will be conducted at habitat creation sites identified in Section E, including CVCA, PVER, and Hart Mine Marsh. Post-development monitoring will be conducted at existing restoration demonstration and habitat creation sites, including Beal Lake, Cibola NWR Unit #1, CVCA, PVER, and 'Ahakav Tribal Preserve. Surveys for SWFL will be conducted under D2 at 'Ahakav Tribal Preserve, Beal Lake, and Cibola NWR Unit #1. Surveys for YBCU will be conducted under D7 at 'Ahakav Tribal Preserve and Beal Lake. Marsh bird presence/absence surveys will be conducted for Imperial Ponds and Hart Mine Marsh.

Proposed FY09 Activities: Pre-development monitoring will be conducted at habitat creation sites identified in Section E, including CVCA, PVER, and Hart Mine Marsh. Post-development monitoring will be conducted at existing restoration demonstration and habitat creation sites, including Beal Lake, Cibola NWR Unit #1, Imperial Ponds, CVCA, PVER, and 'Ahakav Tribal

Preserve. Surveys for SWFL will be conducted under D2 at 'Ahakav Tribal Preserve, Beal Lake and Cibola NWR Unit #1. Surveys for YBCU will be conducted under D7 at 'Ahakav Tribal Preserve and Beal Lake. Marsh bird presence/absence surveys will be conducted for Imperial Ponds and Hart Mine Marsh.

Pertinent Reports: The following reports will be posted on the LCR MSCP Web site: *Beal Lake Riparian and Marsh 2007 Annual Report; Palo Verde Ecological Reserve 2007 Annual Report; Cibola Valley Conservation Area 2007 Annual Report; Hart Mine Marsh 2006-07 Summary Report; 'Ahakav Preserve 2007 Annual Report; Cibola Nature Trail 2007 Annual Report; Monitoring Avian Productivity and Survivorship 2007 Annual Report; Imperial Ponds 2007 Annual Report; Marsh bird 2007 Annual Report; Southwestern Willow Flycatcher Surveys, Demography, and Ecology Along the Lower Colorado River and Tributaries 2007; and Yellow-Billed Cuckoo Distribution, Abundance, and Habitat Use Along The Lower Colorado and Gila Rivers 2007 Annual Report.* 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

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$50,000	\$30,038	\$67,799	\$55,000	\$55,000	\$55,000	\$55,000

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

Start Date: FY05

Expected Duration: FY55

Long-term Goal: Conduct pre- and post-development monitoring for small mammal species.

Conservation Measures: AMM1, AMM5, AMM6, MRM2, DPMO1, CRCR1, CRCR2, YHCR1, and YHCR2.

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 rats (*Sigmodon hispidus eremicus*) 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. have been captured at Pratt Agricultural since 2005. Presence/absence live trapping surveys were conducted at several habitat creation sites during FY06, but only one *Sigmodon* spp. was captured at the Beal Lake Riparian Restoration site.

FY07 Accomplishments: Trapping was conducted at several habitat creation sites, both in the fall and the spring. Efforts were focused on areas most likely to have *Sigmodon* spp. *Sigmodon*

spp. were captured at two sites: 6 individuals were captured at Imperial NWR (E14) and 13 individuals were captured at the Cibola Nature Trail site (E24).

FY08 Activities: Presence/absence live trapping surveys will continue as part of the post-development monitoring efforts at LCR MSCP habitat creation sites. 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 FY09 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 2007 will be posted on the LCR MSCP Web site.

Work Task F4: Post-Development Monitoring of Covered Bat Species

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$60,000	\$69,898	\$69,898	\$70,000	\$90,000	\$90,000	\$90,000

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

Start Date: FY07

Expected Duration: FY55

Long-term Goal: Pre- and post-development monitoring of covered bat species.

Conservation Measures: AMM1, MRM1, MRM2, WRBA2, WYBA2, and WYBA3.

Location: Beal Lake, Havasu NWR; PVER, CA; CVCA, Cibola Nature Trail, Cibola NWR, 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 protocol developed in 2006. 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 protocol developed in 2006. Acoustic monitoring will be conducted at habitat creation sites, including CVCA, PVER, Cibola NWR Unit #1, Beal Lake, and Imperial Ponds. These surveys will utilize either active or stationary Anabat systems to record bat sounds for presence/absence surveys. In some circumstances, capture techniques may be used for those species not readily recorded by the Anabat™ system. 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, Sonabat, infrared cameras, stationary detection equipment, and mist netting, where appropriate.

Previous Activities: This is a new start in FY07.

FY07 Accomplishments: Quarterly post-development bat monitoring was conducted utilizing Anabat bat detectors in six LCR MSCP habitat creation areas, including Beal Lake Habitat Restoration, Palo Verde Ecological Reserve, Cibola Valley Conservation Area, Cibola National

Wildlife Refuge Conservation Unit 1, 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.

In July 2007, a bat capture program was established utilizing mist nets and harp traps. During this quarter, three restoration sites were sampled, including Beal Lake Riparian Restoration, Cibola NWR Unit #1 Area, and Pratt Restoration Demonstration Site. 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 76 individual bats, from eight or possibly nine species, were captured among the four sites. Two LCR MSCP target species, the western yellow bat and the California leaf-nosed bat, were 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.

A total of 57 detector nights were completed on nine monitoring sites in the Beal Lake Habitat Restoration area. A total of 17,204 call files were collected, edited, and identified to species or species groups for valid call files. All four LCR MSCP covered and evaluation species were identified utilizing the Beal Lake site and surrounding areas. Thirteen detector nights were completed on four monitoring sites in the Palo Verde Ecological Reserve. A total of 3,733 bat call files were collected and edited. Western red bat, western yellow bat, and California leaf-nosed bat were all identified as utilizing the PVER site and surrounding habitats. A total of 42 detector nights were completed for six CVCA sites. A total of 3,052 call files were obtained, edited, and identified to species or species group. Western red bat, Townsend's big-eared bat, and California leaf-nosed bat were identified as utilizing CVCA. Eight detector nights were completed for two Cibola NWR Unit #1 Conservation Area sites. A total of 569 call files were obtained, edited, and identified to species or species group. California leaf-nosed bat was identified as utilizing Cibola Nature Trail. A total of 12 detector nights were completed for two Pratt sites. A total of 2,423 call files were obtained, edited, and identified to species or species group. Western red bat was recorded and western yellow bat was captured during mist netting at the Pratt site. A total of 48 detector nights were completed for eight Imperial Conservation Area sites. A total of 22,853 call files were obtained, edited, and identified to species or species group. All four covered and evaluation species were recorded utilizing the Imperial Conservation Area sites.

FY08 Activities: Conduct pre- and post-development bat surveys on habitat creation sites, including Beal Lake, Cibola Nature Trail, CVCA, Imperial Ponds, and PVER. Anabat™ files will be analyzed to determine species richness and abundance at restoration sites. Capture techniques will be utilized to enhance acoustic surveys, identify hard to record (whispering bat) species, and obtain voucher calls.

Proposed FY09 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 files will be analyzed to determine species richness and abundance at restoration sites.

Capture techniques will be utilized to enhance acoustic surveys, identify hard to record (whispering bat) species, and obtain voucher calls.

Pertinent Reports: *Post-Development Bat Monitoring of Restoration Sites along the Lower Colorado River – 2007* will be posted on the LCR MSCP Web site.

Work Task F5: Post-Development Monitoring of Fish Restoration Sites

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$65,000	\$41,574	\$41,574	\$130,000	\$150,000	\$180,000	\$200,000

Contact: Jeff Lantow, (702) 293-8557, jlantow@lc.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: N/A.

FY07 Accomplishments: An interagency meeting was held at Bill Williams River NWR to scope monitoring parameters for native fish backwater habitats. The USFWS developed a draft fishery management plan for Beal Lake. Physical and chemical habitat at Beal Lake was monitored, and electro-fishing and netting surveys were conducted. RASU were contacted along with threadfin shad, largemouth bass, and common carp. No BONY were captured. RASU

captured exceeded 500 mm TL, showing that Beal Lake may be a source for rearing RASU to adult size for research use elsewhere in the project area.

Native fish habitats at Imperial Ponds were completed and a research and monitoring plan was approved. An interagency coordination team has been established. Four ponds are to be stocked in FY08. Arizona State University was awarded a research grant to assess the development of this fishery (C25).

FY08 Activities: Post-development monitoring of Beal Lake similar to FY07 monitoring will be continued. RASU and BONY will be stocked and monitored. 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 not be used during summer, when water temperatures are too stressful on the fish. Larvae light trapping will be conducted monthly from February to May to assess reproduction and recruitment. If needed, funds will be utilized for nonnative fish removal.

Staff will participate in fishery surveys of other native fish sanctuary habitats in the lower river floodplain to gather information on developing fisheries.

Proposed FY09 Activities: Native fish restoration sites will continue to be monitored for physical, chemical, and biological conditions.

Pertinent Reports: N/A.

Work Task F6: Post-Development Monitoring of MacNeill's Sootywing in Habitat Creation Sites

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$0	\$0	\$0	\$0	\$10,000	\$25,000	\$50,000

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

Start Date: FY09

Expected Duration: FY55

Long-term Goal: Post-development monitoring for MacNeill's sootywing.

Conservation Measures: MNSW2.

Location: Habitat-creation sites, initially Palo Verde Ecological Restoration Site.

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 C7: Survey and Habitat Characterization for MacNeill's Sootywing. F6 will be phased in as C7, to be completed during FY09-10.

Project Description: Preliminary results from C7 have determined that sootywings require host plants (*Atriplex lentiformis*) that are larger than 1.6 m in height, greater than 64% in plant water content, and greater than 3.2% in leaf nitrogen content. Sootywings also require plants other than *A. lentiformis* for nectar (e.g., *Heliotropium curassavicum* [Boraginaceae] and *Sesuvium verrucosum* [Aizoaceae]). These attributes will need to be monitored in created habitat. Monitoring host plant water content is especially critical, as it will be driven by the timing and amounts of irrigation. Utilization of new habitat by sootywings also will need to be determined. This work task will need to allow for additional determinations (i.e., adaptive management) of habitat needs if created habitat fails to become colonized.

Previous Activities: None. This is a new start for FY09.

FY07 Accomplishments: None.

FY08 Activities: None.

Proposed 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 to October 1). Leaf nitrogen content will be measured if apparently suitable habitat is not 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 is not colonized.

Pertinent Reports: N/A.

**WORK TASKS
SECTION G**

ADAPTIVE MANAGEMENT PROGRAM

Work Task G1: Data Management

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$650,000	\$143,492	\$476,451	\$450,000	\$450,000	\$450,000	\$450,000

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

Start Date: FY06

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.

FY07 Accomplishments: While options described in the FY06 analysis were evaluated, a document/calendar management system was identified and implemented to facilitate collaboration among staff. Modifications were made to this off-the-shelf software package tailoring it to the needs of the LCR MSCP. Data collected for the FY07 field season was placed into this management system and an organizational structure for the system was put in place.

All tagging and stocking data for RASU and BONY collected in FY07 were provided to ASU and included in the Lower Colorado River Native Fishes database.

In FY07, a decision was made to proceed with a modular database management system. While the database management process was being determined, data entry was accomplished through individual work tasks so costs are not reflected in this work task. Funding was moved to accelerate accomplishments under work task G3.

FY08 Activities: The database management system will be implemented by staffing a database manager position and developing high priority modules. It is anticipated that FY08 expenditures will be less than the approved budget estimate due to delays in implementing this project.

All tagging and stocking data for RASU and BONY will continue to be provided to ASU for inclusion into the Lower Colorado River Native Fishes database.

Proposed FY09 Activities: Database design and implementation will continue. A pilot project will be conducted and a plan developed to begin work on high priority modules. 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 database is estimated to be \$110,000 per year.

Pertinent Reports: *Draft LCR MSCP Database Management Framework Requirements Analysis* is available upon request from the LCR MSCP.

Work Task G2: Annual Report Writing and Production

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$75,000	\$73,272	\$165,535	\$0	\$0	\$0	\$0

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

Start Date: FY05

Expected Duration: FY07

Long-Term Goal: Transparent program communications between internal and external stakeholders.

Conservation Measures: N/A.

Location: Boulder City, NV.

Purpose: The creation of annual program documents as stated in the FMA section 7.3.12(A).

Connections with Other Work Tasks (past and future): This is an ongoing activity that will continue through the term of the program.

Project Description: Funds are reserved for labor and materials associated with creating the annual Implementation Report, Work Plan, Budget and Contribution Schedule, as required by the LCR MSCP FMA.

FY07 Accomplishments: Preparation of the Final Implementation Report, Fiscal Year 2008 Work Plan and Budget, Fiscal Year 2006 Accomplishment Report was completed.

FY08 Activities: This work task was folded into A-1 Program Administration commencing in FY08. Work Task Closed.

FY08 Activities: Work task closed.

Pertinent Reports: *Lower Colorado River Multi-Species Conservation Program Final Implementation Report, Fiscal Year 2007 Work Plan, and Budget and Fiscal Year FY2005 Accomplishment* was posted on LCR MSCP Web site; *Final Implementation Report, Fiscal Year 2008 Work Plan, and Budget and Fiscal Year 2006 Accomplishment* was posted to the LCR MSCP Web site.

Work Task G3: Adaptive Management Research Projects

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$275,000	\$343,216	\$624,544	\$230,000	\$230,000	\$230,000	\$230,000

Contact: John Swett, (702) 293-8574, jswett@lc.usbr.gov

Start Date: FY06

Expected Duration: FY55

Long-term Goal: Species research.

Conservation Measures: MRM1, MRM2, MRM4, WIFL1, AMM1, MRM5, BONY5, RASU6, CRCR1, YHCR1, MRM3, FLSU3, LLFR1, and LLFR3.

Location: System-wide.

Purpose: Evaluate existing knowledge for each LCR MSCP covered species to determine research needs, develop a research program to complete appropriate conservation measures, and provide data for the habitat creation and maintenance program. As data gaps are identified for each covered species and their habitats, a research activity will be developed to provide information for the Adaptive Management Program. This work task enables Reclamation to implement priority research projects in a timely manner.

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: To achieve successful habitat creation and an effective Fish Augmentation Program over a long period of time, an Adaptive Management Program must be implemented. Data gaps will be identified during C3 and species research priorities will be defined. These research opportunities will be developed into projects/studies and be implemented by Reclamation staff or via contracts, grants, and agreements. Miscellaneous research projects that relate to LCR MSCP covered species and habitats may also be executed in this work task. New knowledge accumulated during the adaptive management process will be used in planning habitat creation projects for covered species, fish augmentation strategies, and system monitoring programs.

Previous Activities: More than 31,000 RASU were stocked into Lake Havasu and the Colorado River below Davis Dam as part of the Lake Havasu Fish Improvement Project initiated in 1993. The USGS and Reclamation have been studying this community since 1999. As a result of these

studies a population of spawning RASU was discovered near Needles, California. Results of this work are included in a report covering a 3-year period from 2003 to 2005, which is posted on the LCR MSCP Web site.

Research needs were identified in the Fish Augmentation Program (Section B) to evaluate monitoring techniques for assessing relative abundance of RASU, especially in riverine reaches. Techniques evaluated included video and still photography from helicopters, visual counts by drift boats, and using night-time electrofishing. These techniques were tested at the spawning group of RASU near Needles.

FY07 Accomplishments: An evaluation of monitoring techniques for assessing relative abundance of RASU was continued at the spawning group near Needles. Aerial photography and videography was highly influenced by wind, which distorts visibility; however, aerial still photography showed promise. Spawning RASU proved far more accessible to night electrofishing than to standard trammel netting. More fish were contacted per staff hour, resulting in better population size estimates. Population estimates derived by boat surface counts (1,133 fish) fell within the population confidence limits resulting from the electrofishing (1,196 fish). A standardized sampling protocol for float counts and electro-fishing was developed and tested.

A RASU telemetry study was initiated in reach 3 during FY07 to determine range and habitat use for these fish. Fifteen adult male RASU were collected from three distinct spawning groups in the river near Needles, California, and Laughlin, Nevada. They were then surgically implanted with a 36-month sonic tag. These fish were tracked every 2 weeks during the spawning season and monthly for the remainder of the year. Habitat data were collected for each fish contacted during tracking. This information will determine the effectiveness of our current monitoring efforts and provide guidance to improve future monitoring.

Research was conducted to experimentally determine lethal salinity limits for RASU eggs and larvae. Adult RASU were captured from Lake Mohave via trammel nets and electrofishing and were manually spawned on-site during March. Fertilized eggs were transported to the USBR Fisheries Laboratory in Boulder City, Nevada, for experimental trials. Laboratory research for FY07 was conducted from March 14 to May 24, 2007. Salinity levels chosen for experimentation indicated that upper salinity tolerances are between 10,000-15,000 $\mu\text{S}/\text{cm}$ and 23,000-26,000 $\mu\text{S}/\text{cm}$ for eggs and larvae respectively. Additional research will be completed in FY08.

FY08 Activities: An external science review of the strategy for implementing the conservation measures for avian species will be initiated. Current and proposed activities will be evaluated and recommendations for increasing overall program efficiency will be made.

New avian research projects have been proposed in FY08 under this workplan. To effectively and efficiently create marsh habitat for covered bird species, created habitats must be designed to provided necessary requirements for CLRA, LEBI, and BLRA. A study will be initiated to develop a conceptual design to provide these habitat requirements. FY09 work will be continued under Work Task C28.

Through work accomplished under Work Task D2, nest predation was determined to be the leading cause of nest failure for SWFL and other open nest passerines. However, little is known about nest predation along the LCR. In FY08, a study will be initiated to determine causes of nest predation and to recommend management actions that may reduce these stresses. FY09 work will be conducted under Work Task C28.

A final report for the development and evaluation of monitoring techniques of RASU in riverine habitats is being completed. It will include a final evaluation of aerial photography and videography, as well as refinement of standardized protocols for float counts and electro-fishing surveys. These data will be compared to data from standard mark/recapture protocols using electrofishing for accuracy, cost, and overall impact and the least favorable survey methods will be discontinued.

The RASU telemetry efforts initiated in FY07 will be continued. An additional five fish will be sonic tagged and released in the lower end of Lake Havasu, and their movements will be followed, which could possibly lead to the discovery of new spawning aggregations. Initial tags had a 36-month tag life and monitoring will continue through 2009.

This is the first year for the evaluation of RASU ageing techniques. Previous work by a contractor has indicated that accurate ageing can be accomplished by analyzing sections of the second and third fin ray. We will determine if this technique is viable for fish inhabiting tailwater areas. FY08 work will include literature review of ageing techniques, and field demonstrations of the fin ray sectioning method (C29).

Salinity research will also continue with modifications suggested by FY07 data. Lethal ranges identified in FY07 will be further scrutinized in an effort to produce a more precise measure of salinity tolerance. Again, attention will be focused on RASU eggs and larvae, and research will be conducted beginning in March. A new research work task will be developed to continue this work with larger-sized RASU and BONY in future years (C32).

Initial research will be conducted to characterize zooplankton communities in off-channel floodplain habitats that have native fishes (C34).

Proposed FY09 Activities: The avian program review will be completed and results will be published in refereed outlets. Based on the outcome of the remote sensing work for RASU monitoring from FY07, a final monitoring protocol will be developed, further tested, and refined. A final report will be written in FY08 presenting the outcome of these tests in terms of estimating population trends, cost, and overall impact to the resource.

RASU telemetry work will be developed as a new research work task for FY09. Evaluation of RASU ageing techniques will increase this year and will include collection of fin rays from the Needles spawning group. These samples will be analyzed and compared with any known ages of the fish which were sampled. If results are positive and the technique appears useful, a new research work task will be developed to expand application of this technique to characterize year-class strength of known spawning groups throughout the LCR MSCP area.

Pertinent Reports: A draft final report, *Development of Remote Sensing Techniques to Monitor Relative Abundance of Razorback Sucker Found Between Hoover and Parker Dams*, is under review and will be posted to the LCR MSCP Web site.

Work Task G4: Science/Adaptive Management Strategy

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$100,000	\$60,549	\$143,419	\$20,000	\$50,000	\$50,000	\$50,000

Contact: John Swett, (702) 293-8574, jswett@lc.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: A draft science strategy was developed in FY06 that defines processes for ensuring LCR MSCP implementation using the best available science. This strategy includes processes for planning, adaptive management, status review, implementation elements, and monitoring and research plans. Annual meeting or workshops will be held to provide a forum for interested parties to discuss natural resource conservation along the LCR, especially LCR MSCP implementation.

During FY07, a 5-year monitoring and research priorities report was drafted outlining priorities for FY08-FY12. It is anticipated that an interim workshop will be held in FY10, highlighting ongoing research and monitoring activities.

The LCR MSCP will rear and stock some 1.2 million native fishes. Roughly 10% of these fish are to be released over a 5-year period to allow for extensive research and monitoring. These releases are targeted to begin in 2011 and run through 2016. The associated research and monitoring program will also commence in 2011; however, the studies may continue through 2019 if necessary. During fall/winter 2007, Reclamation will develop a science advisory panel consisting of fishery scientists familiar with RASU and BONY life history and ecology. The panel will convene quarterly during 2008 and 2009 to develop and prioritize a multi-year research and monitoring program to coincide with fish releases. During 2010, Reclamation will

organize, coordinate, and finalize study plans and scopes of work necessary to begin this research program in 2011 in concert with the accelerated native fish stockings.

Previous Activities: In FY06, a draft science strategy was developed. In January 2006, the first annual Colorado River terrestrial and riparian ecosystem (CRITER) meeting was held to discuss research and monitoring of terrestrial, riparian, and marsh wildlife and their habitats along the LCR.

FY07 Accomplishments: Draft 5-year monitoring and research priorities for FY08-12 were developed and comments were received.

The second annual CRITER meeting was held in January 2007. In conjunction with the meeting, discussions were held on SWFL and YBCU research and monitoring along the LCR.

A fish culture workshop was held in Mesa, Arizona, to review the status of rearing and distributing native Colorado River fishes within the river basin. All current facilities rearing these fishes participated. As a result from this workshop, Reclamation has contracted with USFWS to develop a specific diet formulation for BONY.

FY08 Activities: The final science strategy was adopted by the Steering Committee in October, 2007. The draft 5-year monitoring and research priorities report will be finalized to guide research and monitoring activities through 2012. The third annual CRITER meeting will be held in January 2008.

A fisheries science advisory panel will be organized to evaluate RASU and BONY life history and ecology, and to plan and design fishery research actions to be implemented between 2011 and 2018, in association with the accelerated fish augmentation stockings required by the HCP (see conservation measures RASU3, RASU6, BONY3, and BONY5).

Proposed FY09 Activities: The final science strategy will be implemented. Additional informational meetings, including CRITER, will be held. Quarterly meetings of the fisheries advisory panel will be convened to develop and prioritize monitoring and research programs in advance of expected large-scale RASU and BONY stocking efforts.

Pertinent Reports: *Final Science Strategy*, and *Five Year Research and Monitoring Priorities—FY08-12*, will be posted on the LCR MSCP Web site.

**WORK TASKS
SECTION H**

EXISTING HABITAT MAINTENANCE

Work Task H1: Existing Habitat Maintenance

FY07 Estimates	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$561,000	\$561,000	\$1,102,500	\$593,500	\$605,000	\$605,000	\$5,445,000*

*Based on FY09 inflation estimates.

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

Start Date: FY06

Expected Duration: FY15

Long-term Goal: Maintenance of existing habitat.

Conservation Measures: N/A.

Location: Lower Colorado River (reaches 1-7).

Purpose: Maintain existing habitat 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 to restore habitats suitable for LCR MSCP covered species in the planning areas that have become degraded since the LCR MSCP was initiated. 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 LCR MSCP Program Manager, primarily through award of grants to participating entities.

Previous Activities: This was a new start in FY06.

FY07 Accomplishments: A total of \$561,000 was deposited into interest bearing accounts among the Arizona, California, and Nevada partners. The total dollar value of the fund at the end of FY07, with interest, was 1,235,238.

FY08 Activities: A total of \$593,500 will be deposited into interest bearing accounts among Arizona, California, and Nevada partners.

Proposed FY09 Activities: A total of \$605,000 is expected to be deposited into the three non-Federal interest-bearing accounts. A process for use of the Habitat Maintenance Fund will be developed.

Pertinent Reports: N/A

**WORK TASKS
SECTION I**

PUBLIC OUTREACH

Work Task I1: Public Outreach *

FY07 Estimate	FY07 Actual	Cumulative Accomplishment Through FY07	FY08 Approved Estimate	FY09 Proposed Estimate	FY10 Proposed Estimate	FY11 Proposed Estimate
\$35,000	\$35,511	\$44,300	\$35,000	\$40,000	\$50,000	\$70,000

* previously listed as Work Task G5

Contact: Laura Vecerina, (702) 293-8540, lvecerina@lc.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.

FY07 Accomplishments: In FY07, Reclamation, along with the Central Arizona Water Conservation District and the Imperial National Wildlife Refuge, held a dedication for the Imperial Ponds Project. More than 65 people representing Arizona and Nevada agencies, USFWS, Reclamation, and the CAWCD Board attended an outdoor ceremony at the Imperial National Wildlife Refuge. For the dedication, project-specific information (displays, fact sheets) were developed. Reclamation also staffed a booth at Colorado River Water Users that featured the Imperial Ponds Project. During FY07, short educational field trips for the Steering Committee were initiated, including a 2-day field visit to Lake Mohave to participate in razorback sucker larvae collection.

FY08 Activities: The focus of FY08 outreach activities will continue to be education. A number of Steering Committee field trips have been planned including site visits to the Big Bend Conservation Area, Cibola Valley Conservation Area and the Palo Verde Ecological Reserve, and the Lake Mead Fish Hatchery and Overton Wildlife Management Area. Reclamation will continue to staff a booth at Colorado River Water Users.

Proposed FY09 Activities: In FY09, work will continue on updating the LCR MSCP Web site to include more information for the general public as well as developing project-specific fact sheets. Educational field trips will also be continued.

Pertinent Reports: N/A.

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 5, 2008

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

Anthony P. Miller
 Natural Resource Analyst
 Colorado River Commission of Nevada
 555 E. Washington Ave., Suite 3100
 Las Vegas, NV 89101

Gentlemen:

For the Federal Fiscal Year 2009, the Non-Federal share, both annually and quarterly by state are detailed in this letter. The inflation index used is 1.210.

FY 2009 Non-Federal Share (2003 \$)	\$5,607,000
FY 2009 Inflation Index	1.210
FY 2009 Non-Federal Share (Escalated \$)	\$6,784,470

<u>FY 2009 Non-Federal Payments</u>	<u>Existing Habitat Maintenance</u>	<u>Balance</u>	<u>Total</u>
Arizona (15% of Non-Federal Share)	\$151,250.00	\$ 866,420.50	\$ 1,017,670.50
Nevada (30% of Non-Federal Share)	151,250.00	1,884,091.00	2,035,341.00
California (55% of Non-Federal Share)	<u>302,500.00</u>	<u>3,428,958.50</u>	<u>3,731,458.50</u>
Total	\$605,000.00	\$6,179,470.00	\$6,784,470.00

<u>FY 2009 Quarterly Payments</u>		<u>Existing Habitat Maintenance</u>	<u>Balance</u>	<u>Total</u>
Arizona	Q1	\$ 37,812.50	\$ 216,605.14	\$ 254,417.64
	Q2	37,812.50	216,605.12	254,417.62
	Q3	37,812.50	216,605.12	254,417.62
	Q4	37,812.50	216,605.12	254,417.62
Nevada	Q1	\$ 37,812.50	\$ 471,022.75	\$ 508,835.25
	Q2	37,812.50	471,022.75	508,835.25
	Q3	37,812.50	471,022.75	508,835.25
	Q4	37,812.50	471,022.75	508,835.25
California	Q1	\$ 75,625.00	\$ 857,239.64	\$ 932,864.64
	Q2	75,625.00	857,239.62	932,864.62
	Q3	75,625.00	857,239.62	932,864.62
	Q4	75,625.00	857,239.62	932,864.62

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) or myself, 623-869-2167 (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
 Jed Blake, MSCP Site Development Coordinator, Bureau of Reclamation
 Gera Ashton, MSCP Budget Analyst, Bureau of Reclamation
 Jackie Brown, Financial Analysis and Planning Manager, CAP
 Dana Medlock, Senior Financial Analyst, CAP

Section 8.1.1 - Fiscal Year 2009 Inflation Calculation for Lower Colorado River Multi-Species Conservation Program

Item		Description / Formula		Values		Result
FY	=	Federal Fiscal Year Being Adjusted for Inflation		2009		2009
FY-2	=	Federal Fiscal Year for 2 years prior to Federal Fiscal Year Being Adjusted for Inflation		2007		2007
PPI Inflation Index for FY	=	<u>Producer Price Index for Materials and Components for Const Sept FY-2</u> Producer Price Index for Materials and Components for Const Sept 2002	=	193.2/ 152.1	=	1.2700
GDPIP Inflation Index for FY	=	<u>Gross Domestic Product Implicit Price Deflator September 30, FY-2</u> / <u>Gross Domestic Product Implicit Price Deflator September 30, 2002</u>		119.826 / 104.243	=	1.1490
Inflation Index for FY	=	(PPI Inflation Index for FY + GDPIP inflation Index for FY)/2		(1.270+1.149)/2	=	1.210
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 \$11,214 / 2	=	\$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 1.210	=	\$6,784.470
Federal Indexed Funding Obligation for FY	=	(Federal Funding Obligation for FY) X (Inflation Index for FY)		\$5,607 X 1.210	=	\$6,784.470

All \$ are in thousands

Individual State's share in \$

California Share - 50%		50.00%	\$3,392,235.00
Arizona Share - 25%		25.00%	\$1,696,117.50
Nevada Share - 25%		25.00%	\$1,696,117.50
Total Non-Federal Share			\$6,784,470.00

Adjusted Split in Individual State Shares

California - 55%	55.0%	\$ 3,731,458.50
Arizona - 15%	15%	1,017,670.50
Nevada - 30%	30.0%	2,035,341.00
Total Non-Federal Share	100%	\$ 6,784,470.00

**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
Total Annual Funding Commitment	\$ 13,568,940.00
X Existing Habitat Percentage Above	4.458712323880860%
Existing Habitat Maintenance Cost	\$ 605,000.00
Arizona - 25%	\$ 151,250.00
Nevada - 25%	151,250.00
California - 50%	302,500.00
Total Existing Habitat Maintenance Cost	\$ 605,000.00

Fiscal Year 2009 Lower Colorado River Multi-Species Program Funding, Indexing and Inflation Adjusted Changes in Funding (Actual Indices through September 2007)

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 2009 d7/d2 =e7		For 2009 f7/f2 =g7	For 2009 (e7+g7)/2 =h7					For 2009 j9*h7 =m9	For 2009 k9*h7 =n9
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	3.0%	3.5%	123.421	1.184	199.962	1.315	1.250	11,214	5,607	5,607	13,311	6,656	6,656
9	2009	3.0%	3.5%	127.123	1.219	206.961	1.361	1.290	11,214	5,607	5,607	13,569	6,784	6,784
10	2010	3.0%	3.5%	130.937	1.256	214.204	1.408	1.332	11,214	5,607	5,607	14,018	7,009	7,009
11	2011	3.0%	3.5%	134.865	1.294	221.701	1.458	1.376	27,540	13,770	13,770	35,527	17,763	17,763
12	2012	3.0%	3.5%	138.911	1.333	229.461	1.509	1.421	27,540	13,770	13,770	36,683	18,342	18,342
13	2013	3.0%	3.5%	143.079	1.373	237.492	1.561	1.467	27,540	13,770	13,770	37,895	18,948	18,948
14	2014	3.0%	3.5%	147.371	1.414	245.804	1.616	1.515	27,540	13,770	13,770	39,134	19,567	19,567
15	2015	3.0%	3.5%	151.792	1.456	254.408	1.673	1.565	27,540	13,770	13,770	40,401	20,201	20,201
16	2016	3.0%	3.5%	156.346	1.500	263.312	1.731	1.616	22,164	11,082	11,082	33,578	16,789	16,789
17	2017	3.0%	3.5%	161.036	1.545	272.528	1.792	1.669	22,164	11,082	11,082	34,687	17,343	17,343
18	2018	3.0%	3.5%	165.867	1.591	282.066	1.854	1.723	22,164	11,082	11,082	35,817	17,909	17,909
19	2019	3.0%	3.5%	170.843	1.639	291.938	1.919	1.779	22,164	11,082	11,082	36,992	18,496	18,496
20	2020	3.0%	3.5%	175.969	1.688	302.156	1.987	1.838	22,164	11,082	11,082	38,189	19,094	19,094
21	2021	3.0%	3.5%	181.248	1.739	312.732	2.056	1.898	19,982	9,991	9,991	35,548	17,774	17,774
22	2022	3.0%	3.5%	186.685	1.791	323.677	2.128	1.960	19,982	9,991	9,991	36,727	18,363	18,363
23	2023	3.0%	3.5%	192.286	1.845	335.006	2.203	2.024	19,982	9,991	9,991	37,926	18,963	18,963
24	2024	3.0%	3.5%	198.054	1.900	346.731	2.280	2.090	19,982	9,991	9,991	39,165	19,582	19,582
25	2025	3.0%	3.5%	203.996	1.957	358.867	2.359	2.158	19,982	9,991	9,991	40,444	20,222	20,222
26	2026	3.0%	3.5%	210.116	2.016	371.427	2.442	2.229	8,144	4,072	4,072	17,021	8,510	8,510
27	2027	3.0%	3.5%	216.419	2.076	384.427	2.527	2.302	8,144	4,072	4,072	17,575	8,787	8,787
28	2028	3.0%	3.5%	222.912	2.138	397.882	2.616	2.377	8,144	4,072	4,072	18,153	9,076	9,076
29	2029	3.0%	3.5%	229.599	2.203	411.808	2.707	2.455	8,144	4,072	4,072	18,747	9,374	9,374
30	2030	3.0%	3.5%	236.487	2.269	426.221	2.802	2.536	8,144	4,072	4,072	19,358	9,679	9,679
31	2031	3.0%	3.5%	243.582	2.337	441.139	2.900	2.619	7,500	3,750	3,750	18,413	9,206	9,206
32	2032	3.0%	3.5%	250.889	2.407	456.579	3.002	2.705	7,500	3,750	3,750	19,020	9,510	9,510

33	2033	3.0%	3.5%	258,416	2,479	472,559	3,107	2,793	7,500	3,750	3,750	19,643	9,821	9,821
34	2034	3.0%	3.5%	266,168	2,553	489,099	3,216	2,885	7,500	3,750	3,750	20,288	10,144	10,144
35	2035	3.0%	3.5%	274,153	2,630	506,217	3,328	2,979	7,500	3,750	3,750	20,948	10,474	10,474
36	2036	3.0%	3.5%	282,378	2,709	523,935	3,445	3,077	7,173	3,587	3,587	20,694	10,347	10,347
37	2037	3.0%	3.5%	290,849	2,790	542,273	3,565	3,178	7,173	3,587	3,587	21,368	10,684	10,684
38	2038	3.0%	3.5%	299,575	2,874	561,252	3,690	3,282	7,173	3,587	3,587	22,071	11,036	11,036
39	2039	3.0%	3.5%	308,562	2,960	580,896	3,819	3,390	7,173	3,587	3,587	22,796	11,398	11,398
40	2040	3.0%	3.5%	317,819	3,049	601,227	3,953	3,501	7,173	3,587	3,587	23,542	11,771	11,771
41	2041	3.0%	3.5%	327,353	3,140	622,270	4,091	3,616	7,173	3,587	3,587	24,316	12,158	12,158
42	2042	3.0%	3.5%	337,174	3,234	644,050	4,234	3,734	7,173	3,587	3,587	25,113	12,556	12,556
43	2043	3.0%	3.5%	347,289	3,332	666,591	4,383	3,858	7,173	3,587	3,587	25,938	12,969	12,969
44	2044	3.0%	3.5%	357,708	3,431	689,922	4,536	3,984	7,173	3,587	3,587	26,784	13,392	13,392
45	2045	3.0%	3.5%	368,439	3,534	714,069	4,695	4,115	7,173	3,587	3,587	27,673	13,837	13,837
46	2046	3.0%	3.5%	379,492	3,640	739,062	4,859	4,250	7,173	3,587	3,587	28,577	14,289	14,289
47	2047	3.0%	3.5%	390,877	3,750	764,929	5,029	4,390	7,173	3,587	3,587	29,517	14,758	14,758
48	2048	3.0%	3.5%	402,603	3,862	791,701	5,205	4,534	7,173	3,587	3,587	30,485	15,243	15,243
49	2049	3.0%	3.5%	414,681	3,978	819,411	5,387	4,683	7,173	3,587	3,587	31,489	15,745	15,745
50	2050	3.0%	3.5%	427,122	4,097	848,090	5,576	4,837	7,173	3,587	3,587	32,522	16,261	16,261
51	2051	3.0%	3.5%	439,935	4,220	877,774	5,771	4,996	7,173	3,587	3,587	33,591	16,796	16,796
52	2052	3.0%	3.5%	453,134	4,347	908,496	5,973	5,160	7,173	3,587	3,587	34,696	17,348	17,348
53	2053	3.0%	3.5%	466,728	4,477	940,293	6,182	5,330	7,173	3,587	3,587	35,836	17,918	17,918
54	2054	3.0%	3.5%	480,729	4,612	973,203	6,398	5,505	7,173	3,587	3,587	37,013	18,506	18,506
55	2055	3.0%	3.5%	495,151	4,750	1,007,265	6,622	5,686	7,173	3,587	3,587	38,232	19,116	19,116
Total									626,180	313,090	313,090	1,385,755	692,878	692,878

Appendix B. Description of Take

AZ	HAVASU NATIONAL WILDLIFE REFUGE														
AZ	INLET-NW NE NW SEC 33 T9N RSSW G&SRM	DIVERSION 8/	399	1549	4106	5993	5195	4941	5331	3372	2167	757	52	-1	33861
AZ	FARM DITCH	DIVERSION	110	431	1106	1316	1080	1052	813	590	673	316	23	-8	7502
AZ	WELL 8N/23E-15Aa	DIVERSION 2/													0
AZ		MEAS. RETURNS	0	0	2	9	0	1	0	0	0	0	0	0	12
AZ		UNMEAS. RETURNS	448	1742	4585	6424	5522	5273	5407	3487	2499	944	66	-8	36389
AZ		CONSUMPTIVE USE	61	238	625	876	753	719	737	475	341	129	9	-1	4962
AZ	LAKE HAVASU I.D.D. (CITY)														
AZ	DISTRICT PUMPED FROM WELLS	DIVERSION	1149	1025	1107	1138	1141	1500	1632	1794	1523	1459	1270	1113	15851
AZ		MEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		UNMEAS. RETURNS	437	390	421	432	434	570	620	682	579	554	483	423	6025
AZ		CONSUMPTIVE USE	712	635	686	706	707	930	1012	1112	944	905	787	690	9826
AZ	CENTRAL ARIZONA PROJECT														
AZ	PUMPED FROM LAKE HAVASU	DIVERSION	133727	131318	171214	160808	159299	148452	100014	42417	134100	164060	147108	118236	1610753
AZ		MEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		UNMEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		CONSUMPTIVE USE	133727	131318	171214	160808	159299	148452	100014	42417	134100	164060	147108	118236	1610753
AZ	TOWN OF PARKER														
AZ	PUMPED FROM RIVER	DIVERSION	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ	1 WELL-NW NW NW SEC 7 T9N R19W G&SRM	DIVERSION 10/	58	54	78	81	96	103	102	98	82	77	61	48	938
AZ		MEAS. RETURNS	21	21	24	25	24	22	23	22	21	22	25	24	274
AZ		UNMEAS. RETURNS	17	15	22	23	27	29	29	28	23	22	17	14	266
AZ		CONSUMPTIVE USE	20	18	32	33	45	52	50	48	38	33	19	10	398
AZ	COLORADO RIVER INDIAN RESERVATION														
AZ	DIVERSION AT HEADGATE ROCK DAM	DIVERSION	26410	32290	42280	64540	69880	69920	73230	70960	57050	40880	28160	25290	600890
AZ	2 PUMPS AND MUNICIPAL	DIVERSION 4/10/	6	6	5	7	12	17	16	6	7	6	5	9	102.19
AZ		MEAS. RETURNS	14049	13859	16719	19432	21521	18502	19445	19898	19755	19689	17282	16157	216308
AZ		UNMEAS. RETURNS	1453	1776	2326	3550	3844	3847	4029	3903	3138	2249	1549	1391	33055
AZ		CONSUMPTIVE USE	10914	16661	23240	41565	44527	47588	49772	47165	34164	18948	9334	7751	351629.19
AZ	EHRENBURG IMPROVEMENT ASSN.														
AZ	ONE RIVER PUMP	DIVERSION	32	29	35	39	41	47	51	49	43	39	31	25	461
AZ		MEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		UNMEAS. RETURNS	9	8	10	11	12	13	15	14	12	11	9	7	131
AZ		CONSUMPTIVE USE	23	21	25	28	29	34	36	35	31	28	22	18	330
AZ	CIBOLA VALLEY IRRIGATION DISTRICT														
AZ	3 PUMPS SEC'S 20, 21 & 26T1N R23W	DIVERSION													0
AZ		MEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		UNMEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		CONSUMPTIVE USE	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ	CIBOLA NATIONAL WILDLIFE REFUGE														
AZ	5 PUMPS IN SEC. 2 & 31 T1S, R23W	DIVERSION													0
AZ		MEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		UNMEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		CONSUMPTIVE USE	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ	IMPERIAL NATIONAL WILDLIFE REFUGE														
AZ	2 WELLS SEC 13 T5S R22W G&SRM	DIVERSION 2/													0
AZ		MEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		UNMEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		CONSUMPTIVE USE	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ	YUMA PROVING GROUND														
AZ	DIVERSION AT IMPERIAL DAM	DIVERSION	0	1	1	0	0	0	3	1	0	0	0	1	7
AZ	WELLS W, X, Y, Z	DIVERSION 2/	22	20	25	68	93	72	96	112	27	60	51	60	706
AZ		MEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		UNMEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		CONSUMPTIVE USE	22	21	26	68	93	72	99	113	27	60	51	61	713

AZ NORTH GILA VALLEY IRRIGATION DISTRICT															
AZ	DIVERSION AT IMPERIAL DAM 7/	DIVERSION	2785	2591	4610	4837	5734	4920	4688	3290	3550	4965	3345	2221	47536
AZ		MEAS. RETURNS	1672	1362	2503	2571	3048	2622	2735	2103	2116	2967	2146	1769	27614
AZ		UNMEAS. RETURNS	382	355	632	663	786	674	642	451	486	680	458	304	6513
AZ		CONSUMPTIVE USE	731	874	1475	1603	1900	1624	1311	736	948	1318	741	148	13409
AZ YUMA IRRIGATION DISTRICT															
AZ	DIVERSION AT IMPERIAL DAM 7/	DIVERSION	4030	4685	7596	7656	8137	6704	5735	5606	5075	6634	4654	3310	69822
AZ	PUMPED FROM PRIVATE WELLS	DIVERSION	127	94	199	176	193	108	202	145	158	115	71	25	1613
AZ		MEAS. RETURNS	1061	1208	2326	1931	2187	1837	1479	1603	1101	1668	1004	825	18230
AZ		UNMEAS. RETURNS	885	1018	1660	1668	1774	1451	1265	1225	1115	1438	1006	710	15215
AZ		CONSUMPTIVE USE	2211	2553	3809	4233	4369	3524	3193	2923	3017	3643	2715	1800	37990
AZ YUMA MESA I. D. D.															
AZ	DIVERSION AT IMPERIAL DAM 7/	DIVERSION	11213	10145	15227	18954	24236	24866	28703	25426	16305	13992	11752	5714	206533
AZ		MEAS. RETURNS	4350	5598	7505	5982	6739	7430	10282	9301	6323	7130	5528	5356	81524
AZ		UNMEAS. RETURNS	1794	1623	2436	3033	3878	3979	4592	4068	2609	2239	1880	914	33045
AZ		CONSUMPTIVE USE	5069	2924	5286	9939	13619	13457	13829	12057	7373	4623	4344	-556	91964
AZ UNIT "B" I. D. D.															
AZ	DIVERSION AT IMPERIAL DAM 7/7E/	DIVERSION	1739	1582	1850	2330	3091	3478	3823	3656	2580	2490	1997	831	29447
AZ		MEAS. RETURNS	747	971	1201	964	1067	1215	1704	1557	1107	1260	974	939	13706
AZ		UNMEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		CONSUMPTIVE USE	992	611	649	1366	2024	2263	2119	2099	1473	1230	1023	-108	15741
AZ FORT YUMA INDIAN RESERVATION															
AZ	DIVERSIONS FOR YUMA EAST WETLANDS	DIVERSION	5	5	21	16	18	19							
AZ	RANCH "5" LANDS, YUMA ISLAND, AZ (180 ac)	DIVERSION	56	43	62	86	131	48	161	31	62	56	108	30	874
AZ		MEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		UNMEAS. RETURNS	21	17	29	36	52	23	56	11	22	20	38	11	335
AZ		CONSUMPTIVE USE	40	31	54	66	97	44	104	20	40	37	70	20	623
AZ YUMA COUNTY WATER USERS ASSOCIATION															
AZ	DIVERSION AT IMPERIAL DAM	DIVERSION	21030	22647	37488	43041	39582	26293	24194	19990	27374	39886	29825	16873	348223
AZ	PUMPED FROM WELLS 7E/	DIVERSION	149	41	25	40	479	45	19	0	13	0	9	17	837
AZ		MEAS. RETURNS	8754	8032	8459	8188	8534	7365	6025	5512	8077	10517	10740	8096	98299
AZ		UNMEAS. RETURNS	445	476	788	905	841	553	508	420	575	838	627	355	7331
AZ		CONSUMPTIVE USE	11980	14180	28266	33988	30686	18420	17680	14058	18735	28531	18467	8439	243430
AZ COCOPA INDIAN RESERVATION															
AZ	DIVERSION AT IMPERIAL DAM	DIVERSION	88	71	136	133	397	115	121	500	312	790	441	375	3479
AZ	PUMPED FROM WELLS 7E/	DIVERSION	1	0	0	0	5	0	0	0	0	0	0	0	6
AZ	PUMPED FROM WELLS, WEST COCOPA	DIVERSION	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		MEAS. RETURNS	2	1	3	2	5	2	1	8	7	24	17	7	79
AZ		UNMEAS. RETURNS	0	0	0	0	2	0	0	0	0	0	0	0	2
AZ		CONSUMPTIVE USE	87	70	133	131	395	113	120	492	305	766	424	368	3404
AZ YUMA AREA OFFICE, USBR															
AZ	DIVERSION FROM WELL NO.8	DIVERSION 2/													0
AZ		MEAS. RETURNS													0
AZ		UNMEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		CONSUMPTIVE USE	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ PUMPED FROM SOUTH GILA WELLS (DPOC'S)															
AZ		MEAS. RETURNS 5/	0	5894	5912	5561	5929	6481	5907	5929	5854	6067	5718	3925	63177
AZ		UNMEAS. ABOVE	0	-5894	-5912	-5561	-5929	-6481	-5907	-5929	-5854	-6067	-5718	-3925	-63177
AZ		RETURNS CREDIT	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ OTHER USERS PUMPING FROM COLORADO															
AZ	RIVER AND WELLS IN FLOOD PLAIN DAVIS	DIVERSION 6/													0
AZ	DAM TO INTERNATIONAL BOUNDARY	MEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		UNMEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ		CONSUMPTIVE USE	0	0	0	0	0	0	0	0	0	0	0	0	0
AZ ARIZONA TOTALS															
AZ		DIVERSION	233137	244009	344671	368874	386092	359994	310035	231574	304723	324082	258393	188272	3553856

AZ	MEAS. RETURNS	43390	48413	60788	58787	63806	59290	60902	58528	55491	61905	55010	50731	677041
AZ	UNMEAS. RETURNS	8442	4692	11317	16155	18008	17088	17761	14405	10963	7223	3383	1682	131118
AZ	CONSUMPTIVE USE	181305	190904	272566	293932	304278	283616	231371	158642	238269	254954	200001	135860	2745697

AZ

AZ NOTE: The term 'CONSUMPTIVE USE' in this tabulation means diversions including underground pumping, less measured return flow and less current estimated unmeasured return flow to the river.

AZ

AZ 1/ No surface returns unless shown.

AZ 2/ Reported annual total only, distributed monthly according to nearby users.

AZ 3/ Calculated by assuming an annual diversion of 6 ac-ft per irrigated acre.

AZ 4/ Calculated using monthly power records.

AZ 5/ Pumped from underground and credited as return flow to Yuma Mesa Division but unassigned to districts as returns.

AZ Includes quantities of drainage from Yuma Mesa, Unit B, as well as from South Gila Valley.

AZ 6/ Details on Arizona Supplemental Sheets.

AZ 7/ Summation for the Yuma Mesa Division, consisting of the North Gila Valley Irrigation District, the Yuma Irrigation District, and the Yuma Mesa Irrigation & Drainage District is as follows:

Item	Annual Totals (Acre-Feet)	
----	-----	
Diversion at Imperial Dam A/	323891	
Pumped from wells	1613	
Surface returns from South Gila Valley (S.Gila Cal Wasteway)	2778 *	
Return flow North Gila Valley (6 drains & wasteways)	7788 *	
Return flow South Gila Valley wells (DPOC's) less Unmeasured Return	54773	
Return flow Yuma Mesa Outlet Drain B/	20272.5 *	
Return flow protective and regulatory pumping unit C/	43319.4 *	
Estimated unmeasured groundwater return flow D/	27838.8	
Return flow share of Gila Main Canal loss E/	25367 *	
Subtotal return flow F/	182137	182141 check from above
Consumptive Use (see note above)	143367	143363 check from above
(A) Total for the North Gila Valley, The Yuma Irrigation and the Yuma Mesa Irrigation and Drainage Districts, and 'Unit B'.		
(B) Estimated at 85 percent of the Yuma Mesa Outlet Drain with balance credited to 'Unit B'.		
(C) Estimated at 85 percent of Protective and Regulatory Pumping Unit with balance credited to 'Unit B'.		
(D) Estimated at 38 percent of the North Gila Valley Diversion at Imperial Dam plus 14 percent of Yuma Irrigation District diversion at Imperial Dam. (Based on analysis of the USGS Report 83-4220 entitled 'A Method for Estimating Ground-Water Return Flow to the Lower Colorado River in the Yuma Area')		
(E) Diversion*mileage weighted share of Gila Main Canal loss less canal surface evaporation (1397 af/yr) and phreatophytes (2154 af/yr).		
(F) Additional unmeasured amounts of return flows from the Yuma Mesa Irrigation and Drainage District, 'Unit B', the Cocopah Indian Reservation, and the Yuma County Water Users Association (YCWUA) are utilized to meet consumptive uses in the United States and in partial satisfaction of the Mexican Treaty obligation. Some of these underground flows are recovered by pumping from wells on the Cocopah Indian Reservation and in the YCWUA area, and by some of the surface drains in the YCWUA area. Efforts will be made to at least quantify these return flows within broad limits by respective water user entities in future years.		
8/ Diversion adjusted for delivery to Mohave Valley I. D. D. (Chesney) and Farm Ditch (FMIR).		
9/ Main Outlet Drain return flow credit is measured flow at Station 0+00 and includes both Colorado River and Gila River water. Reclamation is working to develop a method to separate the different sources of return flow and will apply that methodology when available.		
10/ Includes 1 river pump, CRIT tribal usage delivered by the Town of Parker has been deducted.		

AZ

DIVERSIONS FROM MAINSTREAM-AVAILABLE RETURN FLOW AND CONSUMPTIVE USE OF SUCH WATER CALENDAR YEAR 2007 STATE OF CALIFORNIA														
02/25/08													(ACRE-FEET)	
CA WATER USER		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL 1/
CA FORT MOJAVE INDIAN RESERVATION														
CA DELIVERED BY CITY OF NEEDLES	DIVERSION													0
CA PUMPED FROM RIVER AND WELLS	DIVERSION 4/	572	1357	1894	2101	1850	2993	2794	2579	1905	1437	965	595	21042
	MEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
	UNMEAS. RETURNS	264	627	875	971	855	1383	1291	1191	880	664	446	275	9722
	CONSUMPTIVE USE	308	730	1019	1130	995	1610	1503	1388	1025	773	519	320	11320
CA CITY OF NEEDLES														
CA PUMPED FROM WELLS	DIVERSION	137	146	190	227	259	288	296	278	241	231	182	111	2,586
	MEAS. RETURNS	33	31	34	34	40	34	39	36	35	33	31	33	413
	UNMEAS. RETURNS	30	30	37	41	50	57	60	51	49	48	37	24	514
	CONSUMPTIVE USE	74	85	119	152	169	197	197	191	157	150	114	54	1,659
CA CHEMEHUEVI INDIAN RESERVATION														
CA PUMPED FROM RIVER AND WELLS	DIVERSION 7/													0
	MEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
	UNMEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
	CONSUMPTIVE USE	0	0	0	0	0	0	0	0	0	0	0	0	0
CA METROPOLITAN WATER DISTRICT														
CA DIVERSION FROM LAKE HAVASU	DIVERSION	50478	59008	19525	75813	85649	82797	63320	97340	90731	27404	29313	34911	716289
	MEAS. RETURNS 2/	268	234	257	247	247	230	199	203	200	244	244	260	2833
	UNMEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
	CONSUMPTIVE USE	50210	58774	19268	75566	85402	82567	63121	97137	90531	27160	29069	34651	713456
CA PARKER DAM AND GOVERNMENT CAMP														
CA DIVERSION AT PARKER DAM	DIVERSION													0
	MEAS. RETURNS													0
	UNMEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
	CONSUMPTIVE USE	0	0	0	0	0	0	0	0	0	0	0	0	0
CA COLORADO RIVER INDIAN RESERVATION														
CA PUMPED FROM 11 PUMPS AND WELLS	DIVERSION 4/													0
CA 4 PUMPS BIG RIVER	DIVERSION 4/6/													0
	MEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
	UNMEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
	CONSUMPTIVE USE	0	0	0	0	0	0	0	0	0	0	0	0	0
CA CITY OF WINTERHAVEN														
CA 1 WELL SE NE NE SEC 27 T16S R22E SBM	DIVERSION 6/													0
	MEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
	UNMEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0
	CONSUMPTIVE USE	0	0	0	0	0	0	0	0	0	0	0	0	0
CA PALO VERDE IRRIGATION DISTRICT														
CA DIVERSION FROM PALO VERDE DAM	DIVERSION	36710	52060	67870	77590	107900	107300	113000	110000	96320	62710	48280	37350	917090
	MEAS. RETURNS	31608	31285	38198	37338	42132	45455	50652	47513	48337	42212	37820	37835	490385
	UNMEAS. RETURNS	2056	2915	3801	4345	6042	6009	6328	6160	5394	3512	2704	2092	51358
	CONSUMPTIVE USE	3046	17860	25871	35907	59726	55836	56020	56327	42589	16986	7756	-2577	375347
CA YUMA PROJECT, RES. DIV. INDIAN UNIT														
CA DIVERSION AT IMPERIAL DAM	DIVERSION	3094	2931	5274	5876	5812	1724	1852	2638	2271	5320	4442	2470	43704
	MEAS. RETURNS	64	51	89	86	63	32	16	37	33	132	140	39	782
	UNMEAS. RETURNS	517	489	881	981	971	288	309	441	379	888	742	412	7298
	CONSUMPTIVE USE	2513	2391	4304	4809	4778	1404	1527	2160	1859	4300	3560	2019	35624

CA YUMA PROJECT, RES. DIV. BARD UNIT															
CA DIVERSION AT IMPERIAL DAM	DIVERSION	2275	1965	4298	5611	6118	5721	3112	3007	3445	3792	3275	1613	44232	
CA	MEAS. RETURNS	29	20	40	46	36	55	17	25	40	56	69	15	448	
CA	UNMEAS. RETURNS	380	328	718	937	1022	955	520	502	575	633	547	269	7386	
CA	CONSUMPTIVE USE	1866	1617	3540	4628	5060	4711	2575	2480	2830	3103	2659	1329	36398	
CA RETURNS FROM YUMA PROJECT															
CA RESERVATION DIVISION RETURNS	MEAS. RETURNS 3/	2178	1786	2314	2078	1903	1954	2301	2315	2380	2380	2222	2084	25895	
CA SUM YUMA PROJECTS, RES. DIV. USE	CONSUMPTIVE USE	2201	2222	5530	7359	7935	4161	1801	2325	2309	5023	3997	1264	46127	
CA															
CA IMPERIAL IRRIGATION DISTRICT															
CA DIVERSION AT IMPERIAL DAM	DIVERSION	157668	174743	287839	317642	333477	310384	339390	290303	249979	230433	149440	110634	2951932	
CA	MEAS. RETURNS	5506	5028	7673	7431	5605	8741	4835	6789	7427	9705	8116	2898	79754	
CA	UNMEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0	
CA	CONSUMPTIVE USE	152162	169715	280166	310211	327872	301643	334555	283514	242552	220728	141324	107736	2872178	
CA	DIVERSION	0	7215	1719	1933	2306	3958	4549	2062	0	0	0	129	23871	
CA	MEAS. RETURNS	0	208	46	45	39	111	65	48	0	0	0	3	565	
CA WATER TRANSFERRED TO SDCWA	CA CONSUMPTIVE USE	0	7007	1673	1888	2267	3847	4484	2014	0	0	0	126	23306	
CA COACHELLA VALLEY WATER DISTRICT															
CA DIVERSION AT IMPERIAL DAM	DIVERSION	19321	19215	25882	24574	32816	31827	34260	32901	28417	27397	29859	15399	321868	
CA	MEAS. RETURNS	675	553	690	575	552	896	488	769	844	1154	1622	403	9221	
CA	UNMEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0	
CA	CONSUMPTIVE USE	18646	18662	25192	23999	32264	30931	33772	32132	27573	26243	28237	14996	312647	
CA OTHER USERS PUMPING FROM COLORADO															
CA RIVER AND WELLS IN FLOOD PLAIN	DIVERSION 5/													0	
CA DAVIS DAM TO INTERNATIONAL BOUNDARY	MEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0	
CA	UNMEAS. RETURNS	0	0	0	0	0	0	0	0	0	0	0	0	0	
CA	CONSUMPTIVE USE	0	0	0	0	0	0	0	0	0	0	0	0	0	
CA CALIFORNIA TOTALS															
CA	DIVERSION	270255	318640	414491	511367	576187	546992	562573	541108	473309	358724	265756	203212	5042614	
CA	MEAS. RETURNS	40361	39196	49341	47880	50617	57508	58612	57735	59296	55916	50264	43570	610296	
CA	UNMEAS. RETURNS	3247	4389	6312	7275	8940	8692	8508	8345	7277	5745	4476	3072	76278	
CA	CONSUMPTIVE USE	226647	275055	358838	456212	516630	480792	495453	475028	406736	297063	211016	156570	4356040	
CA	WATER MANAGEMENT														
CA	ACCT. CREDITS	0	0	0	0	0	0	0	0	0	0	0	0	0	
CA	TOTAL USE	226647	275055	358838	456212	516630	480792	495453	475028	406736	297063	211016	156570	4356040	

CA NOTE: The term 'CONSUMPTIVE USE' in this tabulation means diversions including underground pumping, less measured return flow and less current

CA 1/ No surface returns unless shown.

CA 2/ Estimate based on measured returns from regulatory reservoirs less an estimated amount of phreatophyte use.

CA 3/ Returns unassigned include drainage from the Indian Unit and the Bard Unit in the Reservation Division but excludes

CA 4/ See related the Annual Analytical Power Records.

CA 5/ Details on California Supplemental Sheets.

CA 6/ Reported annual total only, distributed monthly according to nearby users.

CA 7/ Calculated by assuming an annual diversion of 6 ac-ft per irrigated acre.

CA 8/ Needles total return estimated as 40% of diversion plus measured returns (unpublished report, Colorado River Board of California).

CA
CA
CA
CA

**APPENDIX B TABLE B-1
Lower Colorado River Multi-Species Conservation Program
Federal Flow-Related Covered Actions and Accomplishments
Calendar Year 2007**

Federal Covered Actions <i>Biological Assessment Chapter 2</i>	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions ¹	2007 Accomplishments ^{2, 3}
2.2 BUREAU OF RECLAMATION				
2.2.1 Ongoing Flow-Related Actions				
2.2.1.1 Flood Control (page 2-3; Table 2-1, page 2-5)	<ul style="list-style-type: none"> • Prescribed flood control releases per Field Working Agreement and <i>Water Control Manual for Lake Mead/Hoover Dam</i> 	<ul style="list-style-type: none"> • Timing of required releases may be varied within the month • Anticipatory flood control releases • Available flood control space in Lake Mead can be reduced to 1.5 maf August 1 to January 1 if prescribed space is available in upstream reservoirs • Management of target elevations for Lake Mohave (Davis Dam) and Lake Havasu (Parker Dam) 	<ul style="list-style-type: none"> • None 	<p>No flood control releases were made from Lake Mead.</p> <p>The elevation of Lake Mead provided for flood control space which was well above that required. In 2007, the Lake Mead elevation varied between 1110.81 and 1129.99 feet mean sea level.</p> <p>Elevations at Lake Mohave and Lake Havasu were managed to target elevations.</p>
2.2.1.2 State Apportionment and Water Contracts (page 2-5; Table 2-2, page 2-6)	<ul style="list-style-type: none"> • Delivery of water to water users in the United States pursuant to applicable Federal law, including the Boulder Canyon Project Act (BCPA); the Supreme Court Decree of March 9, 1964, 376 U.S. 340, as amended (Decree) • Delivery of a State's unused entitlement to a junior entitlement holder within that State on an annual basis 	<ul style="list-style-type: none"> • Determinations and delivery of post-2016 unused apportionment water from one State to another within the Lower Basin on an annual basis 	<ul style="list-style-type: none"> • Delivery of water to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree 	<p>Water deliveries were made to water users in Arizona, California, and Nevada to satisfy the basic entitlements for delivery of Colorado River water. Unused entitlement water within a state's apportionment was delivered to junior priority holders in that state.</p>
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"> • Issuance of an annual operating plan • Delivery of water to water users in the United States pursuant to applicable Federal law, including the Boulder Canyon Project Act (BCPA); the Supreme Court Decree of March 9, 1964, 376 U.S. 340, as amended (Decree) • Delivery of water to Mexico pursuant to the 1944 Water Treaty 	<ul style="list-style-type: none"> • Determination of shortage conditions absent specific guidelines • Determination of surplus conditions absent specific guidelines • 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 • Determinations and delivery of post-2016 unused apportionment water from one State to another within the Lower Basin on an annual basis • Execution of agreements and the delivery of surplus water pursuant to the Reclamation Reform Act and the Reclamation States Emergency Drought Relief Act • Periodic review of the Long Range Operation of the Colorado (LROC) 	<ul style="list-style-type: none"> • Delivery of water to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree 	<p>The Annual Operating Plan for 2007, 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>A Partial Domestic Surplus condition was declared for 2007. However, no surplus water was taken.</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 21,599 acre-feet.</p> <p>There was a review of the Long-Range Operating Criteria of Colorado River reservoirs.</p>

APPENDIX B TABLE B-1
Lower Colorado River Multi-Species Conservation Program
Federal Flow-Related Covered Actions and Accomplishments
Calendar Year 2007

Federal Covered Actions <i>Biological Assessment</i> Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions ¹	2007 Accomplishments ^{2, 3}
2.2.1.4 Daily Hoover Dam Operations (Table 2-4, page 2-10)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States, deliver 1944 Water Treaty water, and generate hydropower with these water releases	• Monthly energy targets are set prior to each month, based on the best information available with respect to downstream water demands and lake elevation targets at Lakes Mohave and Havasu; energy targets may be revised during the month to meet changing water demands and other constraints (e.g., to benefit native fish in Lake Mohave)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States and to generate hydropower with these water releases	Water releases from Hoover Dam were made to satisfy beneficial use requirements of entitlement holders in the United States, to deliver 1944 Water Treaty water, and to generate hydropower with these water releases. Energy targets were set monthly based on the best information available with respect to downstream water demands and lake elevation targets at Lakes Mohave and Havasu. Energy targets were revised during the month to meet changing water demands and other constraints.
2.2.1.4 Daily Davis Dam Operations (Table 2-5, page 2-11)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States, deliver 1944 Water Treaty water, and generate hydropower with these water releases	• Timing of releases, to a limited degree, may be varied by a few days, based on available downstream storage, Lake Mohave and Lake Havasu operational constraints, downstream water requirements, and hydropower needs	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States and generate hydropower with these water releases	Water releases from Davis Dam were made to satisfy beneficial use requirements of entitlement holders in the United States, to deliver 1944 Water Treaty water, and to generate hydropower with these water releases. The timing of releases was varied based on available downstream storage, operational constraints for lakes Mohave and Havasu, downstream water requirements, and hydropower needs.
2.2.1.4 Daily Parker Dam Operations (Table 2-6, page 2-11)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States, deliver 1944 Water Treaty water, and generate hydropower with these water releases	• Timing of releases, to a limited degree, may be varied by the hour based on hydropower needs, water requirements, or other operations constraints immediately downstream of the dam	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States and generate hydropower with these water releases	Water releases from Parker Dam were made to satisfy beneficial use requirements of entitlement holders in the United States, to deliver 1944 Water Treaty water, and to generate hydropower with these water releases. The timing of releases was varied based on available downstream water requirements, hydropower needs, and other operational constraints immediately downstream of Parker Dam.
2.2.1.4 Daily Senator Wash, Imperial Dam, and Laguna Dam Reservoir Operations (Table 2-7, page 2-11)	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States, deliver 1944 Water Treaty water, and generate hydropower with water releases for Senator Wash	• Senator Wash, Imperial Dam, and Laguna Dam operations to prevent over deliveries, to release water to entitlement holders, for sluicing operations, to deliver a portion of the 1944 Water Treaty deliveries to Mexico, and for flood control purposes	• Water releases are made to satisfy beneficial use requirements of entitlement holders in the United States	Water releases from Senator Wash, Imperial, and Laguna dams were made to satisfy beneficial use requirements of entitlement holders in the United States, to deliver 1944 Water Treaty water, and to generate hydropower with water releases from Senator Wash. Water releases from Senator Wash, Imperial, 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.
2.2.1.5 Electric Power Generation (page 2-11) 43 CFR PART 431 (page 2-14)	• Operational requirements to satisfy 43 C.F.R. Part 431 requirements	---	---	Hydroelectric power generated: • Hoover Dam: 3,767,762,710 kWh • Davis Dam: 1,131,610,300 kWh • Parker Dam: 448,960,822 kWh Operations met the requirements to satisfy 43 C.F.R. Part 431.
2.2.1.6 Lower Colorado Water Supply Project - California (page 2-15; Table 2-8, page 2-16)	• Delivery of water under executed Water Supply Project contracts	• Reclamation's execution and administration of individual Water Supply Project contracts	• Participate in the development of and consult in the execution of individual contracts under the Water Supply Project	LCWSP water subcontracted for immediate use totaled 138 acre-feet. LCWSP water subcontracted and reserved for future use totaled 144 acre-feet. Contract among the United States, the City of Needles, and the Metropolitan Water District of Southern California was executed on March 26, 2007, which allowed MWD to divert the unused LCWSP water. In 2007, 5,989 acre-feet of use was offset by the pumpage of the LCWSP wellfield. This amount was not diverted by IID at Imperial Dam and made available to project contractors for delivery from the river. All LCWSP off-set was taken from the river upstream of Parker Dam.

**APPENDIX B TABLE B-1
Lower Colorado River Multi-Species Conservation Program
Federal Flow-Related Covered Actions and Accomplishments
Calendar Year 2007**

Federal Covered Actions <i>Biological Assessment Chapter 2</i>	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions ¹	2007 Accomplishments ^{2, 3}
<p>2.2.1.7 1944 Water Treaty Deliveries (page 2-17; Table 2-9, page 2-20)</p>	<ul style="list-style-type: none"> • Delivery of Mexico allotment (1.5 million acre-feet [maf]) pursuant to the 1944 Water Treaty and related Minutes • Delivery of Mexico allotment (up to 1.7 maf) when surplus water is determined by the United States Section of the International Boundary Water Commission to be available beyond the needs of U.S. users • Deliver of Mexico allotment pursuant to the 1944 Water Treaty and related Minutes under extraordinary drought conditions • Compliance with the salinity requirements of Minute No. 242 of the 1944 Water Treaty • Delivery of emergency water to Tijuana pursuant to Minute No. 310 of the 1944 Water Treaty and contract 	<ul style="list-style-type: none"> • Routing of water through the Yuma Division for delivery to Northerly International Boundary (NIB) • Determination of quantity of water delivered at Southerly International Boundary (SIB) up to 140,000 afy • Drainage pumping and delivery of drainage return flows at NIB and SIB • Operation of variable-speed pumps and diversion canal at SIB to reduce salinity • Execution of contracts to deliver a portion of Mexico's allotment to Tijuana pursuant to Minute No. 310 of the 1944 Water Treaty • Routing of water through the Yuma Division during flood control conditions 	<ul style="list-style-type: none"> • Delivery of emergency water to Tijuana pursuant to Minute No. 310 of the 1944 Water Treaty and contract • Retention of a portion of Metropolitan's entitlement in Lake Mead to accommodate delivery of water pursuant to Minute No. 310 of the 1944 Water Treaty 	<p>Water delivery met the Mexico allotment (1.5 maf) pursuant to the 1944 Water Treaty and related Minutes.</p> <p>A total of 1,521,608 acre-feet of water was delivered to Mexico.</p> <p>Compliance was met with the salinity requirements of Minute No. 242 of the 1944 Water Treaty.</p> <p>Delivery of emergency water to Tijuana pursuant to Minute No. 310 of the 1944 Water Treaty totaled 0 acre-feet.</p> <p>Water was routed through the Yuma Division for delivery to NIB. Water arriving at NIB is water that stays in the river below Imperial Dam, inflow from the Gila River, and water that enters the river from many returns, including Pilot Knob Wasteway.</p> <p>Delivery of water at SIB totaled 132,084 acre-feet.</p> <p>Drainage pumping and delivery of drainage return flows were made at NIB and SIB.</p> <p>Variable-speed pumps and the diversion canal at SIB were used to reduce salinity. A total of 1,884 acre-feet was diverted through the diversion canal.</p>
<p>2.2.1.8 Decree Accounting (page 2-21; Table 2-10, page 2-22)</p>	<ul style="list-style-type: none"> • Annual preparation of official records of the diversion, return flow, and consumptive use of Colorado River water pursuant to Article V of the Supreme Court Decree in <i>Arizona v. California</i> 	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Report data for Decree Accounting records 	<p>The <i>Colorado River Accounting and Water Use Report; Arizona, California, Nevada</i> for calendar year 2007 is currently being prepared. Publication will take place during Calendar Year 2008. Provisional data is available (see Appendix B, Attachment 1) and is summarized below.</p> <p>Provisional Data - Diversions from Mainstream Summary ⁴:</p> <ul style="list-style-type: none"> • Arizona: <ul style="list-style-type: none"> Diversions = 3,603,027 acre-feet Measured Returns = 676,290 acre-feet Unmeasured Returns = 155,682 acre-feet • Consumptive Use = 2,771,055 acre-feet • California: <ul style="list-style-type: none"> Diversions = 5,067,264 acre-feet Measured Returns = 610,359 acre-feet Unmeasured Returns = 87,119 acre-feet • Consumptive Use = 4,369,786 acre-feet • Nevada: <ul style="list-style-type: none"> Diversions = 517,257 acre-feet Measured Returns = 215,453 acre-feet Unmeasured Returns = 1,445 acre-feet • Consumptive Use = 300,359 acre-feet

APPENDIX B TABLE B-1
Lower Colorado River Multi-Species Conservation Program
Federal Flow-Related Covered Actions and Accomplishments
Calendar Year 2007

Federal Covered Actions <i>Biological Assessment</i> Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions ¹	2007 Accomplishments ^{2, 3}
2.2.2 Future Flow-Related Covered Actions				
2.2.2.1 Specific Surplus and Shortage Guidelines (page 2-22; Table 2-11, page 2-24)	<ul style="list-style-type: none"> • Delivery of surplus water pursuant to the Article II(B)(2) of the Supreme Court Decree of March 9, 1964, 376 U.S. 340, as amended (Decree) • Delivery of water pursuant to the Article II(B)(3) of the Decree (shortage) 	<ul style="list-style-type: none"> • Adoption of specific post-2016 surplus guidelines • Adoption of specific shortage guidelines 	<ul style="list-style-type: none"> • Consult with States on development of specific post-2016 surplus guidelines or development of specific shortage guidelines • Delivery of water to water users in the United States pursuant to applicable Federal law, including the Boulder Canyon Project Act and the Decree 	<p>No surplus water was delivered pursuant to Article II(B)(2) of the Decree.</p> <p>No water was delivered pursuant to Article II(B)(3) of the Decree.</p> <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"> • Delivery of water under executed flood release contracts 	<ul style="list-style-type: none"> • Execution of contracts for water released during flood control operations 	<ul style="list-style-type: none"> • Participate in the development of and consult in the execution of flood release contracts 	<p>No water deliveries were made under flood release contracts.</p>
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)	---	---	---	<p>No administrative actions were taken to reduce the water deliveries as listed in Table 2-13 of the <i>Biological Assessment</i>.</p>
Flow Changes Below Hoover Dam to Davis Dam (Table 2-14, after page 2-26)	---	---	---	<p>Repayment of CRWDA Exhibit C obligations resulted in 43,931 acre-feet of water remaining in storage in Lake Mead. Repayment of IOPP overruns resulted in reduced diversions of 606 af in AZ, and 2,188 af in CA remaining in storage. Re-regulatory water was put back into storage through reduced diversions by MWD (21,649 af) and IID (2,356 af). System conservation in PVID resulted in reduced diversions and increased storage in the amount of 7,000 af.</p>
Flow Changes Below Davis Dam to Parker Dam (Table 2-15, after page 2-26)	---	---	---	<p>No banking was done by California for Nevada in 2007. In 2007, California recovered 16,804 acre-feet of credits stored in Arizona. Repayment of CRWDA Exhibit C obligations resulted in 43,931 acre-feet of water remaining in storage in Lake Mead. Repayment of IOPP overruns resulted in reduced diversions of 606af in AZ, and 2188af in CA remaining in storage. Re-regulatory water was put back into storage through reduced diversions by MWD (21,649 af) and IID (2,356 af). System conservation in PVID resulted in reduced diversions and increased storage in the amount of 7,000 af.</p>
Flow Changes Below Parker Dam to Imperial Dam (Table 2-16, after page 2-26)	---	---	---	<p>IID reduced diversions by 5,989 af to make water available to diverters above Parker Dam under the LCWSP. In addition IID reduced it's diversion by the following amounts, all of which remained in storage: 2,188 af for IOPP repayments, 34,831af for Ex. C obligations, 2,356 af for re-regulatory recovery. IID conserved the following amounts for transfer to MWD and SDCWA: 105,000 af under the 1988 Conservation Agreement to MWD and 75,000 conservation under the CRWDA to SCDWA.</p>
Water Conservation Field Services Program (page 2-27; Table 2-17, page 2-28)	<ul style="list-style-type: none"> • Develop water conservation program pursuant to Reclamation Reform Act section 210(a) 	<ul style="list-style-type: none"> • Implementation of the Field Services Program 	<ul style="list-style-type: none"> • Consult in the development of conservation plans pursuant to RRA section 210(a) 	<p>Five water conservation plans were updated (CAP subcontractors' Active Management Plans were included in 2006). All water conservation plans for the Lower Colorado Region are complete.</p>
Unauthorized Use (page 2-28; Table 2-18, page 2-30)	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Implementation of appropriate policy or rule to address four types of unauthorized use • Execution of water delivery contracts with entities identified as non-contract users 	<ul style="list-style-type: none"> • Consult with states in the development of policies or rules to address four types of unauthorized use • Consult with the states on the execution of water delivery contracts with entities identified as noncontract users 	<p>Informal review by Reclamation of proposed rule completed. Informal review by DOI of economic analyses completed.</p>

**APPENDIX B TABLE B-1
Lower Colorado River Multi-Species Conservation Program
Federal Flow-Related Covered Actions and Accomplishments
Calendar Year 2007**

Federal Covered Actions <i>Biological Assessment Chapter 2</i>	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions ¹	2007 Accomplishments ^{2, 3}
Unallocated or Noncontract Water in Arizona, Exclusive of CAP (page 2-30; Table 2-19, page 2-31)	• Delivery of water pursuant to executed contracts for unallocated water in Arizona (non-CAP)	• Execution of water delivery contracts for unallocated water in Arizona (non-CAP)	• Review of water delivery contracts and consultation with Arizona on contract recommendations	Unallocated (non-CAP) Arizona water was delivered to Central Arizona Water Conservation District as allowed under that agency's contract with the United States. This water remains unallocated and not yet placed 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 2008.
Central Arizona Project Contract Actions (page 2-31; Table 2-20, page 2-31)	• Delivery of water pursuant to executed contracts	• Completion of allocation and execution of contracts for delivery of CAP subject to Congressional direction	• Review of contracts and consultation on proposed allocation	Water was delivered to the CAP for use by CAP subcontractors and Indian tribes in satisfaction of water delivery contracts. All contract actions under the Arizona Water Settlements Act have been executed.
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	One water transfer was executed. The Mohave County Water Authority contract was amended to (1) reflect two separate contract service areas for MCWA, consisting of Contract Service Area No. 1, which includes MCWA's farmland in CVIDD and Contract Service Area No. 2, which includes approved contract service areas for Bullhead City and Lake Havasu City in Mohave County, and (2) change the type of use in Contract Service Area No. 1 to irrigation use or domestic use and in Contract Service Area No. 2 for domestic use only. The documents for this water transfer were executed on July 6, 2007. Delivery of 75,000 acre-feet of water was made 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 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 2-32)	• 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	No water was banked for Nevada in California by The Metropolitan Water District of Southern California. In Arizona, 175,570 acre-feet of water were diverted to storage for Nevada. This water was part of Arizona's apportionment; Nevada was not required to reduce its diversions. In 2007, California recovered 16,804 acre-feet of credits stored in Arizona. When Arizona pumps water from storage Arizona must reduce its consumptive use from the Colorado River in an amount equal to California or Nevada's requested release. California or Nevada will receive the water through the intentionally created unused apportionment made available by Arizona. The change in point of diversion for delivery is accounted for during the year of banked water recovery.
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	There was one change in point of diversion. We approved the Southern Nevada Water Authority's request for a new point of diversion which is the third intake in Lake Mead. The letter was signed on May 30, 2007
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	One contract was executed for change in type of use. The Mohave County Water Authority contract was amended to (1) reflect two separate contract service areas for MCWA, consisting of Contract Service Area No. 1, which includes MCWA's farmland in CVIDD and Contract Service Area No. 2, which includes approved contract service areas for Bullhead City and Lake Havasu City in Mohave County, and (2) change the type of use in Contract Service Area No. 1 to irrigation use or domestic use and in Contract Service Area No. 2 for domestic use only. The documents for this water transfer were executed on July 6, 2007

APPENDIX B TABLE B-1
Lower Colorado River Multi-Species Conservation Program
Federal Flow-Related Covered Actions and Accomplishments
Calendar Year 2007

Federal Covered Actions <i>Biological Assessment</i> Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions ¹	2007 Accomplishments ^{2, 3}
Inclusions and Exclusions to Service Areas (page 2-34; Table 2-25, page 2-35)	<ul style="list-style-type: none"> • Delivery of water pursuant to executed contract amendments or new contracts that includes or excludes lands in service areas 	<ul style="list-style-type: none"> • Execution of contract amendments or new contracts that includes or excludes lands in service areas 	<ul style="list-style-type: none"> • Review of contracts and consultation on new or amended contracts 	The City of Needles PPR contract was amended to include the Atchison Topeka Railroad PPR entitlement. The amendment was signed March 16, 2007. The Brooke Water Company contract was amended to include several wells and pumps within the Parker strip area into Brooke's contract service area for Brooke to schedule, report, and account for the wells and pumps. The amendment was signed March 16, 2007. The Boy Scouts Contract was assigned to SNWA. The assignment was executed on January 23, 2007.
Contract Terminations (page 2-35; Table 2-26, page 2-36)	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Termination of water contract due to abandonment • Execution of contract amendments when entitlement holder has relinquished water 	<ul style="list-style-type: none"> • Consultation on the disposition of any water allocated for use but not consumptively used within a state 	No contracts were terminated.

APPENDIX B TABLE B-1
Lower Colorado River Multi-Species Conservation Program
Federal Flow-Related Covered Actions and Accomplishments
Calendar Year 2007

Federal Covered Actions <i>Biological Assessment</i> Chapter 2	Nondiscretionary Actions	Discretionary Actions	Nondiscretionary Actions Related to Non-Federal Actions ¹	2007 Accomplishments ^{2, 3}
2.3 WESTERN AREA POWER ADMINISTRATION⁵	---	---	---	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 2007.
2.5.3.5 Headgate Rock Dam Operation and Maintenance (page 2-88)	---	• Water releases and generate hydropower with these water releases	---	Existing practices were continued.
2.6 FISH AND WILDLIFE SERVICE	---	---	• Water entitlement holder	See section 2.2.1.8 accomplishments in this table.
2.7 BUREAU OF LAND MANAGEMENT	---	---	• Water entitlement holder	See section 2.2.1.8 accomplishments in this table.

NOTES:

1. See *LCR MSCP Habitat Conservation Plan*, section 2.1.1, Relationship of Non-Federal Covered Activities to Federal Nondiscretionary Actions. This can be accessed at <http://www.lcrmscp.gov/publications/Volumell.pdf>.
2. Reporting for the Non-Federal Flow-Related Covered Activities (Appendix B, Table B-3) is included in the Federal Flow-Related Covered Actions and Accomplishments.
3. Flow-Related Federal Covered Actions and Flow-Related Non-Federal Covered Activities are reported for Calendar Year 2006.
4. Bureau of Reclamation. Provisional data from Draft *Colorado River Accounting and Water Use Report; Arizona, California, Nevada; Calendar Year 2006* (see Appendix B, Attachment 1). This can be accessed at <http://www.usbr.gov/lc/region/g4000/hourly/use06.pdf>.
5. Actions associated with water releases, and associated power generation, are described in the *LCR MSCP Biological Assessment*, section 2.2, Bureau of Reclamation Covered Actions. This can be accessed at <http://www.lcrmscp.gov/publications/Volumelll.pdf>.

**APPENDIX B TABLE B-2
Lower Colorado River Multi-Species Conservation Program
Federal Non-Flow-Related Covered Actions and Incidental Take Summary
Fiscal Year 2007**

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"> • Operate, maintain, and control river in Arizona, California, and Nevada • Construct, maintain, and improve drainage works for water projects • Maintain floodway to accommodate flood flows for 100-year event or 40,000 cubic feet per second, whichever is greater • Measure diversions and return flows to and from the mainstem of the Colorado River 	---	<ul style="list-style-type: none"> • Administration of contracts for water district operation and maintenance of Federally owned facilities 							See line items in this table.
2.2.3.1 Channel Maintenance (page 2-38)	---	---	---							
Wash Fans (page 2-40; Table 2-30, page 2-42)	---	<ul style="list-style-type: none"> • Wash fan removal 	---							No implementation in FY07
Protected Bankline Maintenance and Care of Unprotected Banklines (page 2-43)	---	<ul style="list-style-type: none"> • Protected bankline location and maintenance 	---	4	---	C133.8- C135.7	None	0	1, 3, and 6	Above Palo Verde Dam (AZ and CA side) 19,000 linear ft
				4	---	C133.6	None	0	1, 3, and 6	Below Palo Verde Dam (CA side) 75 linear ft
				3	---	A275.0	None	0	1, 3, and 6	Below Davis Dam (AZ side) 500 linear ft
Levee Maintenance (page 2-44)	---	<ul style="list-style-type: none"> • Levee location and maintenance 	---							No implementation in FY07
Desilting Basins (page 2-46; Table 2-32, page 2-46)	---	<ul style="list-style-type: none"> • Sediment dredging upstream of principal canal diversions and disposal sites • Maintenance of settling basins to remove sediment and maintain flows; four principal basins 	---		---					No implementation in FY07
Jetties and Training Structures (page 2-47; Tables 2-33 – 2-34, page 2-48)	---	<ul style="list-style-type: none"> • Jetty and training structure location and maintenance 	---							No implementation in FY07.
Stockpiles (page 2-49; Table 2-37, page 2-49)	---	<ul style="list-style-type: none"> • Location of three future stock piles 	---							No implementation in FY07.

APPENDIX B TABLE B-2
Lower Colorado River Multi-Species Conservation Program
Federal Non-Flow-Related Covered Actions and Incidental Take Summary
Fiscal Year 2007

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	
Riprap Placement and Haul Roads (page 2-50)	---	• Haul roads and riprap storage location and maintenance	---	7	---	0.00-49.00	None	0	1, 3, and 6	Road maintenance Limitrophe Division - bladed miles 16.5.
				6	---	0.00-49.00	None	0	1, 3, and 6	Road maintenance Yuma Division - bladed miles 52.6.
				6	---	00.0-49.00	None	0	1, 3, and 6	Road maintenance Gila River area - bladed miles 8.4.
				4	---	87.5-175.0	None	0	1, 3, and 6	Road maintenance Cibola Division - bladed miles 123.4.
				4	---	87.5-175.0	None	0	1, 3, and 6	Road maintenance Palo Verde Division - bladed miles 52.4.
				3	---	235.0-271.0	None	0	1, 3, and 6	Road maintenance Mohave Division - bladed miles 54.0.
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	---	7	MODE III, MODE II, and Fortuna Pond Outlet	31.0-36.0	None	0	1, 3, and 6	Concrete lining repairs and cleaning out outlet channel.
				7	Yuma Mesa Conduit	27.0	None	0	1, 3, and 6	Repair work of associated components, Yuma Valley.
				7	Yuma Mesa, Yuma Valley, & South Gila wells	31.0-34.0	None	0	1, 3, and 6	Pump and motors, Yuma Mesa.
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	Pump and motor work repairs, and conveyance channel maintenance.
2.2.3.3 Backwater Maintenance (page 2-53; Table 2-37, page 2-54)	---	• Backwater maintenance	---							No implementation in FY07.
Mohave Division (page 2-55; Table 2-38, page 2-56)	---	• Backwater maintenance	---							No implementation in FY07.
Parker Division (page 2-57; Table 2-39, page 2-57)	---	• Backwater maintenance	---							No implementation in FY07.
Palo Verde Division (page 2-58; Table 2-40, page 2-58)	---	• Backwater maintenance	---							No implementation in FY07.
Cibola Division (page 2-58; Table 2-41, page 2-59)	---	• Backwater maintenance	---							No implementation in FY07.
Imperial Division (page 2-59; Table 2-42, page 2-59)	---	• Backwater maintenance	---	5		A51.0-A55.0	None	0	1, 3, and 6	Imperial Division - AZ channel backwater area remove 98,000 cubic yards of material in order to reestablish flow along 2.65 miles of side channels.
Laguna Division (page 2-60; Table 2-43, page 2-60)	---	• Backwater maintenance	---							No implementation in FY07.

**APPENDIX B TABLE B-2
Lower Colorado River Multi-Species Conservation Program
Federal Non-Flow-Related Covered Actions and Incidental Take Summary
Fiscal Year 2007**

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	
Yuma Division (page 2-60; Table 2-44, page 2-61)	---	• Backwater maintenance	---	6 6						No Implementation in FY07.
Limitrophe Division Mitigation Obligations (page 2-61; Table 2-45, page 2-62)	---	---	---							No implementation in FY07.
2.2.3.4 Limitrophe Division Maintenance (page 2-62)	---	---	---							No implementation in FY07.
2.2.4 Future Non-Flow-Related Actions (page 2-63)	---	---	---							
2.2.4.1 Topock Marsh (page 2-63)	---	---	---							No implementation in FY07.
2.2.4.2 Laguna Reservoir (page 2-63)	---	---	---	6		44.0	None	0		Removed riprap material along Laguna Basin outlet channel in preparation for dredging activities.
2.2.4.3 Bankline Maintenance - Unprotected Banklines (page 2-65; Table 2-46, page 2-66)	---	---	---							No implementation in FY07.
2.2.4.4 Proposed Jetties (page 2-67; Table 2-48, page 2-67)	---	---	---							No implementation in FY07.

**APPENDIX B TABLE B-2
Lower Colorado River Multi-Species Conservation Program
Federal Non-Flow-Related Covered Actions and Incidental Take Summary
Fiscal Year 2007**

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	
2.3 WESTERN AREA POWER ADMINISTRATION			Maintenance for Davis - Mead 230k Transmission line	2	Lake Mohave	3/4 Mile	Flood Plain (No Impact)	0	3 and 5	Reconductor 230 kV transmission line. Reconductor of structure 6/3 accomplished by helicopter.
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 FY07
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		21 habitat modules installed at Carp Cove AZ.
2.4.4 Boating Access (page 2-72)		• Maintenance and enhancement of boating access on Lake Mead and Lake Mohave								No implementation in FY07.
2.5 BUREAU OF INDIAN AFFAIRS										
2.5.2.1 Ongoing Irrigation System Operation and Maintenance (page 2-74)		• Irrigation system operation and maintenance for existing Irrigation Projects		3	Fort Mohave	---	None	0	1 and 3	Continued existing practices.
				3	Chemehuevi	---	None	0	1 and 3	Continued existing practices.
				4	CRIT	---	None	0	1 and 3	Continued existing practices.
				6	Fort Yuma	---	None	0	1 and 3	Continued existing practices.
				7	Cocopah	---	None	0	1 and 3	Continued existing practices.
2.5.2.2 Ongoing Water Conservation Practices (page 2-77)		• Operation and maintenance of existing equipment								Continued existing practices.
2.5.2.4 Ongoing Wildland Fire Management (page 2-88)		• Implementation of fuels management projects								No implementation in FY07.
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 FY07.
2.5.3.2 Future Water Conservation Practices (page 2-85)		• Installation, operation, and maintenance of new equipment								No implementation in FY07.
2.5.3.3 Future Farmland Development (page 2-85)		• Develop additional agricultural acreage, including construction of irrigation systems								No implementation in FY07.
2.5.3.6 Future Wildland Fire Management (page 2-88)		• Implementation of new fuels management projects								No implementation in FY07.
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 2007**

Non-Federal Covered Activities <i>Habitat Conservation Plan</i> Chapter 2	Covered Activities Summary	Covered Activities Implemented						Notes
		Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.2 ARIZONA								
2.2.1 Ongoing Flow-Related Covered Activities¹ (page 2-4)	<ul style="list-style-type: none"> • Diversion of up to 2.8 maf of Arizona's full annual entitlement, plus surplus, plus Arizona's share of any unused apportionment, plus the volume of return flow, as applicable • Generation and transmission of hydroelectric power • Power contracting 							Non-Federal Flow-Related Covered Activities are included in the Federal Flow-Related Covered Actions and Accomplishments (see Appendix B, Table B-1).
2.2.2 Future Flow-Related Covered Activities¹ (page 2-6)	<p>Future Arizona water contract holder activities may include:</p> <ul style="list-style-type: none"> • Diversions, discharges, and return flows through existing facilities • Changes to points of diversion • New points of diversion • Interstate water banking • Water marketing • Water transfers • Any other actions as made possible from any future agreements and/or measures taken by the Arizona Department of Water Resources or contract holder(s) <p>Future Arizona hydroelectric power contract holder activities may include:</p> <ul style="list-style-type: none"> • Execution, administration, and operation of extended, renewed, new, or additional contracts for hydroelectric power from hydroelectric facilities at Hoover Dam, Davis Dam, Parker Dam, Headgate Rock Dam, Siphon Drop Power Plant, and Pilot Knob Power Plant 							No implementation in FY07.
2.2.3 Ongoing Non-Flow-Related Covered Activities (page 2-7)	<p>Operation, maintenance, and replacement of:</p> <ul style="list-style-type: none"> • The facilities and equipment through which water is diverted and conveyed • The facilities through which return flows are returned to the river • Drainage wells in the Yuma area • The facilities and equipment through which electric power is generated and transmitted • The appurtenant works that support these facilities, including access and service roads, electric power and communication transmission lines and substations, docks, boat ramps, and bankline protection 	6	Yuma Valley	---	---	---	1 and 3	54 miles of 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 FY07.
Fish Surveys (page 2-8)	• Surveys for Federally listed and nonnative fish species							27.0 nights of electro-fishing surveys and 4 nights of trammel net surveys.
Fish Stocking (page 2-9)	• Stocking of trout							No implementation in FY07.
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							508 person-days of watercraft patrol.

**APPENDIX B TABLE B-3
Lower Colorado River Multi-Species Conservation Program
Non-Federal Covered Activities and Incidental Take Summary
Fiscal Year 2007**

Non-Federal Covered Activities <i>Habitat Conservation Plan</i> Chapter 2	Covered Activities Summary	Covered Activities Implemented						Notes
		Reach	Location	River Miles	Habitat Type Impacted	Number of Acres Impacted	Complied with Avoidance and Minimization Measures	
2.4 NEVADA								
2.4.1 Ongoing Flow-Related Covered Activities¹ (page 2-15)	<ul style="list-style-type: none"> • Diversion of up to 0.3 maf of Nevada's full annual entitlement, plus surplus flows, plus Nevada's share of any unused apportionment, plus volume of return flows, as applicable • Generation and transmission of hydroelectric power • Power contracting 							Non-Federal Flow-Related Covered Activities are included in the Federal Flow-Related Covered Actions and Accomplishments (see Appendix B, Table B-1).
2.4.2 Future Flow-Related Covered Activities¹ (page 2-17)	<p>Future Nevada water contract holder activities may include:</p> <ul style="list-style-type: none"> • Diversions, discharges, and return flows through existing facilities • Changes to points of diversion • New points of diversion • Interstate water banking • Water marketing • Water transfers • Any other actions as made possible from any future agreements and/or measures taken by the Colorado River Commission of Nevada or contract holder(s) <p>Future Nevada hydroelectric power contract holder activities may include:</p> <ul style="list-style-type: none"> • Execution, administration, and operation of extended, renewed, new, or additional contracts for hydroelectric power from hydroelectric facilities at Hoover Dam, Davis Dam, Parker Dam, and Headgate Rock Dam 							Non-Federal Flow-Related Covered Activities are included in the Federal Flow-Related Covered Actions and Accomplishments (see Appendix B, Table B-1).
2.4.3 Ongoing Non-Flow-Related Activities (page 2-18)	<p>Operation, maintenance, and replacement of:</p> <ul style="list-style-type: none"> • The facilities and equipment through which water is diverted and conveyed • The facilities through which return flows are returned to the river • The facilities and equipment through which electric power is generated and transmitted • The appurtenant works that support these facilities, including access and service roads, electric power and communication transmission lines and substations, docks, boat ramps, and bankline protection 							No implementation in 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"> • Aquatic, wetland, and riparian habitat maintenance and restoration activities • Aquatic, wetland, and riparian revegetation enhancement activities • Place and maintain aids to navigation and boating access • Administer law enforcement and boating safety program using watercraft patrols 	---	---	---	---	---	---	<p>Twenty-one habitat modules installed at Carp Cove AZ. Cooperative project with NDOW and AGFD.</p> <p>No implementation in FY07.</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>
NOTE: 1. See LCR MSCP <i>Habitat Conservation Plan</i> , section 2.1.1, Relationship of Non-Federal Covered Activities to Federal Nondiscretionary Actions. This can be accessed at http://www.lcrmscp.gov/publications/Volumell.pdf .								

Appendix C. Recommendations from Resource Agencies

Appendix D. LCR MSCP Closed Work Tasks

LCR MSCP implementation during Fiscal Year 2008 beginning on October 1, 2007. 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 me (x244) or Lesley Fitzpatrick (x236).



Steven L. Spangle

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES: Luella Roberts-Stroebel)
Lower Colorado River Coordinator, Fish and Wildlife Service, Phoenix, AZ



DEPARTMENT OF FISH AND GAME

<http://www.dfg.ca.gov>

Inland Deserts Region - R6
P.O. Box 2160
Blythe, CA 92226



10/22/07
10/15/07
ENU-1110
08001781
1032123

October 19, 2007

Laura Vecerina
Bureau of Reclamation
Lower Colorado Region
P.O. Box 61470
Boulder City, NV 89006-1470

Re: Comments on the Lower Colorado River Multi-species Conservation Program Final Implementation Report, FY2008 Work Plan, and Budget, FY2006 Accomplishment Report

Dear Ms. Vecerina:

The California Department of Fish and Game (Department) has reviewed the Lower Colorado River Multi-species Conservation Program Final Implementation Report, FY2008 Work Plan, and Budget, FY2006 Accomplishment Report (Work Plan) and provides comment on the consistency with the California Endangered Species Act Incidental Take Permit No. 2081-2005-008-06 (CESA Permit). The Department finds the Work Plan to be consistent with requirements pursuant to the CESA Permit. No changes or additions are warranted by the Department at this time. The Department, as an LCRMSCP member, shall continue to review LCRMSCP annual work plans and provide comments on biological resources that may be affected by the implementation of those activities.

The Department appreciates the opportunity to comment on the Work Plan. If you have any questions regarding this letter please contact me at (760) 921-2974.

Sincerely,

Canh Nguyen
Environmental Scientist

Work Task		FY Closed	Total Accomplishment
	Pre FY07		
B9	Boulder City Wetland Ponds Total	FY05	\$4,370
	Pre FY07		
C1	Brown-Headed Cowbird Trap Assessment	FY06	\$125,989
C17	Senator Wash Razorback Sucker Stock Assessment	FY05	\$45,000
C18	Point Count Design and Sample Size Evaluation	FY05	\$49,920
C19	Southwestern Willow Flycatcher Feather Colorimetry	FY05	\$20,970
C20	Southwestern Willow Flycatcher Prey Base Study	FY05	\$104,981
C21	Yellow Billed Cuckoo Demographics Study	FY05	\$112,964
C22	Yellow-Billed Cuckoo Survey's Demographic Study, and Survey Protocol Evaluation	FY05	\$50,971
	Total		\$510,795
	FY07		
C6	Insect Population Biology in Riparian Restoration	FY07	\$103,551
C9	Razorback Sucker and Bonytail Pen Rearing Tests	FY07	\$111,040
C16	Evaluation of Past Bonytail Stockings	FY07	\$55,333
	Total		\$269,924
	Pre FY07		
D11	Vegetation Type Mapping Total	FY05	\$725,873
	Pre FY07		
E10	Walker Lake	FY05	\$0
E11	Draper Lake	FY05	\$0
E19	Needles-Topock (AZ RM 240) Stabilization	FY05	\$0
E20	Pintail Slough	FY05	\$95,000
E21	Planet Ranch, Bill Williams River	FY05	\$20,000
E22	Pratt Agricultural Lease	FY05	\$5,088
E23	Mittry Lake Fire Rehabilitation Project	FY05	\$0
	Total		\$120,088
	FY07		
E6	Cottonwood Genetics Study	FY07	\$259,405
E7	Mass Transplanting Demonstration	FY07	\$324,825
E12	Butler Lake	FY07	\$11,633
E13	McAllister Lake	FY07	\$18,876
	Total		\$614,739
	FY07		
G2	Annual Report Writing and Production Total	FY07	\$165,535

Appendix E. Financial Statement

MSCP Financial Statement

	CASH CONTRIBUTIONS			HABITAT MAINTENANCE FUND			CREDITS*			
	FY06	FY07	TOTAL CASH	FY06	FY07	TOTAL	FY04	FY05	FY06	FY07
Reclamation	6,072,381.00	6,291,054.00	12,363,435.00	0.00	0.00	0.00	3,381,440.00	5,980,712.00	506,149.00	3,869,537.00
Arizona	471,863.10	488,855.40	960,718.50	135,375.00	140,250.00	275,625.00				
Nevada	1,838,148.82	1,904,342.55	3,742,491.37	135,375.00	140,250.00	275,625.00				
California	3,220,869.08	3,336,856.05	6,557,725.13	270,750.00	280,500.00	551,250.00				
Metropolitan Water District	1,715,447.63	1,955,327.46								
Imperial Irrigation District	500,971.43	519,011.96								
Cochella Valley Water District	273,257.15	283,097.43								
Los Angeles Dept Water Power	154,845.72	160,421.88								
San Diego County Water	145,737.14	150,985.30						145,737.00	500,000.00	250,000.00
Palo Verde Irrigation District	122,067.53	126,463.31								
S. Cal Public Power Authority	63,760.00	66,056.07								
Southern California Edison	54,651.43	56,619.49								
Bard Water District	6,072.38	6,291.05								
Colorado River Board of CA	6,072.38	6,291.05								
Needles	6,072.38	6,291.05								
TOTAL	\$11,603,262.00	\$12,021,108.00	\$23,624,370.00	\$541,500.00	\$561,000.00	\$1,102,500.00	\$3,381,440.00	\$6,126,449.00	\$1,006,149.00	\$4,119,537.00

*Credits are shown in current fiscal year dollars.