# Lower Colorado River Multi-Species Conservation Program

*Balancing Resource Needs*

## Final Implementation Report, Fiscal Year 2007 Work Plan, and Budget Fiscal Year 2005 Accomplishment Report

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

August 16, 2006

# Lower Colorado River Multi-Species Conservation Program Implementation 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

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**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 2007 Work Plan, and Budget
## Fiscal Year 2005 Accomplishment Report

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

**August 16, 2006**

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## ACRONYMS

| | |
|---|---|
| AGFD | Arizona Game and Fish Department |
| AMP | Adaptive Management Program |
| ASU | Arizona State University |
| BO | Biological Conference Opinion |
| BHCO | Brown-headed cowbird |
| BLM | Bureau of Land Management |
| BLRA | California black-rail |
| BO | Biological Opinion |
| BONY | Bonytail |
| CAP | Central Arizona Project |
| CAWCD | Central Arizona Water Conservation District |
| CDFG | California Department of Fish and Game |
| CESA | California Endangered Species Act |
| CLRA | Yuma clapper-rail |
| CNWR | Cibola National Wildlife Refuge |
| CRIT | Colorado River Indian Tribes |
| CVCA | Cibola Valley Conservation Area |
| ESA | Endangered Species Act |
| FLSU | Flannelmouth sucker |
| FMA | Funding and Management Agreement |
| FWS | United States Fish and Wildlife Service |
| FY | Fiscal Year |
| GBBO | Great Basin Bird Observatory |
| GPS | Global Positioning System |
| HCP | Habitat Conservation Plan |
| HUCH | Humpback chub |
| IA | Implementation Agreement |
| ISC | Interim Surplus Criteria |
| ISG | Interim Surplus Guidelines |
| LCR | lower Colorado River |
| LCR MSCP | LCR Multi-Species Conservation Program |
| LEBI | Western least bittern |
| MAPS | Monitoring Avian Productivity and Survivorship |
| MCWA | Mohave County Water Authority |
| Metropolitan | The Metropolitan Water District of Southern California |
| MSHCP | Clark County Multi-Species Habitat Conservation Program |
| NAU | Northern Arizona University |
| NDOW | Nevada Division of Wildlife |
| NEPA | National Environmental Policy Act |
| NFH | National Fish Hatchery |
| NFWG | National Fish Work Group |
| NPS | National Park Service |
| NWR | National Wildlife Refuge |
| PIT | Passive Integrated Transponder |
| PVER | Palo Verde Ecological Reserve |
| RASU | Razorback sucker |
| Reclamation | Bureau of Reclamation |
| SFH | State Fish Hatchery |
| SIA | Secretarial Implementation Agreement |
| SNWA | Southern Nevada Water Authority |
| SWA | State Wildlife Area |
| SWFL | Southwestern willow flycatcher |
| U of A | University of Arizona |
| UCD | University of California, Davis |
| USGS | United States Geological Survey |
| WMA | Wildlife Management Area |
| YAO | Yuma Area Office |
| YBCU | Yellow-billed cuckoo |

## 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 the lower Colorado River 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 Lower Colorado River from Lake Mead to the Southerly International Boundary of 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 the ESA Section 7, and non-federal agency needs for endangered species incidental take authorization under the ESA Section 10. The program also allows California agencies to meet their obligations under California state law for 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 addressed in the LCR MSCP. Of the 26 focus species, six 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 backwaters) and produce 660,000 sub-adult razorback suckers and 620,000 bonytail to augment the existing populations of these fish in the lower Colorado River. The LCR MSCP may also participate in the recovery programs for these fish developed by funding other appropriate activities in lieu of stocking. The program also establishes a $25 million fund to support projects implemented by land use managers in the planning area 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 percent of the LCR MSCP cost. The states of California, Nevada, and Arizona will pay the remaining 50 percent, 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 and 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, Biological Assessment, Biological Opinion (2005 BO), HCP, Record of Decision, Funding and

Management Agreement (FMA), Implementation Agreement (IA), and Section 10 Permit. These documents can be found at the LCR MSCP website at www.usbr.gov/lc/lcrmscp.

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

1. On April 4, 2005, Reclamation entered into a Memorandum of Agreement with California Parties 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. 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 Parties upon request.
2. In December of 2001, the Fish and Wildlife Service (FWS) 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.

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. These entities include non-Federal and Federal entities that are receiving ESA coverage through the LCR MSCP, or stakeholders interested in the environment of the lower Colorado River. A complete list of membership can be viewed on the LCR MSCP website.

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. While ESA compliance under the LCR MSCP began with the signing of the Program Documents in April 2005, the first full program year began October 1, 2005, which was the start of Federal Fiscal Year (FY) 2006. This year's Annual Report will address both FY05 work accomplishments and FY07 work to be performed. This report contains a description of conservation activities accomplished in FY05, a summary of work being accomplished in FY06, and proposed work to be performed in FY07. It also documents research and monitoring activities undertaken in support of the LCR MSCP program. This Annual Report fully meets the reporting requirements outlined in Section 7.4.1 of the FMA.

While the FY05 work occurred prior to first full year of LCR MSCP implementation, in accordance with a Resolution passed by the Steering Committee on June 22, 2005, "Process for Receiving and Utilizing Financial Credit for LCR MSCP Work Tasks Performed in FY04 and FY05", Reclamation is seeking Steering Committee approval of financial credits for those funds used to accomplish work performed FY05 as described in this Annual Report. The FY05 work falls into two categories:

1. Work performed between October 2004 and April 2005, associated with conservation actions in support of two existing Biological Opinions (Interim River Operations and Surplus/Secretarial Implementation Agreement).
2. Work performed between April and September 2005, associated directly with the LCR MSCP HCP.

To ensure the work being performed in FY05 was acceptable to the Steering Committee and the FWS, Reclamation presented a "*Draft Work Tasks and Obligations for Federal Fiscal Year 2005 Report"* (Draft FY05 Work Tasks) at the May 13, 2005 Steering Committee meeting. These work task descriptions were reviewed by a Steering Committee Technical Work Group on June 3, 2005 and found to be consistent with the HCP. At the August 24, 2005 Steering Committee meeting it was decided that the FY05 work tasks and accomplishments would be finalized in an Annual Report after the end of the fiscal year.

In April 2006, Reclamation submitted two draft reports, *"Draft Implementation Report – Fiscal Year 2007 Work Plan and Budget"* and *"Draft Implementation Report – Fiscal Year 2005 Accomplishment"* to the Steering Committee for review. The work tasks described for both the FY05 and FY07 documents were reviewed on May 22-23, 2006 by a Steering Committee Technical Work Group and comments were incorporated. In addition to providing more information about the work being accomplished, this final Annual Report combines both the FY05 Accomplishments and FY07 Work Plan and Budget into a single document. This cumulative Annual Report volume supersedes the Draft FY05 report developed in the spring of 2005 and the Draft FY05 and FY07 reports developed in the spring of 2006.

## 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 required funding level. Each year, the 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 used to calculate both FY06 and FY07, and the Indexed Annual Contributions required for those two years.

**Table 1-1a Federal/Non-Federal Funding Requirements**
**Lower Colorado River Multi-Species Conservation Program**
(All $ are in thousands)

| | | | Annual Program Cost | | |
|---|---|---|---|---|---|
| **Fiscal Year** | **Annual Contribution Before Inflation** | **Composite Inflation Index** | **Indexed Annual Program** | **Indexed Annual Federal** | **Indexed Annual Non-Federal** |
| 2004 | 0 | 1.083 (final) | 0 | 0 | 0 |
| 2005 | 0 | 1.122 (final) | 0 | 0 | 0 |
| 2006 | $11,214 | 1.158 (projected) | $12,145 | $6,072 | $6,072 |
| 2007 | $11,214 | 1.196 (projected) | $12,582 | $6,291 | $6,291 |

Indexed Annual Program costs are calculated using the composite inflation index from two years prior as outlined in the FMA.

Section 8.1.2 of the FMA states that if funds are provided in excess of funding obligations for a specific year, those funds shall be treated as a credit against future funding obligations. In addition, any shortage of funds will be treated as a deficit by entity and can be offset by utilizing that entity's established credits. Table 1-1b provides a listing of funding credits by funding entity.

**Table 1-1b Funding Credit & 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 |

Table 1-1c provides a summary of the LCR MSCP financial accomplishments. It 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 | Total Budget Available | 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 | 6,126,449 |
| | | | | | **Total** | **9,507,889** |

## FY07 Contributions and Adjustments

As outlined in Table 1-1a, the annual funding commitment for FY07 is $11,214,000, based on the 2003 estimate, and $12,582,108 after the Composite Inflation Index of 1.122 is applied. In accordance with Section 8.3, the non-Federal share by state and Federal share of the FY07 allocation is shown below. Section 8.3 of the FMA allows for adjusted non-Federal funding during the first 10 years of the program. Based on direction from the Central Arizona Water Conservation District (Appendix A), the FY07 final funding amounts are shown below:

| | **FY07 Contributions** | **FY07 Adjusted Contributions** |
|---|---|---|
| **Federal:** | **$6,291,054.00** | **$6,291,054.00** |
| **Non-Federal:** | **$6,291,054.00** | **$6,291,054.00** |
| California | $3,145,527.00 | $3,617,356.05 |
| Arizona | $1,572,763.50 | $ 629,105.40 |
| Nevada | $1,572,763.50 | $2,044,592.55 |
| **Total** | **$12,582,108.00** | **$12,582,108.00** |

## 2001 Biological Opinion Account

A total of $6 million is available through the 2001 BO Funding. This funding is part of LCR MSCP contributions from the San Diego County Water Authority and The Metropolitan Water District of Southern California (Metropolitan) and will be used to meet their portions of the Indexed Annual Contribution outlined in Table 1-1a. 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 contributions may be requested by Reclamation and result in a funding credit.

In FY05, Reclamation drew $145,737 from San Diego County Water Authority's account. This money was used to modify an existing contract to include the monitoring of 372 new acres, as required by the 2001 BO Conservation Measure 4, Tier 1. This funding is shown as a credit in Table 1-1b.

## Habitat Maintenance Fund

As outlined in Section 8.4.2 of the FMA, 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. Total funds contributed in FY06 and projected to be contributed in FY07 are listed below. No funds have been withdrawn from any of the accounts to date.

| | **FY06 Actual Contribution** | **FY07 Projected Contribution** |
|---|---|---|
| **California** | $270,750.00 | $280,500.00 |
| **Arizona** | $135,375.00 | $140,250.00 |
| **Nevada** | $135,375.00 | $140,250.00 |
| **Total** | **$541,500.00** | **$561,000.00** |

## In-Kind Contributions

Section 8.7.4 of the FMA provides that In-Kind Goods or Services shall be credited based on agreement by the Program Manager and the Steering Committee. In April 2006, the Steering Committee passed Program Decision Document 06-001 *In-Kind Credit for Land and Water Contributions* which provided specific guidelines for the calculation of in-kind credit for land and water. No in-kind contributions were credited in FY05.

## 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 in the Palo Verde Irrigation District for

program purposes. Given the overall commonality between the CESA permit and the HCP, these California-specific actions are not expected to result in additional program costs.

## Proposed FY07 Program and FY05 Accomplishment

FY07 funding provides for the minimum program as required in the LCR MSCP Program documents of $12,582,108. For FY07, Reclamation is proposing a program totaling $16,326,000. Table 1-2 shows FY07 estimates by work task, as well as out-year funding for FY08 and FY09. The FY07 proposed program provides funding for:

| | |
|---|---|
| Program Administration | $1,142,196 |
| Fish Augmentation | $1,440,000 |
| Species Research | $1,612,000 |
| System Monitoring | $2,506,000 |
| Conservation Areas Development and Management | $7,330,000 |
| Post Development Monitoring | $600,000 |
| Adaptive Management Program | $1,135,000 |
| Existing Habitat Maintenance | $561,000 |
| **TOTAL** | **$16,326,196** |

In order for Reclamation to perform work in accordance with the FMA, a description of the work is presented to the Steering Committee to ensure no disputes exist and subsequently presented to FWS to ensure it is consistent with the HCP.

Reclamation will ensure program accomplishment which meets the Indexed Annual Contribution outlined in Table 1-1a of $12,582,108; however, Reclamation is presenting work tasks totaling $16,326,196 to ensure adequate flexibility in accomplishing the program. By receiving Steering Committee and FWS input on the broad range of work, Reclamation can accomplish additional work should funds become available or change work priorities if unforeseen circumstances arise.

Reclamation's goal is to fully implement the LCR MSCP in an effective, cost efficient and transparent manner. Throughout FY07, should Reclamation determine that a specific work task can not be undertaken, funds identified for this specific work will be redirected and used for the following purposes: fund another work task approved through this document; increase the funding for a work task that is expected to require funding in FY08 or FY09; provide more than the minimum funding required to the Habitat Maintenance Fund; or begin activities associated with any changed circumstances as defined in Section 5.12.3 of the HCP, should any occur.

Table 1-2 provides funding accomplishment and projects per work task for FY05 through FY09. In FY05, Reclamation estimated work tasks totaling $7,060,000. Actual LCR MSCP costs for FY05 were $6,126,449. In accordance with the FMA, full program funding began in FY06; therefore, Reclamation is seeking a credit for FY05 in the amount of $5,980,712 and San Diego County Water Authority is seeking a credit for FY05 in the amount of $145,737 (Table 1-1b&c).

| Table 1-2 Annual Funding Matrix | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Work Task** | **Name** | **FY2005 Estimate** | **FY2005 Actual Accomplishment** | **Cumulative Accomplishment through FY2005** | **FY2006 Approved Estimate** | **FY2007 Proposed Estimate** | **FY2008 Projected Estimate** | **FY2009 Projected Estimate** |
| **A** | **Program Administration** | | | | | | | |
| A-1 | Program Administration | $550,000 | $446,590 | $446,590 | $1,000,000 | $1,142,196 | $1,142,196 | $1,142,196 |
| | | **$550,000** | **$446,590** | **$446,590** | **$1,000,000** | **$1,142,196** | **$1,142,196** | **$1,142,196** |
| | | | | | | | | |
| **B** | **Fish Augmentation** | | | | | | | |
| B-1 | Lake Mohave Razorback Sucker Larvae Collection | $175,000 | $143,000 | $201,823 | $225,000 | $200,000 | $200,000 | $200,000 |
| B-2 | Willow Beach National Fish Hatchery | $170,000 | $180,000 | $180,000 | $200,000 | $225,000 | $225,000 | $225,000 |
| B-3 | Achii Hanyo Rearing Station | $50,000 | $50,000 | $100,000 | $25,000 | $50,000 | $100,000 | $100,000 |
| B-4 | Dexter National Fish Hatchery | $142,000 | $122,000 | $122,000 | $110,000 | $125,000 | $125,000 | $125,000 |
| B-5 | Bubbling Ponds Fish Hatchery | $86,000 | $38,000 | $38,000 | $140,000 | $225,000 | $225,000 | $225,000 |
| B-6 | Lake Mead Fish Hatchery | $50,000 | $32,000 | $32,000 | $45,000 | $55,000 | $55,000 | $55,000 |
| B-7 | Lake Side Rearing Ponds | $250,000 | $230,000 | $230,000 | $200,000 | $150,000 | $150,000 | $150,000 |
| B-8 | Fish Tagging Equipment | $75,000 | $88,700 | $143,462 | $45,000 | $75,000 | $75,000 | $75,000 |
| B-9 | Boulder City Wetlands Ponds | $35,000 | $3,800 | $3,800 | $0 | $0 | $0 | $0 |
| B-10 | Uvalde National Fish Hatchery (Approved mid-year) | $0 | $0 | $0 | $60,000 | $260,000 | $60,000 | $60,000 |
| B-11 | Overton Wildlife Management Area (Approved mid-year) | $0 | $0 | $0 | $35,000 | $75,000 | $75,000 | $45,000 |
| | | **$1,033,000** | **$887,500** | **$1,051,085** | **$1,085,000** | **$1,440,000** | **$1,290,000** | **$1,260,000** |
| | | | | | | | | |
| **C** | **Species Research** | | | | | | | |
| C-1 | Brown-Headed Cowbird Trap Assessment | $80,000 | $52,464 | $52,464 | $85,000 | $0 | $0 | $0 |
| C-2 | Sticky Buckwheat and Threecorner Milkvetch | $0 | $0 | $0 | $25,000 | $11,000 | $11,000 | $11,000 |
| C-3 | Multi-Species Conservation Program Profiles | $50,000 | $47,847 | $47,847 | $100,000 | $15,000 | $15,000 | $15,000 |
| C-4 | Relict Leopard Frog | $0 | $0 | $0 | $15,000 | $11,000 | $11,000 | $11,000 |
| C-5 | Effects of Abiotic Factors on Insect Populations… | $0 | $0 | $0 | $90,000 | $90,000 | $90,000 | $90,000 |

| Work Task | Name | FY2005 Estimate | FY2005 Actual Accomplishment | Cumulative Accomplishment through FY2005 | FY2006 Approved Estimate | FY2007 Proposed Estimate | FY2008 Projected Estimate | FY2009 Projected Estimate |
|---|---|---|---|---|---|---|---|---|
| C-6 | Insect Population Biology in Riparian Restoration… | $0 | $0 | $0 | $126,000 | $30,000 | $40,000 | $40,000 |
| C-7 | Survey and Habitat Characterization for MacNeil's… | $0 | $0 | $0 | $150,000 | $160,000 | $160,000 | $80,000 |
| C-8 | Razorback Sucker Survival Study | $250,000 | $237,979 | $237,979 | $190,000 | $190,000 | $190,000 | $45,000 |
| C-9 | Razorback Sucker and Bonytail Pen Rearing Tests | $62,000 | $42,000 | $42,000 | $48,000 | $35,000 | $35,000 | $35,000 |
| C-10 | Razorback Sucker Growth Study | $0 | $0 | $0 | $125,000 | $125,000 | $125,000 | $125,000 |
| C-11 | Bonytail Rearing Studies | $24,000 | $0 | $0 | $165,000 | $165,000 | $165,000 | $165,000 |
| C-12 | Demographics and Post Stocking Survival of… | $0 | $0 | $0 | $185,000 | $185,000 | $185,000 | $60,000 |
| C-13 | Lake Mead Razorback Sucker Study | $198,000 | $98,000 | $98,000 | $350,000 | $300,000 | $100,000 | $100,000 |
| C-14 | Humpback Chub Program Support | $10,000 | $0 | $0 | $15,000 | $10,000 | $10,000 | $10,000 |
| C-15 | Flannelmouth Sucker Habitat Use, Preference and.. | $58,000 | $52,000 | $52,000 | $80,000 | $80,000 | $80,000 | $80,000 |
| C-16 | Evaluation of Past Bonytail Stocking | $0 | $0 | $0 | $0 | $60,000 | $0 | $0 |
| C-17 | Senator Wash Razorback Sucker Stock… | $45,000 | $45,000 | $45,000 | $0 | $0 | $0 | $0 |
| C-18 | Point Count Design and Sample Size Evaluation | $50,000 | $49,920 | $49,920 | $0 | $0 | $0 | $0 |
| C-19 | Southwestern Willow Flycatcher Feather… | $21,000 | $20,970 | $20,970 | $0 | $0 | $0 | $0 |
| C-20 | Southwestern Willow Flycatcher Prey Base Study | $65,000 | $63,949 | $104,981 | $0 | $0 | $0 | $0 |
| C-21 | Yellow-Billed Cuckoo Demographics Study | $115,000 | $112,964 | $112,964 | $0 | $0 | $0 | $0 |
| C-22 | Yellow-Billed Cuckoo Surveys, Demographics | $51,000 | $50,971 | $50,971 | $0 | $0 | $0 | $0 |

| Work Task | Name | FY2005 Estimate | FY2005 Actual Accomplishment | Cumulative Accomplishment through FY2005 | FY2006 Approved Estimate | FY2007 Proposed Estimate | FY2008 Projected Estimate | FY2009 Projected Estimate |
|---|---|---|---|---|---|---|---|---|
| C-23 | Evaluation of Remote Sensing Techniques of PIT… | $0 | $0 | $0 | $0 | $145,000 | $145,000 | $0 |
| | | **$1,079,000** | **$874,064** | **$915,096** | **$1,749,000** | **$1,612,000** | **$1,362,000** | **$867,000** |
| | | | | | | | | |
| **D** | **System Monitoring** | | | | | | | |
| D-1 | Marsh Bird Surveys | $50,000 | $34,920 | $34,920 | $25,000 | $25,000 | $25,000 | $25,000 |
| D-2 | Southwestern Willow Flycatcher Presence/Absence | $785,000 | $784,594 | $784,594 | $880,000 | $925,000 | $950,000 | $950,000 |
| D-3 | Southwestern Willow Flycatcher Habitat Monitoring | $160,000 | $159,969 | $159,969 | $90,000 | $90,000 | $90,000 | $90,000 |
| D-4 | Southwestern Willow Flycatcher-Hualapai | $65,000 | $64,657 | $64,657 | $68,000 | $76,000 | $78,000 | $0 |
| D-5 | Monitoring Avian Productivity and Survivorship | $300,000 | $293,845 | $293,845 | $300,000 | $300,000 | $300,000 | $300,000 |
| D-6 | System Monitoring for Riparian Obligate Avian… | $0 | $0 | $0 | $100,000 | $100,000 | $100,000 | $100,000 |
| D-7 | Yellow-Billed Cuckoo Presence/Absence Surveys | $0 | $0 | $0 | $500,000 | $500,000 | $500,000 | $500,000 |
| D-8 | Razorback Sucker and Bonytail Stock Assessment | $180,000 | $166,000 | $166,000 | $285,000 | $325,000 | $325,000 | $325,000 |
| D-9 | System Monitoring and Research of Covered Bat… | $0 | $0 | $55,000 | $110,000 | $100,000 | $100,000 | $100,000 |
| D-10 | System Monitoring and Studies on Small… | $0 | $0 | $0 | $60,000 | $65,000 | $65,000 | $65,000 |
| D-11 | Vegetation Type Mapping | $327,000 | $325,873 | $725,873 | $0 | $0 | $0 | $0 |
| | | **$1,867,000** | **$1,829,858** | **$2,284,858** | **$2,418,000** | **$2,506,000** | **$2,533,000** | **$2,455,000** |
| | | | | | | | | |
| **E** | **Conservation Areas Development and Management** | | | | | | | |
| E-1 | Beal Lake Riparian and Marsh | $293,000 | $393,000 | $1,625,267 | $200,000 | $358,000 | $210,000 | $210,000 |
| E-2 | Beal Lake Native Fish | $250,000 | $214,572 | $214,572 | $210,000 | $100,000 | $50,000 | $50,000 |
| E-3 | Ahakhav Tribal Preserve | $120,000 | $43,928 | $1,081,719 | $120,000 | $60,000 | $60,000 | $160,000 |
| E-4 | Palo Verde Ecological Reserve | $0 | $66,745 | $66,745 | $310,000 | $976,000 | $770,000 | $1,405,000 |

| Work Task | Name | FY2005 Estimate | FY2005 Actual Accomplishment | Cumulative Accomplishment through FY2005 | FY2006 Approved Estimate | FY2007 Proposed Estimate | FY2008 Projected Estimate | FY2009 Projected Estimate |
|---|---|---|---|---|---|---|---|---|
| E-5 | Cibola Valley Conservation Area | $120,000 | $117,716 | $117,716 | $1,633,000 | $2,656,000 | $1,594,000 | $1,566,000 |
| E-6 | Cottonwood Genetics Study | $50,000 | $109,927 | $219,931 | $25,000 | $15,000 | $15,000 | $15,000 |
| E-7 | Mass Transplanting Demonstration | $350,000 | $307,000 | $307,000 | $10,000 | $15,000 | $15,000 | $15,000 |
| E-8 | Seed Feasibility Study | $92,000 | $4,000 | $4,000 | $150,000 | $160,000 | $177,000 | $15,000 |
| E-9 | Hart Mine Marsh | $100,000 | $53,320 | $53,320 | $100,000 | $125,000 | $200,000 | $1,000,000 |
| E-10 | Walker Lake | $61,000 | $0 | $0 | $75,000 | $0 | $0 | $0 |
| E-11 | Draper Lake | $100,000 | $0 | $0 | $70,000 | $0 | $0 | $0 |
| E-12 | Butler Lake | $55,000 | $70,893 | $77,566 | $140,000 | $120,000 | $200,000 | $40,000 |
| E-13 | McAllister Lake | $40,000 | $71,051 | $71,051 | $75,000 | $50,000 | $40,000 | $52,000 |
| E-14 | Imperial Ponds | $105,000 | $104,309 | $104,309 | $595,000 | $2,070,000 | $462,000 | $150,000 |
| E-15 | Backwater Site Selection | $0 | $0 | $0 | $200,000 | $430,000 | $775,000 | $400,000 |
| E-16 | Conservation Area Site Selection | $0 | $134,814 | $134,814 | $200,000 | $50,000 | $200,000 | $200,000 |
| E-17 | Topock Marsh Pumping | $0 | $0 | $0 | $70,000 | $70,000 | $70,000 | $70,000 |
| E-18 | Law Enforcement and Fire Suppression | $0 | $0 | $0 | $50,000 | $75,000 | $75,000 | $75,000 |
| E-19 | Needles-Topock (AZ RM 240) Stabilization | $80,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| E-20 | Pintail Slough | $10,000 | $0 | $95,000 | $0 | $0 | $0 | $0 |
| E-21 | Planet Ranch, Bill Williams River | $100,000 | $20,000 | $20,000 | $0 | $0 | $0 | $0 |
| E-22 | Pratt Agricultural Lease | $15,000 | $0 | $5,088 | $0 | $0 | $0 | $0 |
| E-23 | Mittry Lake Fire Rehabilitation Project | $50,000 | $0 | $0 | $0 | $0 | $0 | $0 |
| | | **$1,991,000** | **$1,711,275** | **$4,198,098** | **$4,233,000** | **$7,330,000** | **$4,913,000** | **$5,423,000** |
| | | | | | | | | |
| **F** | **Post Development Monitoring** | | | | | | | |
| F-1 | Habitat Monitoring | $250,000 | $237,214 | $237,214 | $250,000 | $275,000 | $310,000 | $350,000 |
| F-2 | Avian Use of Restoration Sites | $50,000 | $77,571 | $77,571 | $125,000 | $150,000 | $175,000 | $200,000 |
| F-3 | Small Mammal Colonization of Restoration Sites | $45,000 | $27,377 | $27,377 | $45,000 | $50,000 | $55,000 | $60,000 |
| F-4 | Post-Development Monitoring of Covered Bat Species | $0 | $0 | $0 | $0 | $60,000 | $60,000 | $60,000 |

| Work Task | Name | FY2005 Estimate | FY2005 Actual Accomplishment | Cumulative Accomplishment through FY2005 | FY2006 Approved Estimate | FY2007 Proposed Estimate | FY2008 Projected Estimate | FY2009 Projected Estimate |
|---|---|---|---|---|---|---|---|---|
| F-5 | Post-Development Monitoring of Fish Restoration Sites | $0 | $0 | $0 | $0 | $65,000 | $70,000 | $95,000 |
| | | $345,000 | $342,162 | $342,162 | $420,000 | $600,000 | $670,000 | $765,000 |
| **G** | **Adaptive Management Program** | | | | | | | |
| G-1 | Data Management | $160,000 | $0 | $235,000 | $225,000 | $650,000 | $960,000 | $950,000 |
| G-2 | Annual Report Writing and Production | $35,000 | $35,000 | $35,000 | $35,000 | $75,000 | $75,000 | $75,000 |
| G-3 | Adaptive Management Research Projects | $0 | $0 | $0 | $230,000 | $275,000 | $325,000 | $325,000 |
| G-4 | Science/Adaptive Management Strategy | $0 | $0 | $0 | $173,000 | $100,000 | $100,000 | $100,000 |
| G-5 | Public Outreach | $0 | $0 | $0 | $35,000 | $35,000 | $35,000 | $35,000 |
| | | **$195,000** | **$35,000** | **$270,000** | **$698,000** | **$1,135,000** | **$1,495,000** | **$1,485,000** |
| | | | | | | | | |
| **H** | **Existing Habitat Maintenance** | | | | | | | |
| H-1 | Existing Habitat Maintenance | $0 | $0 | $0 | $541,000 | $561,000 | $561,000 | $561,000 |
| | | $0 | $0 | $0 | $541,000 | $561,000 | $561,000 | $561,000 |
| | **PROGRAM TOTAL** | **$7,060,000** | **$6,126,449** | **$9,507,889** | **$12,144,000** | **$16,326,196** | **$13,966,196** | **$13,958,196** |

Included in other sections in this document is an overview of the work tasks, as well as detailed information for each work task. Work task information includes starting date, duration, purpose, project description, FY05 accomplishment, current FY06 activities, proposed FY07 activities, and pertinent reports.

# Compliance Reporting

## LCR MSCP

As outlined in the requirements for the Annual Report in the FMA, Reclamation is required to provide:

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 ground cover as determined by the Ohmart and Anderson 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 outlines how Reclamation and FWS will account for and credit the 8,132 acres of new habitat. The year that vegetation is planted or construction of a backwater occurs, Reclamation will begin accounting for those acres in the annual report. In the year that Reclamation determines the established or restored land cover types have developed or matured into what constitutes suitable habitat based on current knowledge of species needs, then that acreage will be credited towards the LCR MSCP objectives in the Compliance Section of the Annual Report. This will be done by moving the acres from the established column to the Credited Habitat column noting the year it was achieved.

   Through the adaptive management process, establishment and management of new target habitats 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.

   One of the early LCR MSCP objectives is to create habitat required to meet the commitments of the 2001 BO. This commitment consists of creating 372 acres of cottonwood/willow habitat for the southwestern willow flycatcher (SWFL) and 44 acres of backwater for native fish. Through FY07 it is anticipated that a minimum of 224 acres of cottonwood/willow will be established in addition to two nurseries totaling 53 acres. It is anticipated that an additional 160 acres of cottonwood willow habitat will be established in FY08. In addition, construction was initiated on approximately 55 acres of backwater in FY06. As a result, the habitat creation requirement outlined in the 2001 BO will be accomplished.

## Table 1-3 LCR MSCP Habitat Objectives

| Land Cover Type | Projected Acres Established | Projected Year Established | Projected Year To Be Credited | Actual Habitat Created (Acres) | Year Achieved |
|---|---|---|---|---|---|
| **Nurseries** | | | | | |
| (All Plant Species) | | | | | |
| FY06 Work Task E4 | 31 | FY06 | | | |
| FY06 Work Task E5 | 22 | FY06 | | | |
| Total | 53 | | | | |
| **Cottonwood/Willow** | | | | | |
| Southwestern Willow Flycatcher | | | | | |
| FY06 Work Task E5 | 64 | FY06 | FY09 | | |
| FY07 Work Task E4 | 80 | FY07 | FY10 | | |
| FY07 Work Task E5 | 80 | FY07 | FY10 | | |
| FY08 Work Task E4 | 80 | FY08 | FY11 | | |
| FY08 Work Task E5 | 80 | FY08 | FY11 | | |
| Total | 384 | | | | |
| Yellow-Billed Cuckoo | | | | | |
| **Honey Mesquite** | | | | | |
| **Marsh** | | | | | |
| Yuma Clapper Rail | | | | | |
| California Black Rail | | | | | |
| FY06 Work Task E14 | 12 | FY06 | FY08 | | |
| FY07 Work Task | 0 | | | | |
| FY08 Work Task | 0 | | | | |
| Total | 12 | | | | |
| **Backwater** | | | | | |
| Isolated | | | | | |
| FY06 Work Task E14 | 55 | FY06 | FY08 | | |
| FY07 Work Task | 0 | | | | |
| FY08 Work Task | 0 | | | | |
| Total | 55 | | | | |
| Surface Connected | | | | | |

| | | |
|---|---|---|
| **Razorback Sucker** | | |
| **Lake Mohave (Reach 2)** | | |
| FY05 Worktask B4 | | 136 |
| FY05 Worktask B7 | | 1,691 |
| FY05 Worktask B2 | | 10,373 |
| **Total** | | **12,200** |
| **Below Parker Dam (Reach 4-5)** | | |
| FY05 Worktask B5 | | 4,814 |
| **Total** | | **4,814** |
| **Total Razorback Sucker** | | **17,014** |
| | | |
| **Bonytail** | | |
| **Lake Havasu (Reach 3)** | | |
| FY05 Worktask B3 | | 6,725 |
| **Total** | | **6,725** |
| | | |
| **Total Bonytail** | | **6,725** |

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

   Table 1-4 provides a matrix showing those work tasks which work towards 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 FY05 (April 2005 – September 2005) is reported in Appendix B. The FWS section 10(a)(1)(B) permit and 2005 BO authorize incidental take resulting from conducting 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 FY05. 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, and implementation of the shortage criteria.

   As total habitat loss was calculated for all of these actions, take is being documented as amount and type of covered actions and activities being implemented.

| Table 1 – 4 Status of Conservation Measures | | | | | |
|---|---|---|---|---|---|
| **Species/Habitat/Action** | **Code** | **Description** | **FY2005 Approved** | **FY2006 Approved** | **FY2007 Proposed** |
| Yuma Clapper Rail | CLRA1 | Create Habitat 512 ac | C3 | E4 E5 E9 E10 E11 E12 E13 E14 E15 E16 | E1 E4 E5 E9 E10 E11 E12 E13 E14 E15 E19 E20 E21 E23 F1 F2 |
| | CLRA-R | Restoration Research | E1 E2-E15 | E1 E3 | E1 E3 |
| | CLRA2 | Maintain existing important habitat | C3 | H1 | D1 H1 |
| | MRM1 | Define Habitat Characteristics | C1 D1 D2 D6 | C3 D1 F1 F2 | C3 C21 D1 D2 D5 D6 F1 F2 |
| | MRM2 | Monitor and adaptively manage created habitat | C1 D1 D2 D6 F1 F2 | C3 D1 F1 F2 | C3 D1 D2 D5 D6 F1 F2 F4 G6 |
| | MRM5 | Monitor Selenium levels in backwater | | | |
| | CMM1 | Reduce risk of loss to wildfire | | E18 | E18 |
| | CMM2 | Replace created habitat affected by wildfire | | | |
| Southwestern Willow Flycatcher | WIFL1 | Create Habitat 4050 ac | | E4 E5 E16 | C5 C6 C20 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E22 E23 G3 F1 F2 |
| | WIFL1-R | Restoration Research | E1 E2-E6 E8-E15 | E1 E3 E6 E7 E8 | E1 E3 E6 E7 E8 E19 |
| | WIFL2 | Maintain existing important habitat | | H1 | C5 C6 C20 D3 D4 E21 H1 |
| | MRM1 | Define Habitat Characteristics | C1 C4 C5 D1 D3 D4 D5 D6 | C3 C5 C6 D2 D3 D4 D5 D6 F2 | C3 C5 C6 D1 D2 D3 D4 D5 D6 F2 |
| | MRM2 | Monitor and adaptively manage created habitat | C1 C4 C5 D1 D3 D4 D5 D6 F1 F2 | C3 C5 C6 D2 D3 D4 D5 D6 F1 F2 | C3 C5 C6 C21 D1 D2 D3 D4 D5 D6 F1 F2 F4 G6 |
| | MRM4 | Brown-headed cowbird evaluation | C2 | C1 D2 | C1 D2 |
| | CMM1 | Reduce risk of loss to wildfire | | E18 | E18 |
| | CMM2 | Replace created habitat affected by wildfire | | | |
| Desert Tortoise | DETO1 | Acquire/protect Protect 230 ac | | | |
| | DETO2 | Avoid impacts on individuals and burrows | | | |
| Bonytail | BONY1 | Coordinate conservation efforts w/FWS and recovery programs | | | |
| | BONY2 | 360 ac | C3 | E2 E10 E11 E12 E13 E14 E15 E16 | E2 E10 E11 E12 E13 E14 E15 |
| | BONY2-R | Restoration Research | E1 E2 E8-E13 | E14 | E14 E20 |
| | BONY3 | Rear/stock 620,000:<br>4000-6000 sub-adults/yr for 40 yr Mohave<br>4000 sub-adult Lake Havasu/yr for 50 years<br>8000 exp augmentation parker-imperial 5 consecutive yrs<br>4000 sub-adult/yr Parker-Imperial for 45 yrs | B3 B4 B8 B9 C11 D8 | B2 B3 B4 B8 B9 C11 D8 | B2 B3 B4 B7 B8 B9 B10 C9 C11 C16 D8 |
| | BONY4 | Develop (if necessary) additional rearing capacity | B3 B4 C11 | B2 B3 B4 C11 | B2 B3 B4 B7 B8 B10 C9 C11 |
| | BONY5 | Monitor & Research, adaptive management pops and backwater habitat | B8 B9 D8 | B8 B9 D8 | B7 B8 B9 D8 C11 C16 C23 F5 G3 |

| Table 1 – 4 Status of Conservation Measures | | | | | |
|---|---|---|---|---|---|
| **Species/Habitat/Action** | **Code** | **Description** | **FY2005 Approved** | **FY2006 Approved** | **FY2007 Proposed** |
| | MRM5 | Monitor Selenium levels in backwater | | | |
| Humpback Chub | HUCH1 | $500,000 to existing programs | D10 | C14 | C14 |
| Razorback Sucker | RASU1 | Coordinate conservation efforts w/FWS and recovery programs | C10 | | |
| | RASU2 | 360 ac | C3 | E2 E10 E11 E12 E13 E14E15 E16 | E2 E10 E11 E12 E13 E14 E15 |
| | RASU2-R | Restoration Research | E1 E2 E8-E13 | | |
| | RASU3 | Rear/stock 660,000:<br>24,000 sub-adult/yr for 5 yrs (Parker, Mohave – see plan)<br>6000 sub-adult/yr for 45 yrs Lake Havasu<br>6000 sub-adult/yr for 45 years Parker Dam | B1 B2 B4 B5 B6 B7 B8 B9 C9 D8 | B1 B2 B4 B5 B6 B7 B8 B9 C9 C10 D8 | B1 B2 B3 B4 B5 B6 B7 B8 B10 B11 C9 C10 D8 |
| | RASU4 | Develop (if necessary) additional rearing capacity | B2 B4 B5 B6 C9 | B2 B4 B5 B6 C9 C10 | B2 B4 B3 B5 B6 B7 B8 B10 B11 C9 C10 |
| | RASU5 | Support ongoing Mohave conservation efforts | B1 B7 D8 | B1 B7 C12 D8 | B1 B2 B7 B8 C12 D8 |
| | RASU6 | Monitor & Research, adaptive management pops and backwater habitat | B8 B9 C8 C10 D9 | B8 B9 C8 C12 D9 | B2 B7 B8 B11 C8 C10 C12 C17 C23 D8 F5 G3 |
| | RASU7 | Funding for ongoing USBR/SNWA Lake Mead Studies | B6 D7 | B6 C13 | B6 B11 C13 |
| | RASU8 | Continue conservation efforts identified in ISC/SIA BO | B1 B6 | B1 B8 C8 | B1 B6 B8 B11 C8 |
| | MRM5 | Monitor Selenium levels in backwater | | | |
| Western Red Bat | WRBA1 | Status/habitat surveys | | D10 | D9 |
| | WRBA2 | Create 765 ac | | D10 E4 E5 E16 | C5 C6 D9 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E23 F1 F4 |
| | WRBA2-R | Restoration Research | E1 E2-E6 E8-E15 | E1 E3 E6 E7 E8 | E1 E3 E6 E7 E8 E19 |
| | MRM1 | Define Habitat Characteristics | C1 D1 D6 | C3 C5 C6 D10 | C3 C5 C6 C18 C19 D1 D2 D10 |
| | MRM2 | Monitor and adaptively manage created habitat | C1 D1 D6 F1 F2 | C3 C5 C6 D10 F1 | C3 C5 C6 C18 C19 D1 D2 D10 F1 F4 G6 |
| | CMM1 | Reduce risk of loss of habitat to wildfire | | E18 | E18 |
| | CMM2 | Replace created habitat affected by wildfire | | | |
| Western Yellow Bat | WYBA1 | Conduct surveys for species distribution | | D10 | D9 F4 |
| | WYBA2 | Avoid removal of roost trees (palms) | | | F4 |
| | WYBA3 | Create 765 ac | | D10 E4 E5 E16 | C5 C6 D9 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E23 F1 F4 |
| | WYBA3-R | Restoration Research | E1 E2-E6 E8-E15 | E1 E3 E6 E7 E8 | E1 E3 E6 E7 E8 |
| | MRM1 | Define Habitat Characteristics | C1 D1 D6 | C3 C5 C6 D10 | C3 C5 C6 D1 D5 D10 |

| Table 1 – 4 Status of Conservation Measures | | | | | |
|---|---|---|---|---|---|
| **Species/Habitat/Action** | **Code** | **Description** | **FY2005 Approved** | **FY2006 Approved** | **FY2007 Proposed** |
| | MRM2 | Monitor and adaptively manage created habitat | C1 D1 D6 F1 F2 | C3 C5 C6 D10 F1 | C3 C5 C6 D5 D10 F1 F4 G6 |
| | CMM1 | Reduce risk of loss of habitat to wildfire | | E18 | E18 |
| | CMM2 | Replace created habitat affected by wildfire | | | |
| Desert Pocket Mouse | DPMO1 | Located occupied habitat, restore disturbed habitat | | | D10 F3 |
| | | | | | |
| Colorado River Cotton Rat | CRCR1 | Status/habitat surveys - *define Habitat 1st 5-yr | | D11 | D10 F3 G3 |
| | CRCR2 | Create 125 ac | | E4 E5 E16 F3 | D10 E1 E3 E4 E5 E6 E7 E8 E16 F3 E19 E21 E22 F1 F3 |
| | CRCR2-R | Restoration Research | E1 E2-E6 E8-E15 | E1 E3 E6 E7 E8 | E1 E3 E6 E7 E8 E19 |
| | MRM2 | Monitor and adaptively manage created habitat | C1 D1 F3 | C3 D11 F1 F3 | C3 D11 F1 F3 G6 |
| | CMM1 | Reduce risk of loss of habitat to wildfire | | E18 | E18 |
| | CMM2 | Replace created habitat affected by wildfire | | | |
| Yuma Hispid Cotton Rat | YHCR1 | Status/habitat *define Habitat 1st 5-yr | D11 | D11 | D10 F3 G3 |
| | YHCR2 | Create 76 ac | | E4 E5 E16 F3 | E1 D10 E3 E4 E5 E6 E7 E8 E16 E19 E22 E23 F1 F3 |
| | YHCR2-R | Restoration Research | E1 E2-E6 E8-E15 | E1 E3 E6 E7 E8 | E1 E3 E6 E7 E8 E19 |
| | MRM2 | Monitor and adaptively manage created habitat | C1 D1 F3 | C3 D11 F1 F3 | C3 D11 F1 F3 F4 G6 |
| | CMM1 | Reduce risk of loss of habitat to wildfire | | E18 | E18 |
| | CMM2 | Replace created habitat affected by wildfire | | | |
| Western Least Bittern | LEBI1 | Create 512 ac | | E4 E5 E9 E10 E11 E12 E13 E14 E15 E16 | E1 E3 E4 E5 E7 E8 E9 E10 E11 E12 E13 E14 E15 E19 E20 E21 E22 F1 F2 |
| | LEBI1-R | Restoration Research | E1 E2-E15 | E1 E3 | E1 E3 |
| | MRM1 | Define Habitat Characteristics | D1 D2 D6 | C3 D1 F1 F2 | C3 D1 D5 F1 F2 |
| | MRM2 | Monitor and adaptively manage created habitat | C1 D1 D2 D6 F1 F2 | C3 D1 F1 F2 | C3 D1 D5 F1 F2 F4 G6 |
| | MRM5 | Monitor selenium levels | | | |
| | CMM1 | Reduce risk of loss of habitat affected by wildfire | | | E18 |
| | CMM2 | Replace created habitat affected by wildfire | | | |
| CA Black Rail | BLRA1 | Create 130 ac | C3 | E4 E5 E9 E10 E11 E12 E13 E14 E15 E16 | E1 E3 E4 E5 E8 E9 E10 E11 E12 E13 E14 E15 E23 F1 F2 |
| | BLRA1-R | Restoration Research | E1 E2-E15 | E1 E3 E7 E8 | E1 E3 E7 E8 |
| | BLRA2 | Maintain existing occupied habitat | | H1 | D1 H1 |
| | MRM1 | Define Habitat Characteristics | C1 D1 D2 D6 | C3 D1 F1 F2 | C3 D1 D5 D6 F1 F2 |
| | MRM2 | Monitor and adaptively manage created habitat | C1 D1 D2 D6 F1 F2 | C3 D1 F1 F2 | C3 D1 D2 D6 F1 F2 F4 G6 |
| | MRM5 | Monitor selenium levels | | | |
| | CMM1 | Reduce risk of loss of habitat affected by wildfire | E18 | | E18 |
| | CMM2 | Replace created habitat affected by wildfire | | | |



E18

| Table 1 – 4 Status of Conservation Measures | | | | | |
|---|---|---|---|---|---|
| **Species/Habitat/Action** | **Code** | **Description** | **FY2005 Approved** | **FY2006 Approved** | **FY2007 Proposed** |
| Yellow-billed Cuckoo | YBCU1 | Create 4050 ac | | E4 E5 E16 | C5 C6 C21 C22 E1 E3 E4 E5 E6 E8 E19 E20 E21 E22 E23 F1 F2 |
| | YBCU1-R | Restoration Research | E1 E2-E6 E8-E15 | E1 E3 E6 E7 E8 | E1 E3 E6 E7 E8 E19 |
| | YBCU2 | Maintain Existing habitat | | H1 | C5 C6 C21 C22 E22 H1 |
| | MRM1 | Define Habitat Characteristics | C1 C6 C7 D1 D6 | C3 C5 C6 D5 D6 D7 F1 F2 | C3 C5 C6 C22 D1 D5 D6 D7 F1 F2 |
| | MRM2 | Monitor and adaptively manage created habitat | C1 C6 C7 D1 D6 F1 F2 | C3 C5 C6 D5 D6 D7 F1 F2 | C3 C5 C6 C22 D5 D6 D7 F1 F2 F4 G6 |
| | CMM1 | Reduce risk of loss of habitat affected by wildfire | | | E18 |
| | CMM2 | Replace created habitat affected by wildfire | | | |
| Elf Owl | ELOW1 | 1,784 reach 3-5 | | E4 E5 E16 | E1E3 E4 E5 E6 E8 E19 E21 E22 E23 F1 F2 |
| | ELOW1-R | Restoration Research | E1 E2-E6 E8-E15 | E1 E3 E6 E7 E8 | E1 E3 E6 E7 E8 E19 |
| | ELOW2 | Install elf owl boxes ** before Gila Woodpeckers established | | | |
| | MRM1 | Define Habitat Characteristics | C1 D1 D6 G1 G2 | C3 D6 F1 F2 | C3 D1 D5 D6 F1 F2 |
| | MRM2 | Monitor and adaptively manage created habitat | C1 D1 D6 F1 F2 G1 G2 E18 | C3 D6 F1 F2 | C3 D5 D6 F1 F2 F4 G6 |
| | MRM3 | Research nest competition European starlings | | | |
| | CMM1 | Reduce risk of loss of habitat affected by wildfire | | | E18 |
| | CMM2 | Replace created habitat affected by wildfire | | | |
| Gilded Flicker | GIFL1 | Create 4050 ac reach 3-7 | | E4 E5 E16 | C5 C6 E1 E3 E4 E5 E6 E8 E19 E21 E22 E23 F1 F2 |
| | GIFL1-R | Restoration Research | E1 E2-E6 E8-E15 | E1 E3 E6 E7 E8 | E1 E3 E6 E7 E8 E19 |
| | GIFL2 | Install artificial snags until vegetation has matured | | | |
| | MRM1 | Define Habitat Characteristics | C1 D1 D6 G1 G2 | C3 C5 C6 D5 D6 F1 F2 | C3 C5 C6 D1 D5 D6 F1 F2 |
| | MRM2 | Monitor and adaptively manage created habitat | C1 D1 D6 F1 F2 G1 G2 E18 | C3 C5 C6 D5 D6 F1 F2 | C3 C5 C6 D5 D6 F1 F2 F4 G6 |
| | MRM3 | Research nest competition European starlings | | | |
| | CMM1 | Reduce risk of loss of habitat affected by wildfire | | | E18 |
| | CMM2 | Replace created habitat affected by wildfire | | | |
| Gila Woodpecker | GIWO1 | Create 1,702 reach 3-6 | | E4 E5 E16 | C5 C6 E3 E1 E4 E5 E6 E8 E19 E20 E21 E22 E23 F1 F2 |
| | GIWO1-R | Restoration Research | E1 E2-E6 – E8-E15 | E1 E3 E6 E7 E8 | E1 E3 E6 E7 E8 E19 |
| | GIWO2 | Install artificial snags | | | |
| | MRM1 | Define Habitat Characteristics | C1 D1 D6 G1 G2 | C3 C5 C6 D5 D6 F1 F2 | C3 C5 C6 D1 D5 D6 F1 F2 |

E18

| Table 1 – 4 Status of Conservation Measures | | | | | |
|---|---|---|---|---|---|
| **Species/Habitat/Action** | **Code** | **Description** | **FY2005 Approved** | **FY2006 Approved** | **FY2007 Proposed** |
| | MRM2 | Monitor and adaptively manage created habitat | C1 D1 D6 F1 F2 G1 G2 | C3 C5 C6 D5 D6 F1 F2 | C3 C5 C6 D5 D6 F1 F2 F4 G6 |
| | MRM3 | Research nest competition European Starlings | | | |
| | CMM1 | Reduce risk of loss of habitat affected by wildfire | | | E18 |
| | CMM2 | Replace created habitat affected by wildfire | | | |
| Vermilion Flycatcher | VEFL1 | Create 5,208 ac | | E4 E5 E16 | C5 C6 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E22 E23 F1 F2 |
| | VEFL1-R | Restoration Research | E1 E2-E6 E8-E15 | E1 E3 E6 E7 E8 | E1 E3 E6 E7 E8 E19 |
| | MRM1 | Define Habitat Characteristics | D1 D6 G1 G2 | C3 C5 C6 D5 D6 F1 F2 | C3 C5 C6 D1 D5 D6 F1 F2 |
| | MRM2 | Monitor and adaptively manage created habitat | D1 D6 F1 F2 G1 G2 | C3 C5 C6 D5 D6 F1 F2 | C3 C5 C6 D5 D6 F1 F2 F4 G6 |
| | MRM4 | Brown-headed cowbird evaluation | C2 E18 | C1 | C1 |
| | CMM1 | Reduce risk of loss of habitat affected by wildfire | | | E18 |
| | CMM2 | Replace created habitat affected by wildfire | | | |
| Arizona Bell's Vireo | BEVI1 | Create 2,983 ac | | E4 E5 E16 | C5 C6 E1 E4 E5 E6 E8 E21 E22 E23 F1 F2 |
| | BEVI1-R | Restoration Research | E1 E2-E6 E8-E15 | E1 E3 E6 E7 E8 | E1 E3 E6 E7 E8 E19 E20 |
| | MRM1 | Define Habitat Characteristics | C1 D1 D6 G1 G2 | C3 C5 C6 D5 D6 F1 F2 | C3 C5 C6 D1 D5 D6 F1 F2 |
| | MRM2 | Monitor and adaptively manage created habitat | C1 D1 D6 F1 F2 G1 G2 | C3 C5 C6 D5 D6 F1 F2 | C3 C5 C6 D5 D6 F1 F2 F4 G6 |
| | MRM4 | Brown-headed cowbird evaluation | C2 | C1 | C1 |
| Sonoran Yellow Warbler | YWAR1 | Create 4050 ac | E18 | E4 E5 E16 | C5 C6 E1 E3 E4 E5 E6 E7 E8 E19 E20 E21 E22 E23 F1 F2 |
| | YWAR1-R | Restoration Research | E1 E2-E6 E8-E15 | E1 E3 E6 E7 E8 | E1 E3 E6 E7 E8 E19 |
| | MRM1 | Define Habitat Characteristics | C1 D1 D6 G1 G2 | C3 C5 C6 D5 D6 F1 F2 | C3 C5 C6 D1 D5 D6 F1 F2 |
| | MRM2 | Monitor and adaptively manage created habitat | C1 D1 D6 F1 F2 G1 G2 | C3 C5 C6 D5 D6 F1 F2 | C3 C5 C6 D5 D6 F1 F2 F4 G6 |
| | MRM4 | Brown-headed cowbird evaluation | C2 | C1 | C1 |
| | CMM1 | Reduce risk of loss of habitat affected by wildfire | | | E18 |
| | CMM2 | Replace created habitat affected by wildfire | | | |
| Summer Tanager | SUTA1 | Create 602 acres | | E4 E5 E16 | C5 C6 E3 E4 E5 E6 E7 E8 E19 E20 E21 E22 F1 F2 |
| | SUTA1-R | Restoration Research | E1 E2-E6 E8-E15 | E1 E3 E6 E7 E8 | E1 E3 E6 E7 E8 |
| | MRM1 | Define Habitat Characteristics | C1 D1 D6 G1 G2 | C3 C5 C6 D5 D6 F1 F2 | C3 C5 C6 D1 D5 D6 F1 F2 |
| | MRM2 | Monitor and adaptively manage created habitat | C1 D1 D6 F1 F2 G1 G2 | C3 C5 C6 D5 D6 F1 F2 | C3 C5 C6 D5 D6 F1 F2 |
| | MRM4 | Brown-headed cowbird evaluation | C2 | C1 | C1 |

E18

| Table 1 – 4 Status of Conservation Measures | | | | | |
|---|---|---|---|---|---|
| **Species/Habitat/Action** | **Code** | **Description** | **FY2005 Approved** | **FY2006 Approved** | **FY2007 Proposed** |
| | CMM1 | Reduce risk of loss of habitat affected by wildfire | | | E18 |
| | CMM2 | Replace created habitat affected by wildfire | | | |
| Flat-tailed Horned Lizard | FTHL1 | Acquire and protect 230 ac | | | |
| | FTHL2 | Impl cons measure to avoid take | | | |
| Relict Leopard Frog | RLFR1 | 10,000/yr for 10 yrs to conservation program | | C4 | C4 |
| Flannelmouth Sucker | FLSU1 | 85 ac Reach 3 | C3 | E16 | E15 G3 |
| | FLSU1-R | Restoration Research | | | |
| | FLSU2 | 80,000/yr for 5 years | D9 | C15 | C15 |
| | FLSU3 | Develop management needs/strategies | D9 | C15 | C15 |
| | MRM2 | Monitor and adaptively manage created habitat | E18 D1 G1 G2 | C15 | C15 F4 G6 |
| | MRM5 | Monitor Selenium levels in backwater | | | |
| MacNeills Sootywing Skipper | MNSW1 | Status surveys/habitat - *define Habitat 1st 5-yr | | C7 | C7 |
| | MNSW2 | 222 ac | | E4 E5 E16 | C7 E1E3 E4 E5 E19 E21 E22 F1 |
| | MNSW2-R | Restoration Research | | E1 E3 E7 E8 | E1 E3 E7 E8 |
| | MRM2 | Monitor and adaptively manage created habitat | C1 G1 G2 | C3 C5 C6 F1 F2 | C3 C5 C6 F1 F2 F4 G6 |
| | CMM1 | Reduce risk of loss of habitat affected by wildfire | | | E18 G3 |
| | CMM2 | Replace created habitat affected by wildfire | | | |
| Sticky Buckwheat | STBU1 | 10,000 yr to 2030 to Clark CO conservation program | | | C2 |
| Threecorner Milkvetch | THMI1 | 10,000 yr to 2030 to Clark CO. conservation program | | | C2 |
| California Leaf-nose bat | CLNB1 | Distribution Surveys | | D10 | D9 F4 |
| | CLNB2 | Create habitat near roost sites (priority when creating c-w, mesq habitat for other spp) | | | C5 C6 E21 |
| | MRM1 | Define habitat characteristics | E18 C1 D1 D6 G1 G2 | C3 C5 C6 D10 F1 | C3 C5 C6 D1 D10 F1 |
| | MRM2 | Monitor and adaptively manage created habitat | C1 D1 G1 G2 | C3 C5 C6 D10 F1 | C3 C5 C6 D10 F1 F4 G6 |
| | CMM1 | Reduce risk of loss of habitat affected by wildfire | C2 | | E18 |
| | CMM2 | Replace created habit affected by wildfire | | | |
| Pale Townsend Big-eared Bat | PTBB1 | Distribution surveys | C2 | D10 | D9 F4 |
| | PTBB2 | Create habitat near roost sites | | | C5 C6 E21 |
| | MRM1 | Determine habitat characteristics | C1 D1 D6 G1 G2 | C3 C5 C6 D10 F1 | C3 C5 C6 D10 F1 |
| | MRM2 | Monitor and adaptively manage created habitat | C1 D1 D6 G1 G2 | C3 C5 C6 D10 F1 | C3 C5 C6 D10 F1 F4 G6 |
| | CMM1 | Reduce risk of loss of habitat affected by wildfire | | | E18 |
| | CMM2 | Replace created habitat affected by wildfire | E18 | | |



E18

| Table 1 – 4 Status of Conservation Measures | | | | | |
|---|---|---|---|---|---|
| **Species/Habitat/Action** | **Code** | **Description** | **FY2005 Approved** | **FY2006 Approved** | **FY2007 Proposed** |
| Colorado River Toad | CRTO1 | Distribution surveys, habitat affinity, limiting factors | | C3 | C3 |
| | CRTO2 | Protect existing occupied habitat | | H1 | H1 |
| | CRTO3 | Research to establish in unoccupied habitat | | | |
| Lowland Leopard Frog | LLFR1 | Distribution surveys, habitat affinity, limiting factors | | C3 | C3 G3 |
| | LLFR2 | Protect existing occupied habitat | | H1 | H1 |
| | LLFR3 | Research to establish in unoccupied habitat | | C3 | C3 G3 |
| **OTHER** | | | | | |
| Topock Marsh Pumping | AMM2 | Avoid Flow-Related Impacts on Covered Species | | E17 | C21 C22 D2 E17 |
| Law Enforcement and Fire Suppression | CMM1 | Reduce effects of fire and vandalism on created habitats | | | E18 |

**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 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 FWS or any state wildlife agency regarding the LCR MSCP*

   Appendix C contains outgoing and incoming letters to and from the FWS regarding SIA reporting increasing the size of stocked razorback sucker.

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.

## 2001 Biological Opinion

In addition to fulfilling the requirements in the LCR MSCP HCP, the workplans 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:

1. *Stocking of 20,000 razorback suckers of 25 cm or greater in length into the Colorado River between Parker and Imperial Dams (Reach 4-5)*

   Reclamation entered into a cooperative agreement with Arizona Game and Fish Department (AGFD) on August 27, 2003, to rear razorback suckers for stocking into the Colorado River between Parker and Imperial Dams at Bubbling Ponds Hatchery near Sedona, Arizona. During FY05 a total of 4,814 razorback sucker were stocked between Parker and Imperial Dams.

2. *$50,000 per year (2001-2006) for wild-born bonytail collection efforts in Lake Mohave and/or to support rearing efforts at Achii Hanyo, a satellite rearing facility of Willow Beach National Fish Hatchery*

Reclamation and the FWS 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 in these efforts by the two agencies during this time. Reclamation entered into an Inter-Agency Agreement with the FWS in July 2004 to improve rearing capabilities for bonytail at Achii Hanyo. The agreement provides $50,000 per year for four years for facility improvements.

Significant improvements have been accomplished at Achii Hanyo with these funds, including installing pond linings, repairing berms and embankments, installing collection kettles, installing circular rearing tanks, constructing a metal workshop, and replacing a well motor and hardware.

3. *Monitoring of 372 acres of currently occupied habitat that could be affected by water transfers and change in point of delivery of up to 400,000 af of Colorado River water between Parker and Imperial dams*

   Three hundred and seventy two acres of habitat in 11 sites were identified for monitoring. Baseline soil and moisture conditions on those sites have been established. These conditions will continue to be monitored annually to determine if a change in soil moisture conditions has occurred due to SIA implementation.

4. *Creation of 372 acres of cottonwood and willow managed for southwestern willow flycatchers*

   Phase 1 of the Cibola Valley Conservation Area (E5) that consists of a 22 acre native plant nursery and 64 acres of SWFL habitat was initiated in FY06. Additional lands within E5 and the Palo Verde Ecological Reserve (E4) have been identified to complete the 372 acres of SWFL habitat.

5. *Creation of 44 acres of backwater managed for native fish and wildlife*

   The Imperial Ponds (E14) was identified to fulfill this requirement. This includes creation of approximately 55 acres of backwaters.

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.*

   This work is described in work task C-13, Lake Mead Razorback Sucker Study. In FY07 the overall study will be reviewed and then the need for and level of future studies will be determined.

2. *Reclamation will to the maximum extent practicable provide rising spring water surface elevations of 5-10 feet on Lake Mead, to the extent 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 1160 feet because of the implementation of the ISC, Reclamation will implement a program to collect and rear larval razorbacks in Lake Mead the spawning season following this determination.*

   The level of Lake Mead did reach the 1160 feet msl elevation during FY05. Reclamation, Southern Nevada Water Authority and NDOW are cooperatively rearing RASU larvae captured from Lake Mead for future repatriation into Lake Mead. Work was completed on a new native fish room at Lake Mead State Fish Hatchery, and planning was initiated for additional rearing capacity at Overton Wildlife Management Area. Work tasks 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 FY05 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 1048 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 and 70 acres for California Black Rail. The acreage shall also support at least 58 acres of Colorado River Cotton Rat habitat.
8. Habitat created within California will be protected in perpetuity.
9. An endowment fee of $295.00 per acre (in 2005 dollars) to be provided to CDFG for each acre of habitat that is transferred to the Department in Fee Title at the time of transfer.
10. Stocking 270,000 razorback sucker and 200,000 bonytail of at least 12” in length into Reaches 3 and 4.

Two quantitative activities were accomplished in FY05. Reclamation stocked 4,814 razorback sucker in Reaches 4-5 below Parker Dam (B5). Also the Palo Verde Ecological Reserve (E4) north of Blythe, California, was identified as a riparian restoration site and initial site planning and compliance began. This property is owned by CDFG and has been made available for LCR MSCP restoration efforts in California.

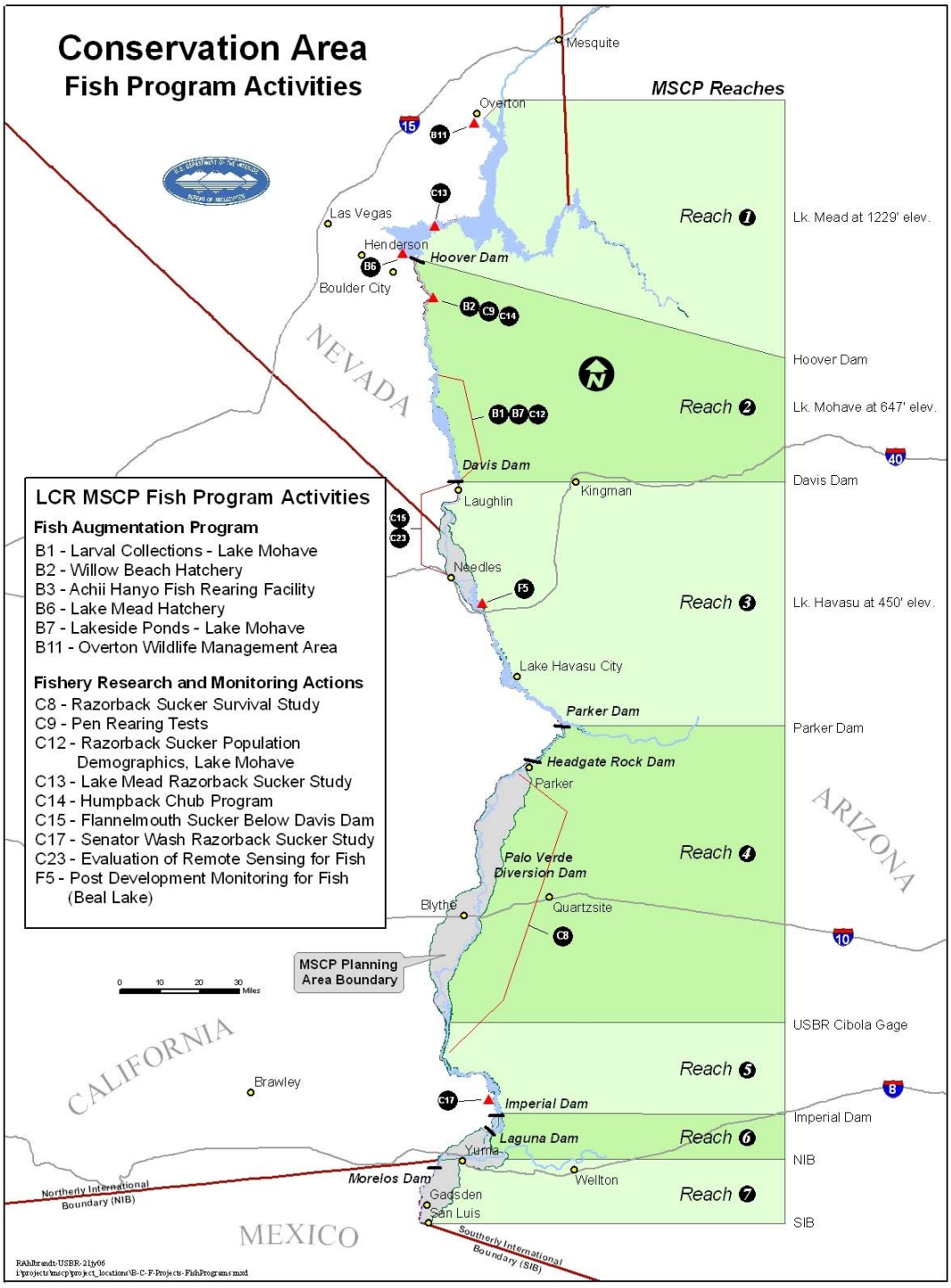
## Overview of Work Tasks

In addition to program administration, LCR MSCP work tasks are categorized into a number of target areas: Fish Augmentation (Section B), Species Research (Section C), System Monitoring (Section D), Conservation Area Development and Management (Section E), Post-Development Monitoring (Section F), and Adaptive Management (Section G). A number of connections and overlap exist between work task categories. This introduction provides an overview of the proposed LCR MSCP by program function: fishery related work; monitoring and research for terrestrial, riparian, and marsh species; and conservation area development. The introduction provides background information on program development and proposed work strategy, for each section. Maps are provided at the beginning of each description to show specific work task locations.

The following list of work task numbers and titles is provided to assist reading of this Annual Report.

| | |
|---|---|
| A-1 | Program Administration |
| B-1 | Lake Mohave Razorback Sucker Larvae Collection |
| B-2 | Willow Beach National Fish Hatchery |
| B-3 | Achii Hanyo Rearing Station |
| B-4 | Dexter National Fish Hatchery |
| B-5 | Bubbling Ponds Fish Hatchery |
| B-6 | Lake Mead Fish Hatchery |
| B-7 | Lake Side Rearing Ponds |
| B-8 | Fish Tagging Equipment |
| B-9 | Boulder City Wetland Ponds |
| B-10 | Uvalde National Fish Hatchery |
| B-11 | Overton Wildlife Management Area |
| C-1 | Brown-Headed Cowbird Trap Assessment |
| C-2 | Sticky Buckwheat and Threecorner Milkvetch Conservation |
| C-3 | Multi-Species Conservation Program Covered Species Profile Development |
| C-4 | Relict Leopard Frog |
| C-5 | Effects of Abiotic Factors on Insect Populations in Riparian Restoration Sites |
| C-6 | Insect Population Biology in Riparian Restoration Sites |
| C-7 | Survey and Habitat Characterization for MacNeill's Sootywing |
| C-8 | Razorback Sucker Survival Studies |
| C-9 | Razorback Sucker and Bonytail Pen Rearing Tests |
| C-10 | Razorback Sucker Growth Studies |
| C-11 | Bonytail Rearing Studies |
| C-12 | Demographics and Post Stocking Survival of Repatriated Razorback Suckers in Lake Mohave |
| C-13 | Lake Mead Razorback Sucker Study |
| C-14 | Humpback Chub Program Support |
| C-15 | Flannelmouth Sucker Habitat Use, Preference and Recruitment Downstream of Davis Dam |
| C-16 | Evaluation of Past Bonytail Stockings |
| C-17 | Senator Wash Razorback Sucker Stock Assessment |
| C-18 | Point Count Design and Sample Size Evaluation |
| C-19 | Southwestern Willow Flycatcher Feather Colorimetry |

C-20 Southwestern Willow Flycatcher Prey Base Study
C-21 Yellow-Billed Cuckoo Demographics Study
C-22 Yellow-Billed Cuckoo Surveys, Demographic Study, and Survey Protocol Evaluation
C-23 Evaluation of Remote Sensing Techniques for PIT Tagged Fish
D-1 Marsh Bird Surveys
D-2 Southwestern Willow Flycatcher Presence/Absence Surveys
D-3 Southwestern Willow Flycatcher Habitat Monitoring
D-4 Southwestern Willow Flycatcher Presence/Absence Survey Hualapai Tribe
D-5 Monitoring Avian Productivity and Survivorship
D-6 System Monitoring for Riparian Obligate Avian Species
D-7 Yellow-Billed Cuckoo Presence/Absence Surveys
D-8 Razorback Sucker and Bonytail Stock Assessment
D-9 System Monitoring and Research of Covered Bat Species
D-10 System Monitoring and Studies on Small Mammal Populations
D-11 Vegetation Type Mapping
E-1 Beal Lake Riparian and Marsh
E-2 Beal Lake Native Fish
E-3 Ahakhav Tribal Preserve
E-4 Palo Verde Ecological Reserve
E-5 Cibola Valley Conservation Area
E-6 Cottonwood Genetics Study
E-7 Mass Transplanting Demonstration
E-8 Seed Feasibility Study
E-9 Hart Mine Marsh
E-10 Walker Lake
E-11 Draper Lake
E-12 Butler Lake
E-13 McAllister Lake
E-14 Imperial Ponds
E-15 Backwater Site Selection
E-16 Conservation Area Site Selection
E-17 Topock Marsh Pumping
E-18 Law Enforcement and Fire Suppression
E-19 Needles-Topock (AZ RM 240) Stabilization
E-20 Pintail Slough
E-21 Planet Ranch, Bill Williams River
E-22 Pratt Agricultural Lease
E-23 Mittry Lake Fire Rehabilitation Project
F-1 Habitat Monitoring
F-2 Avian Use of Restoration Sites
F-3 Small Mammal Colonization of Restoration Sites
F-4 Post-Development Monitoring of Covered Bat Species
F-5 Post-Development Monitoring of Fish Restoration Sites
G-1 Data Management
G-2 Annual Report Writing and Production
G-3 Adaptive Management Research Projects
G-4 Science/Adaptive Management Strategy
G-5 Public Outreach
H-1 Existing Habitat Maintenance


Conservation Area
Fish Program Activities
MSCP Reaches
Mesquite
Overton
B11
C13
Las Vegas
Henderson
B6
Hoover Dam
Boulder City
B2
C9
C14
NEVADA
Reach 1
Lk. Mead at 1229' elev.
Hoover Dam
Reach 2
Lk. Mohave at 647' elev.
B1
B7
C12
Davis Dam
Laughlin
Kingman
Davis Dam
C15
C23
Needles
F5
Reach 3
Lk. Havasu at 450' elev.
Lake Havasu City
Parker Dam
Parker Dam
Headgate Rock Dam
Parker
ARIZONA
Palo Verde
Diversion Dam
Reach 4
Blythe
Quartzsite
C8
MSCP Planning
Area Boundary
USBR Cibola Gage
CALIFORNIA
Reach 5
Brawley
C17
Imperial Dam
Imperial Dam
Laguna Dam
Reach 6
Yuma
NIB
Morelos Dam
Wellton
Northerly International
Boundary (NIB)
Gadsden
San Luis
Reach 7
SIB
MEXICO
Southerly International
Boundary (SIB)
LCR MSCP Fish Program Activities
Fish Augmentation Program
B1 - Larval Collections - Lake Mohave
B2 - Willow Beach Hatchery
B3 - Achii Hanyo Fish Rearing Facility
B6 - Lake Mead Hatchery
B7 - Lakeside Ponds - Lake Mohave
B11 - Overton Wildlife Management Area
Fishery Research and Monitoring Actions
C8 - Razorback Sucker Survival Study
C9 - Pen Rearing Tests
C12 - Razorback Sucker Population
Demographics, Lake Mohave
C13 - Lake Mead Razorback Sucker Study
C14 - Humpback Chub Program
C15 - Flannelmouth Sucker Below Davis Dam
C17 - Senator Wash Razorback Sucker Study
C23 - Evaluation of Remote Sensing for Fish
F5 - Post Development Monitoring for Fish
(Beal Lake)
0 10 20 30
Miles

## 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:

- Fish Augmentation (Section B)
- Species Research (Section C)
- System Monitoring (Section D)
- Conservation Area Development (Section E)
- Post-Development Monitoring (Section F)
- Adaptive Management (Section G)

A brief summary of the work planned for each target area is provided below.

**FISH AUGMENTATION (Section B)**

Augmenting the populations of endangered RASU and BONY is a major component of the LCR MSCP. 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; and
3. Rear the fish to target size and stock them into the LCR MSCP project areas.

(A Fish Augmentation Plan has been developed for the LCR MSCP and provides more detail on this facet of the program. The Fish Augmentation Plan will be available on the LCR MSCP website September 2006.)

1. **Acquire Fish for Grow-out:** To obtain sufficient numbers of young for grow-out, LCR MSCP will develop and maintain adult brood stock for each species. In the case of RASU, the Lake Mohave population is the intended brood stock. Development and maintenance of this stock (underway since 1992) 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). One portion of these larvae are reared to subadult size and returned (repatriated) to Lake Mohave to maintain the RASU brood stock. The remaining larvae are reared at various fish hatcheries and grow-out facilities in order to meet stocking requirements of the LCR MSCP. The LCR MSCP will support maintenance of this genetically diverse stock through out the life of the LCR MSCP.

There is no existing population of adult BONY in the wild from which to conduct a larval fish capture scenario, similar to the one above for razorback sucker. In fact, BONY adults in the wild anywhere in the Colorado River Basin are extremely rare. The only BONY brood stock in the world is at the Dexter NFH in New Mexico. (The parents of these fish came from Lake Mohave.) A captive management plan for this stock has been developed by FWS and is in effect. The LCR MSCP will provide funding to Dexter NFH to support maintenance of this brood stock. Dexter NFH will also receive support for hatching out young BONY and supplying them to other grow-out facilities. In addition, FWS and Reclamation have entered into an agreement to bring BONY from Dexter NFH to Uvalde NFH to determine the feasibility of developing a stock of BONY at this site.

2. **Develop Facilities to Grow the Fish:** The LCR MSCP Fish Augmentation Program will require grow-out facilities for these two species for many years. It is planned and important to have fish growing at a number of facilities at any given time. Fish are prolific, producing tens of thousands of eggs each year. However, natural mortality is also tremendous, and even tens of thousands per year may not assure successful recruitment in the wild. Nowhere are these facts more evident than in the life history of the RASU. Female RASU have up to 200,000 eggs in their ovaries each spring, and females live to be over 45 years. Assuming that one female fish can be reproductively viable for 40 years, this single fish would produce 8 million eggs in order to replace herself. Scientists hypothesize that this reproductive strategy developed because the conditions in the Colorado River were not naturally conducive for successful spawning and recruitment every year, and may not have been so for many consecutive years at a time.

A second reason to have redundancy in the rearing process is that fish rearing is a type of farming, and like farming, whole crops can be lost overnight to both natural and man-made events. The minimum target size for the fish to be released through this program is 300 mm. It currently takes 2-4 years for fish in captivity to reach this size. Most facilities rearing RASU or BONY have three or more year classes on station at any given time. A single flash flood, electric storm, toxic algae infestation, oil spill, or fish-health crisis (i.e. bacterial, viral, fungal infections) could wipe out the entire stock, and set the rearing process back 3 years or more at a single facility.

The program will provide support to the following existing facilities which are currently rearing one or more of these species or have agreed to either enter into or to continue a partnership with the LCR MSCP to provide rearing space for these fishes:

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

Activities required to develop, operate, maintain and/or replace infrastructure will be identified in annual work plans, but will most likely include such routine items as:

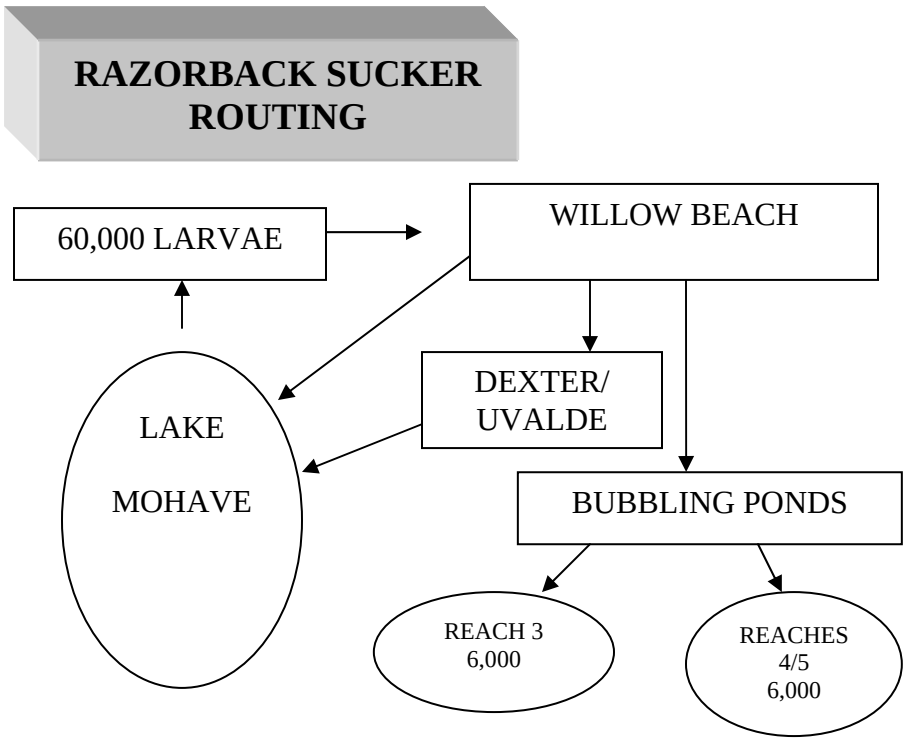
1. Repair/replace pond liners
2. Develop/repair/replace water delivery systems including pipes, valves, pumps, well motors, etc.
3. Construct new ponds
4. Install/repair fish collection kettles
5. Repair/replace bird netting and other predator control devices
6. Maintain access roads, work areas, lighting,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

3. **Rear Fish to Target Size and Stock into LCR:** The HCP provides instructions for RASU and BONY augmentations (See Table below). The augmentation stockings are of three types. Type I requirements are to stock fish for simple population development/maintenance, with a few thousand fish to be stocked each year for 40-50 years. In Type II, fish are to be released in large quantities each year for five consecutive years. Concurrent with these latter stockings, extensive scientific monitoring will be conducted to provide data to the LCR MSCP adaptive management program. Type III stocking requirements complete specific actions associated with conservation measures from previous endangered species consultations.

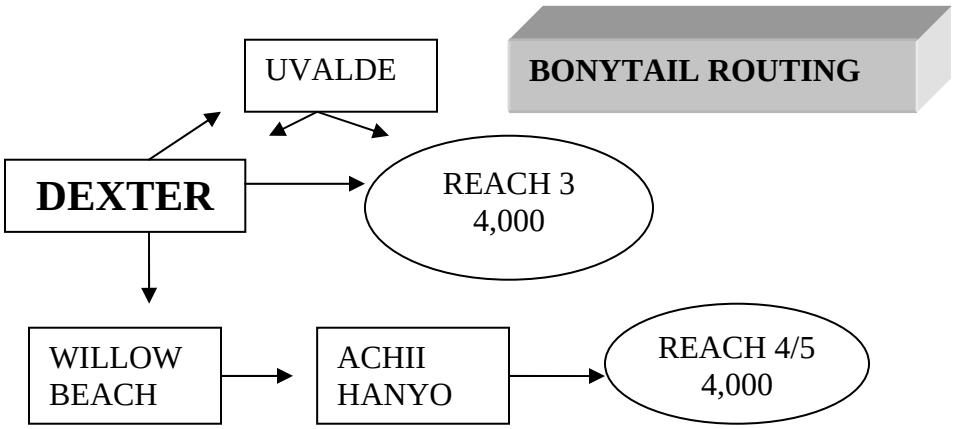
| Species | Location | Notes |
|---|---|---|
| RASU | Reach 3 | 6,000 per year (300 mm) for 45 years (Type I) |
| " | Reach 4/5 | 6,000 per year (300 mm) (Type I) |
| " | Reach 3, 4, 5 | 24,000 per year for five consecutive years with at least 6,000 into Reach 3 and 6,000 into Reach 4/5 for research(Type 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) for 40 years, to begin in 2016 (or completion of BO actions) (Type I) |
| " | Reach 3 | 4,000 per year (300 mm) for 50 years (Type I) |
| " | Reach 4/5 | 8,000 per year (300 mm) for five consecutive years for research (Type II) |
| " | Reach 4/5 | 4,000 per year (300 mm) 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 affect 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. 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.

The current strategy for each fish is diagrammed below. For the RASU between 60,000 and 75,000 larval fish will be captured each spring from Lake Mohave and be taken to Willow Beach NFH. These larvae will be held and reared to fingerling size (50 mm). Approximately one third or 20,000 to 25,000 fingerlings will be transferred to Bubbling Ponds State Fish Hatchery (SFH), where 6000 will be reared for stocking into Lake Havasu (Reach 3) and 6000 reared for stocking into the river between Parker and Imperial Dams (Reaches 4 and 5). Up to 5,000 fingerlings are to be transferred from Willow Beach NFH to Dexter NFH and reared to 500 mm for repatriation to Lake Mohave. (Some of these fish may go to Uvalde NFH to complete grow-out before being returned to Lake Mohave.) Willow Beach NFH itself will keep 20,000 fingerlings from each year class for rearing and repatriation to Lake Mohave and as a backup/contingency for Bubbling Ponds SFH stock. Remaining fish will be distributed to lake-side ponds, sanctuary programs, backwater habitats developed by the LCR MSCP and/or any facility where the fish can be grown to benefit the LCR MSCP.



BONY will similarly be routed through one or more facilities. Adults will be hand spawned in the spring at Dexter NFH and raised to fingerling size. Some of these fingerlings will be distributed to Willow Beach NFH for initial rearing. Willow Beach NFH will raise these fish to juveniles during the first year and transfer a portion to Achii Hanyo in late winter. Achii Hanyo will rear the fish through the following fall/winter for stocking into Reach 4/5. Some stock will be held at Dexter NFH for rearing to target size for stocking into Reach 3. Some of the fish at Dexter NFH will be transferred to Uvalde NFH where they will be monitored through the summer and fall to assess growth rates. Fish will then be moved back to Dexter NFH, and when target size is attained, the fish will be stocked into Reach 3.




In summary, the work plans in this annual report will facilitate completion of the Type I stocking needs through FY11. The table below outlines the generic plan for these augmentation stockings over the next few years (how many fish are required and where they are expected to come from).

| Species | Reach | Number needed per year | To Be Supplied From |
|---|---|---|---|
| RASU | 3 | 6,000 | Bubbling Ponds SFH |
| RASU | 4/5 | 6,000 | Bubbling Ponds SFH |
| | | | |
| BONY | 3 | 4,000 | Dexter NFH |
| BONY | 4/5 | 4,000 | Achii Hanyo |
| | | | |

The work tasks also will allow facility development to move forward in order to attain capacity to accomplish the Type II stockings by FY11.

Many of these work plans will either directly or indirectly accomplish Type III stocking for augmentation. Willow Beach NFH (B2), Dexter NFH (B4), and Lake Side Rearing Ponds (B7) will all result in RASU being repatriated to Lake Mohave for brood stock development, and Lake Mead SFH (B6) and Overton Wildlife Management Area (WMA)

(B11) will provide for larvae captured from Lake Mead to be reared and returned to that water.

**SPECIES RESEARCH (Section C)**

In order 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 ineffective conservation actions. The strategy is to quantify existing knowledge, to identify data gaps, and to design and implement species research in order to fill these data gaps.

Many species research needs for fish were already known prior to signing the LCR MSCP. Species research programs either being planned or already underway when the record of decision was signed in April 2005 were either continued in FY05, were initiated in FY06, or are being proposed for FY07. For example RASU and BONY are rare fishes, and have only been in captivity for a few decades. Propagation and culturing techniques used for rearing other fishes, like rainbow trout and channel catfish, have been applied to these native species, and these techniques do not always work. The LCR MSCP needs many thousands of these native fish, so one of the first focus areas for species research is on the rearing of these species (Razorback Sucker Growth Studies (C10) and Bonytail Rearing Studies (C11)). Because so many fish are needed, one investigation, Razorback Sucker and Bonytail Pen Rearing Tests (C9), is studying the use of placing rearing pens out in the river as a means of expanding hatchery capacity.

There are other examples of species research already existing at the initiation of LCR MSCP implementation:

1. Reclamation has reared and stocked over 50,000 RASU into the Colorado River downstream of Parker Dam, and the LCR MSCP is expected to stock another 200,000 or more. The question of survival is still outstanding. Reclamation began a study to assess post stocking survival in 2003. This species research project, Razorback Sucker Survival Studies (C8), was integrated into the LCR MSCP. The work continues and is expected to be completed in FY08.
2. 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 over 100,000 subadult fish to date, yet recapture data suggest that less than 5,000 have survived. What happened? Demographics and Post Stocking Survival of Repatriated Razorback Suckers in Lake Mohave (C12) began in FY06 to answer this question.
3. The LCR MSCP is also continuing the Lake Mead Razorback Sucker Study (C13) which is a conservation measure from another ESA consultation, the 2001 BO. This is the tenth year of the Lake Mead Razorback Sucker Study, and the goal for next year is to compile a ten-year summary so resource managers can evaluate the results to date, and determine the need for and/or the scope and direction of further work.

Creation of backwater habitats for covered fish species is another major goal of the LCR MSCP. In FY05, work accomplished under Multi-Species Conservation Program Covered Species Profile Development (C3), Development of Backwater Rating Criteria, synthesized existing data for covered species that are found in backwater habitats. These data will be used to develop backwater rating criteria in FY06 under Backwater Site Selection (E15).

The HCP outlines specific research actions in the conservation measures for HUCH and FLSU. Humpback Chub Program Support (C14) provides funding to support HUCH conservation activities being conducted under the Glen Canyon Adaptive Management Program. FLSU conservation is being covered by Flannelmouth Sucker Habitat Use, Preference and Recruitment Downstream of Davis Dam (C15) which provides funding to investigate habitat use, preference and recruitment of this species in the Colorado River downstream of Davis Dam.

Species research actions to begin in FY07 include Evaluation of Past Bonytail Stockings (C16), which will gather data to evaluate past stockings of BONY, so that the LCR MSCP may learn from the successes and failures of others. Another action to begin in FY07 is Evaluation of Remote Sensing Techniques for PIT Tagged Fish (C23). This action will evaluate fish monitoring techniques to determine a more cost effective way to assess fish populations.

In general, the species research work tasks for fish are not esoteric studies. Each task feeds back into one or more of the six target areas listed earlier, and each is being conducted to advance the accomplishments of the LCR MSCP.

**SYSTEM MONITORING (Section D)**

As described in the HCP, system monitoring will be conducted to collect data on existing populations and habitats of covered species to determine their status, distribution, density, migration, productivity, and other ecologically important parameters. The work is to be implemented annually, with decreasing intensity over the term of the LCR MSCP, as post-development monitoring increases at habitat conservation sites. The collected data are to be maintained in a GIS database and other database formats as appropriate. The purposes of this system monitoring include developing and maintaining an awareness of existing populations of these species and their habitats, and to have these data available for use in the adaptive management program as a long-term assessment tool.

Only three of the four covered native fish species (RASU, BONY, and FLSU) will be monitored by the LCR MSCP at this time. The fourth species, HUCH, is essentially extirpated from the main stem Colorado River below 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 will annually gather information on the status of these species by project reach. Data will be entered

into a GIS database and a status report will be developed depicting the end-of-year status for distribution and abundance of each species. Observations of other ecologically important parameters will also be summarized.

## 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 to existing backwaters to major modifications such as the complete excavation of undeveloped land. Backwater development work that was initiated prior to signing of the LCR MSCP is covered in Beal Lake Native Fish (E2), Butler Lake (E12), McAllister Lake (E13) and Imperial Ponds (E14). Future backwater development for native fishes will be guided by the outcome of Backwater Site Selection (E15). This last work task is looked upon as the central action needed to facilitate accomplishment of the remaining backwater development needs for the LCR MSCP.

## POST DEVELOPMENT MONITORING (Section F)

Post development monitoring is to 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 target species. Beal Lake Native Fish (E2) will be the only created backwater habitat developed by the end of FY06 that will have been stocked with native fishes (RASU and BONY introduced in spring FY06). Imperial Ponds (E14) is scheduled to be deepened and expanded in FY06 and FY07. In preparation for construction native fish were removed in FY06. Evaluation of the backwater for post development stocking and monitoring is schedule for FY07. Post-Development Monitoring of Fish Restoration Sites (F5) provides funding to support post development monitoring of these sites.

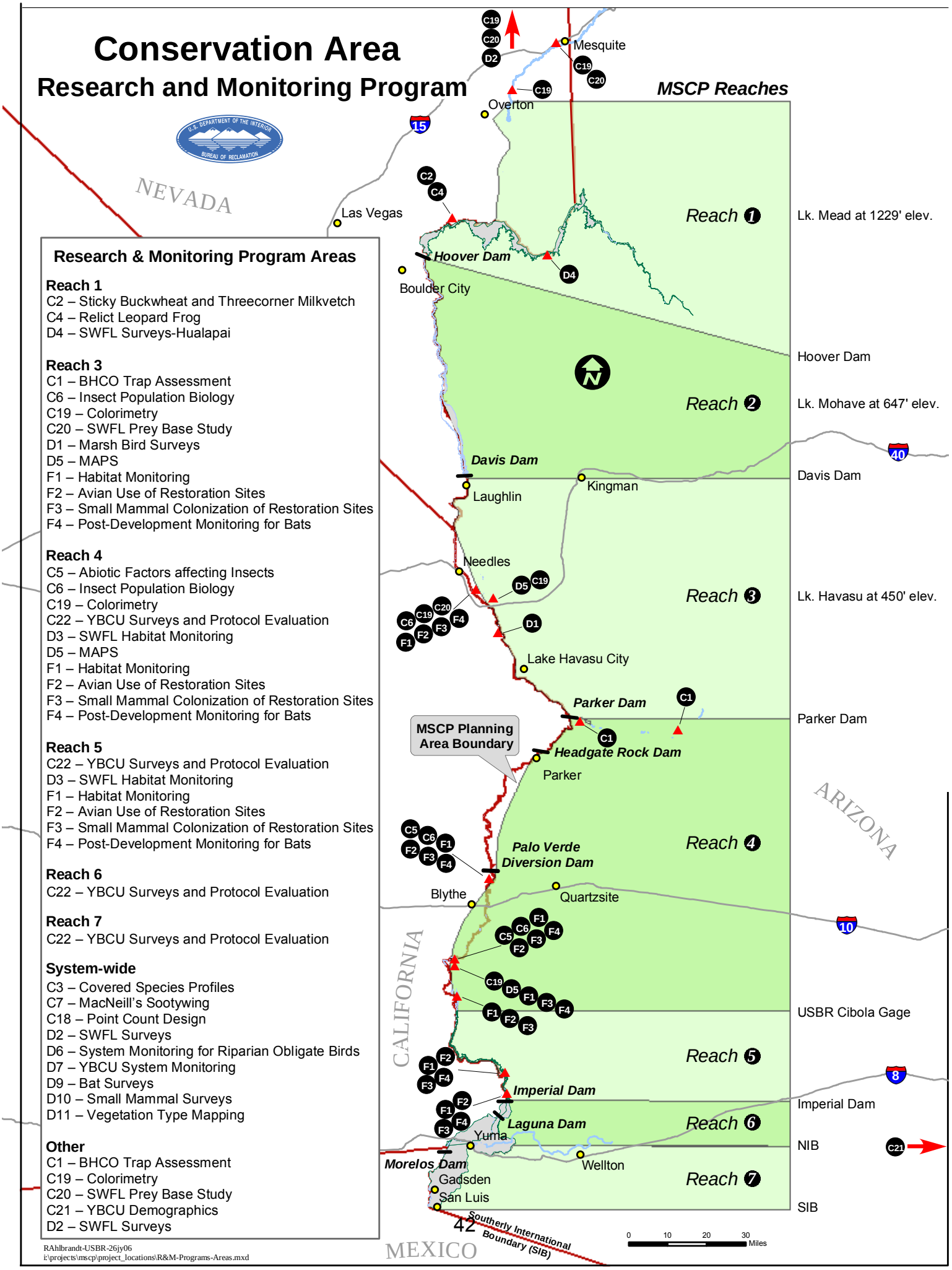
## ADAPTIVE MANAGEMENT PROGRAM (Section G)

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: a) gauge the effectiveness of existing conservation measures; b) propose alternative or modified conservation measures, as needed; and c) address changed and unforeseen circumstances.

With FY06 being the first full year of LCR MSCP implementation, it is as yet unnecessary to change any part of the program. 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. For example, during FY06 and FY07, funds allocated from G3 will allow Reclamation to investigate remote sensing techniques to monitor relative abundance of RASU.

# Conservation Area
## Research and Monitoring Program




### Research & Monitoring Program Areas

**Reach 1**
C2 – Sticky Buckwheat and Threecorner Milkvetch
C4 – Relict Leopard Frog
D4 – SWFL Surveys-Hualapai

**Reach 3**
C1 – BHCO Trap Assessment
C6 – Insect Population Biology
C19 – Colorimetry
C20 – SWFL Prey Base Study
D1 – Marsh Bird Surveys
D5 – MAPS
F1 – Habitat Monitoring
F2 – Avian Use of Restoration Sites
F3 – Small Mammal Colonization of Restoration Sites
F4 – Post-Development Monitoring for Bats

**Reach 4**
C5 – Abiotic Factors affecting Insects
C6 – Insect Population Biology
C19 – Colorimetry
C22 – YBCU Surveys and Protocol Evaluation
D3 – SWFL Habitat Monitoring
D5 – MAPS
F1 – Habitat Monitoring
F2 – Avian Use of Restoration Sites
F3 – Small Mammal Colonization of Restoration Sites
F4 – Post-Development Monitoring for Bats

**Reach 5**
C22 – YBCU Surveys and Protocol Evaluation
D3 – SWFL Habitat Monitoring
F1 – Habitat Monitoring
F2 – Avian Use of Restoration Sites
F3 – Small Mammal Colonization of Restoration Sites
F4 – Post-Development Monitoring for Bats

**Reach 6**
C22 – YBCU Surveys and Protocol Evaluation

**Reach 7**
C22 – YBCU Surveys and Protocol Evaluation

**System-wide**
C3 – Covered Species Profiles
C7 – MacNeill's Sootywing
C18 – Point Count Design
D2 – SWFL Surveys
D6 – System Monitoring for Riparian Obligate Birds
D7 – YBCU System Monitoring
D9 – Bat Surveys
D10 – Small Mammal Surveys
D11 – Vegetation Type Mapping

**Other**
C1 – BHCO Trap Assessment
C19 – Colorimetry
C20 – SWFL Prey Base Study
C21 – YBCU Demographics
D2 – SWFL Surveys

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## 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 utilize standardized and scientifically accepted protocols to acquire information to evaluate 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. A Science Strategy is being developed to provide programmatic guidance for ensuring that the implementation of conservation measures will be based on scientific information, methods, principles, and standards. A five year planning and evaluation period has been identified in the science strategy to provide short-term priorities. The *Draft Final Science Strategy* can be found on the LCR MSCP website.

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, as well as new data accumulated through targeted research projects identified during the above process, will be used to guide proposed habitat creation project design. In addition, research will be conducted to evaluate habitat restoration and maintenance techniques to ensure efficient and effective techniques are utilized 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 will be 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/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 covered species habitats and populations. Work tasks identified in this section focus on identifying known covered species life requisites and habitat requirements (Multi-Species Conservation Program Covered Species Profile Development (C3)) and addressing information gaps necessary for directing the successful establishment and management of created habitats. Information gained will be used to design 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 will be developed after completion of covered species profiles in 2006 (C3). These species profiles will be updated annually, when applicable.

In 2005, several species research work tasks were designed to provide information for the development of new protocols needed to conduct system and post-development monitoring activities once the LCR MSCP began full implementation in October 2005. Point Count Design and Sample Size Evaluation (C18) was designed to provide the data required to determine the number of transects and data points needed to monitor riparian obligate bird species throughout the project area. Prior to implementation of C18, the amount of data anticipated to be collected during the 2005 field season was believed to be sufficient to develop the system monitoring design; however, after consultation with U. S. Geological Survey (USGS) scientists, additional data will be collected and a sample design will be completed in 2006. Full scale implementation of the point count system

monitoring program is anticipated for 2007 and will be executed under System Monitoring for Riparian Obligate Avian Species (D6).

In 2005, existing data for nine covered species that are found in backwater, marsh, and riparian interface habitats were synthesized and a report produced detailing life requisites and habitat requirements for these covered species as a prelude to developing a backwater rating system to be used for habitat creation site selection. These data will be used to develop backwater rating criteria in FY2006 under E15.

Two research work tasks were developed to provide information on yellow-billed cuckoo (YBCU) in 2005. Information obtained from Yellow-Billed Cuckoo Demographics Study (C21) and Yellow-billed Cuckoo Surveys, Demographic Study, and Survey Protocol Evaluation (C22) were used to evaluate the survey protocol developed jointly by USGS and Southern Sierra Research Station. C21 used radio telemetry to evaluate current survey protocol, including detection rate, and to acquire information on species demographics along the San Pedro River in southeastern Arizona where a known population of yellow-billed cuckoos has been monitored for four years. C22 concentrated on habitat selection, habitat requirements, and protocol evaluation along the Lower Colorado River. Information acquired during completion of these work tasks was used to adjust the survey protocol and determine demographic data needs being investigated under Yellow-Billed Cuckoo Presence/Absence Surveys (D7) in 2006.

Other species research work tasks continued existing research projects identified prior to LCR MSCP implementation. Brown-headed Cowbird Trap Assessment (C1) evaluated the success of a trapping program initiated under the 1997 BO. Information gathered through this post-trap assessment will help determine trapping intervals, if brown-headed cowbird (BHCO) trapping becomes necessary under the LCR MSCP and/or SIA. Information gained from this study will be utilized in conjunction with additional BHCO control research being conducted under Southwestern Willow Flycatcher Presence/Absence Surveys (D2).

Southwestern Willow Flycatcher Feather Colorimetry (C19) was an inter-agency effort to determine the viability and practicality of using colorimetry to differentiate between willow flycatcher subspecies in the field. The ability to determine subspecies may enable surveyors to better define habitat use by *extimus* and other subspecies during the early breeding/migration period. Once complete, the information from this study may be used to adjust the protocols for presence/absence surveys under D2.

In 2005, research on insect availability in occupied SWFL breeding habitat commenced to determine feeding patterns for the flycatcher (Southwestern Willow Flycatcher Prey Base Study (C20)). These data may be used to define habitat quality and may provide information for future habitat restoration efforts in Section E.

Three species research work tasks were designed to define insect relationships to riparian plant communities. Information obtained under C20 stimulated studies on Effects of Abiotic Factors on Insect Populations in Riparian Restoration Sites (C5) and Insect

Population Biology in Riparian Restoration Sites (C6). 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. In addition, Survey and Habitat Characterization for MacNeill's Sootywing (C7) defines surveys and habitat characterization for MacNeill's sootywing skipper, an LCR MSCP covered species. 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 by 2009. 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.

**System Monitoring (Section D)**

System monitoring will be undertaken 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 and 2006. In 2007, in addition to continuing existing monitoring programs (D1 through 5), several new system monitoring projects will be 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), System Monitoring and Research of Covered Bat Species (D9), System Monitoring and Studies on Small Mammal Populations (D10)). Monitoring is accomplished by using accepted protocols or protocols previously designed and tested under species research work tasks in 2005. System monitoring may utilize single species or multi-species protocols, depending on species priority, effectiveness, and efficiency.

In accordance to previous biological opinions 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, Yuma clapper rail (CLRA), and neotropical migratory birds. These studies have been integrated into the MSCP, where applicable.

System monitoring for Yuma clapper rail has been conducted since the 1980's. In anticipation of LCR MSCP initiation, a multi-species marsh bird protocol was designed by the U of A. In 2005, Reclamation conducted both Yuma clapper rail surveys, using the established protocol, and multi-species marsh bird surveys using the new protocol. Marsh bird surveys will continue to be conducted annually by an inter-agency group

using the multi-species survey protocol approved by FWS in 2006. Reclamation will continue to be an active participant in the LCR marsh bird survey effort, under Work Task D1, in order to gain pertinent information to maintain existing Yuma clapper rail (CLRA2) and California black rail (BLRA2) habitat areas, in accordance with the HCP.

Three system monitoring work tasks (Southwestern Willow Flycatcher Habitat Monitoring (D3), Southwestern Willow Flycatcher Presence/Absence Survey Hualapai Tribe (D4), and Monitoring Avian Productivity and Survivorship (D5)) 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 D3. These surveys will continue, using the current single-species protocol, until the existing contract expires after the 2007 field season. D3 will then be evaluated and any changes to protocol or deliverables will be incorporated into future work tasks. Additional surveys are conducted by the Hualapai tribe within the Grand Canyon under D4. These surveys will also be evaluated at the end of the 2007 field season, in conjunction with the overall system monitoring effort for SWFL. SWFL occupied habitat is monitored between Parker and Imperial Dams under the 2001 BO requirements subsumed within the LCR MSCP (D3). 2001 BO Reasonable and Prudent Measure 4 requires annual presence/absence surveys for up to five years after the implementation of all water transfers (D2) while Conservation Measure 4 requires habitat monitoring to be conducted annually for the same time period (covered under D3). SWFL habitat monitoring will continue through December 2007 and then the protocols and level of survey effort will be re-evaluated.

System monitoring for YBCU was initiated in 2006 using data acquired from species research work tasks completed in 2005 (C21 and C22). Presence/absence surveys will continue in 2007 (D7). YBCU surveys utilize a species specific protocol to provide data on this late successional riparian obligate species. Data from these studies will be used to help design and manage created habitats in Section E.

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 developed by Great Basin Bird Observatory (GBBO), through the auspices of Nevada Partners in Flight. USGS will provide a sampling design in 2006, with implementation anticipated in 2007. Surveys will be conducted annually for the first five years. Survey interval will be evaluated during the five year program review outlined in the *Draft Final Science Strategy*.

Additional avian monitoring is being conducted through the establishment of MAPS stations along the lower Colorado River (D5). MAPS 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 2005, two MAPS stations were conducted at Cibola and Havasu NWR. Each station is conducted for at least five years to obtain site specific data. The Cibola Nature Trail site will have met that requirement by 2007, while the Havasu site is scheduled to be run through at

least 2009. The MAPS program will be evaluated for effectiveness in achieving system and post-development monitoring goals and objectives.

System Monitoring and Research of Covered Bat Species (D9) were initiated in 2006. In 2007, system monitoring will be conducted using the protocol developed in 2006. 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.

Monitoring and research will be conducted on covered small mammal species in 2007 to determine distributional range, population status, genetic differentiation, and habitat use (D10). These studies will be utilized to determine study plans and protocols for future system-wide monitoring that will be implemented in 2009. Data from these studies, along with Small Mammal Colonization of Restoration Sites (F3), will help determine habitat characteristics needed for the preparation of designs and for the management of created habitats in Section E.

Riparian plant communities were monitored throughout the project area using digital aerial imagery, obtained in August 2004, and classified using the Anderson and Ohmart classification system (Vegetation Type Mapping (D11)). These data are utilized when designing system monitoring programs, such as southwestern willow flycatcher surveys (D2, D3, D4), yellow-billed cuckoo surveys (D7), neotropical migratory bird point count transects (D6), and bat surveys (D9), as well as providing information for the Existing Habitat Maintenance (H1). It is anticipated that periodic updates of the vegetation classification maps will be accomplished at regular intervals throughout the MSCP timeframe.

**Post-Development Monitoring (Section F)**

Since 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 2005, post-development monitoring of habitat characteristics and avian use was conducted at several riparian restoration demonstration sites established under Reasonable and Prudent Alternative 14 of the 1997 BO. Protocols developed during these monitoring activities will be used to monitor prior to and after completion of LCR MSCP habitat creation projects.

Beal Lake Riparian and Marsh (E1), Pratt Agricultural Lease (E22), 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 2005 to acquire data necessary for riparian restoration planning. Future habitat creation projects will require restoration and monitoring plans prior to initiation.

Limited presence/absence surveys were conducted for small mammals at two restoration demonstration sites in 2005 under F3. Information obtained during these surveys will be used to develop monitoring protocols for future pre- and post- development monitoring, as well as 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), will be used to help prepare designs and manage created habitats in Section E.

In 2007, pre-development data will be collected for sites or phases proposed for habitat creation implementation such as under 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 E1, Ahakhav Tribal Preserve (E3), and E5. 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), and bats (F4). Since 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 so that pre-development monitoring will not be conducted at the same intensity for future agricultural conversion. Post-development monitoring will occur for these guilds of species to evaluate effectiveness in providing targeted covered species habitat requirements.

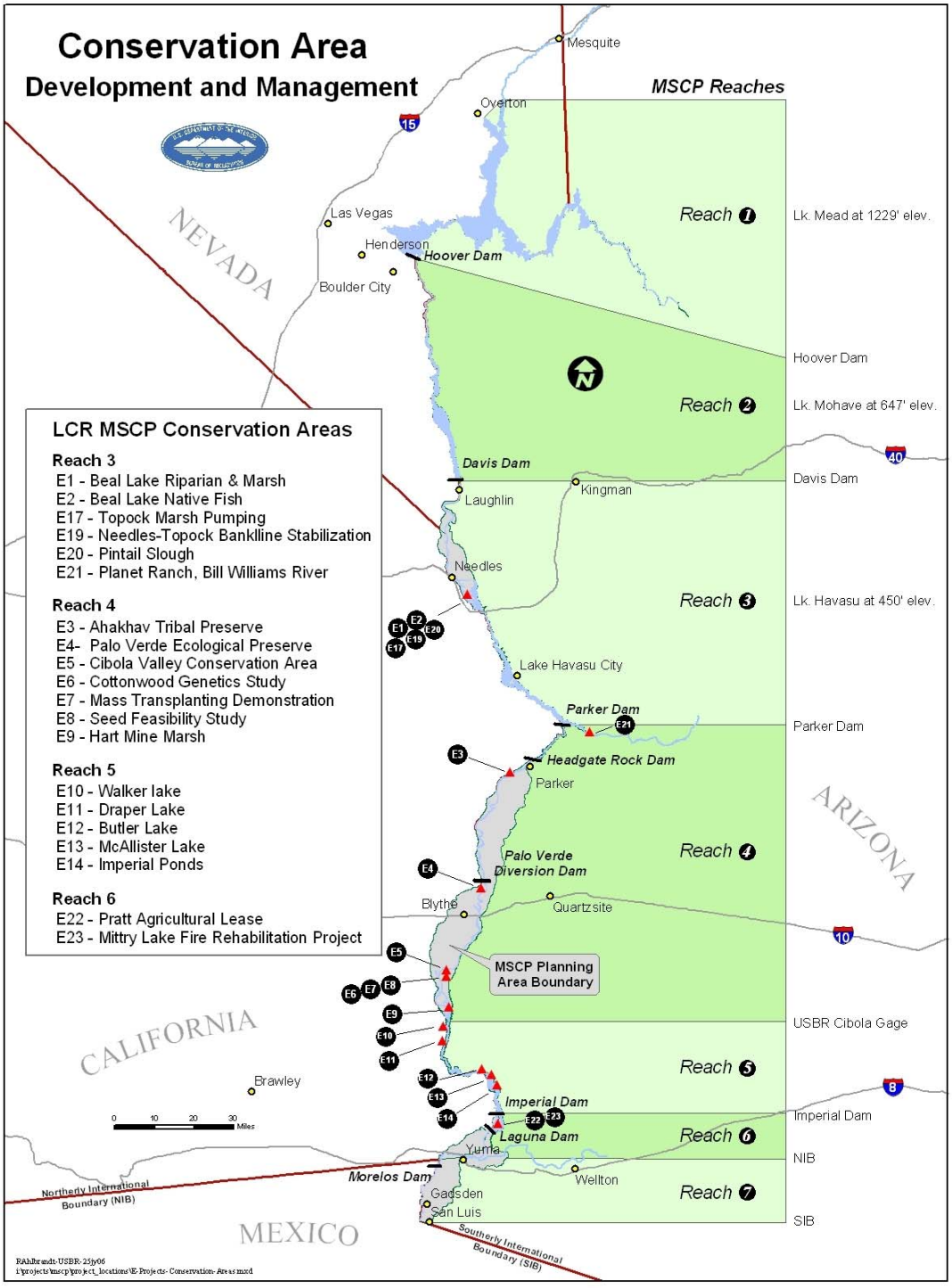
**Adaptive Management Program (Section G)**

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 *Draft Final Science Strategy* details the AMP process for the research and monitoring programs at the project and programmatic levels. A five-year planning cycle has been identified to allow for the receipt of new information, the analysis of that information, and the incorporation of the new information into the design or direction of future work tasks. The five-year planning cycle will allow for a review of past activities and the setting of priorities for the next five-year cycle.

Work tasks identified in FY06 and FY07, 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 FY07.

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
MSCP Reaches
Mesquite
Overton
Las Vegas
Henderson
Hoover Dam
Boulder City
NEVADA
Reach 1
Lk. Mead at 1229' elev.
Hoover Dam
Reach 2
Lk. Mohave at 647' elev.
Davis Dam
Kingman
Laughlin
Needles
Reach 3
Lk. Havasu at 450' elev.
Lake Havasu City
Parker Dam
Parker Dam
Headgate Rock Dam
Parker
ARIZONA
Palo Verde Diversion Dam
Reach 4
Blythe
Quartzsite
MSCP Planning Area Boundary
USBR Cibola Gage
CALIFORNIA
Reach 5
Brawley
Imperial Dam
Imperial Dam
Laguna Dam
Reach 6
Yuma
NIB
Morelos Dam
Wellton
Reach 7
Gadsden
San Luis
SIB
MEXICO
Northerly International Boundary (NIB)
Southerly International Boundary (SIB)
LCR MSCP Conservation Areas
Reach 3
E1 - Beal Lake Riparian & Marsh
E2 - Beal Lake Native Fish
E17 - Topock Marsh Pumping
E19 - Needles-Topock Bankline Stabilization
E20 - Pintail Slough
E21 - Planet Ranch, Bill Williams River
Reach 4
E3 - Ahakhav Tribal Preserve
E4- Palo Verde Ecological Preserve
E5 - Cibola Valley Conservation Area
E6 - Cottonwood Genetics Study
E7 - Mass Transplanting Demonstration
E8 - Seed Feasibility Study
E9 - Hart Mine Marsh
Reach 5
E10 - Walker lake
E11 - Draper Lake
E12 - Butler Lake
E13 - McAllister Lake
E14 - Imperial Ponds
Reach 6
E22 - Pratt Agricultural Lease
E23 - Mittry Lake Fire Rehabilitation Project
0 10 20 30 Miles
RAhlbrandt-USBR-25jy06
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## 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 a land cover type or cover types with the intention of being managed for and/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 both 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/or 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*. 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 that established primarily for native fish. Costs associated with development of the guidelines and their implementation is described in Backwater Site Selection (E15) and Conservation Area Site Selection (E16).

Conservation Areas that are being developed primarily for riparian and/or marsh land cover types such as Palo Verde Ecological Reserve (PVER) (E4) and Cibola Valley Conservation Area (CVCA) (E5) 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*. They are expected to include methods to cost effectively establish and manage planned land cover types while excluding growth of non-native plant species. Terrestrial restoration research project underway include Beal Lake Riparian and Marsh (E1), Ahakhav Tribal Preserve (E3), Cottonwood Genetics Study (E6), Mass Transplanting Demonstration (E7), Seed Feasibility Study (E8), Pratt Agricultural Lease (E22), and the Mittry Lake Fire Rehabilitation Project (E23).

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 non-native fish, maintaining water quality in isolated backwaters, and controlling non-native fish species. Backwater restoration research projects underway include Beal Lake Native Fish (E2), Butler Lake (E12), and McAllister Lake (E13).

Two additional significant requirements are incorporated into the LCR MSCP that are also reflected in Section E. First, the LCR MSCP assumed management of 300 acres of backwater created and dedicated to native fish under the 1997 BO which include Beal Lake Native Fish (E2), E13, and E14. Second, a commitment from the SIA 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.

In 2005, Conservation Area development included securing interest in land and water which would allow us to fulfill the obligations and commitments of the 2001 BO. Working with our partners, three Conservation Areas are being developed to fulfill the commitments of the SIA. The first Conservation Area (PVER) 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 1,000 acres of active agricultural lands is owned by Mohave County Water Authority and serviced by the Cibola Valley Irrigation and Drainage District. Completion of phases 1-3 on both PVER and CVCA will satisfy the cottonwood-willow land cover portion of the SIA. The third Conservation Area involves the expansion of Imperial Ponds (E14), scheduled for FY06, and is anticipated to fulfill the backwater creation portion of the SIA.

Hart Mine Marsh (E9), Walker Lake (E10), Draper Lake (E11), and Butler Lake (E12) were also identified as potential backwater creation projects to fulfill the obligations under the SIA, but are no longer necessary as E14 was selected for immediate implementation. Restoration at Hart Mine Marsh is directed specifically toward creation of marsh habitat. Walker and Draper lakes are now being evaluated using E15. Butler Lake is being evaluated as a restoration research project.

Creating and maintaining the appropriate habitats as dictated by the conservation measures present many 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 to 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/selection, research/ demonstration, and development/management. The following passages 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 many unforeseen factors that can contribute to greater costs and/or may limit success in habitat creation. As the program proceeds, this newly acquired knowledge will be incorporated into the site selection processes outlined in both E15 and E16. Both these processes incorporate scientific, logistical, and technical expertise to increase our knowledge, experience, effectiveness, and efficiency as we move toward the meeting challenges and fulfilling the goals of the LCR MSCP. Appropriate adaptations are being made through the Adaptive Management Process to properly address and apply newly acquired information. In this way, our program can more accurately assess development costs and success potential for future habitat creation projects.

### 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 evaluation of technologies to assist in meeting specific habitat requirements. E2, E4, E6, E8, and E12 all address specific research questions. In contrast, demonstration projects like E1, E3, E7, and E22 are those that assess a particular technique to determine if 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 species' specific performance criteria for created habitat. Until that time, these projects will be referred to as research or demonstration projects. Both of these types of investigations advance our knowledge and will be used to inform and guide future selection and implementation of habitat creation projects.

### 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 we essentially establish and manage for a snapshot in time and ecological succession. This may require actively creating disturbance to "reset" or maintain the 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 identification/selection, research/demonstration, and establishment/management of created habitats, information is gathered that affects and alters our understanding of these processes. This feedback in turn, may serve to modify our 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, 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 at 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.

# WORK TASKS
# SECTION A

# PROGRAM ADMINISTRATION

## Work Task A1: Program Administration

| FY05 Estimate | FY05 Actual | Total Expenditures Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $550,000 | $446,590 | $446,590 | $1,000,000 | $1,142,196 | $1,142,196 | $1,142,196 |

**Contact:** Lorri Gray, (702) 293-8555

**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 to ensure the completion of activities, in accordance with the Program Documents, required to implement the HCP.

**FY05 Accomplishments:** Established a new stand-alone LCR MSCP Office in the Lower Colorado Region of the Bureau of Reclamation reporting to the Regional Director. 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 FY05 work tasks, to offer Steering Committee members and FWS insight to Reclamation's activities to ensure a smooth transition into program implementation. Received approval from a Work Group for FY05 activities, which were in progress. Developed a report format for the LCR MSCP FY06 Work tasks and received approval from a Work Group, the Steering Committee and the FWS for the work to be accomplished. Developed a financial tracking system that allows users to track costs and audit expenditures. Initiated discussions with Resource Agencies in Arizona and California to begin developing partnerships needed to utilize and manage resources over the life of the program.

Reclamation LCR MSCP staff worked with Reclamation's External Affairs Office to establish and maintain the LCR MSCP Website. The Website provides information to Steering Committee members on upcoming meetings and events, and also provides a access to past meeting minutes and steering committee decisions. The Website also offers information on LCR MSCP program goals and accomplishment, including annual work plans and project-specific information. All completed LCR MSCP reports have also been uploaded on to the Website. The

LCR MSCP Website, as one of Reclamation's primary methods of communicating with the Steering Committee, provides a transparency to Reclamation's implementation activities and processes.

Also in FY05, Reclamation established a Farmers Advisory Group. This group, consisting of representatives from a number of irrigation districts, provides Reclamation with technical input on farming actions which improve the outcome of restoration actions.

**FY06 Activities:** The focus for program administration in FY06 is on the development of processes for the program. A draft site selection guidelines process, draft science strategy process, and draft database management options for managing data, were all developed and presented for comment to Steering Committee Work groups. It is anticipated that the site selection guidelines and science strategy will be finalized in FY06. In addition, a program decision document describing how in-kind credit for land and water would be determined was approved by the Steering Committee at its March 2006 meeting. The FY07 Implementation, Work Plan and Budget Report and FY05 Accomplishment Report were presented to the Steering Committee and a workgroup meeting was held in May to receive comments. Other activities focused on educating Steering Committee members on the program. A river tour of the program area was conducted over a three-day period in December 2005, with over 50 Steering Committee members participating. In FY06 Reclamation also focused on its internal processes with the development of a process to improve the issuing of grants and cooperative agreements. A Steering Committee workgroup meeting was also held in April 2006 to determine additional funding options available to the Program through the use of grants.

**Proposed FY07 Activities:** Work in FY07 will continue with 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 will be drafted and presented to the Steering Committee for review this year. It is anticipated that a number of technical meetings on fish augmentation and terrestrial work needs will be held in January 2007. Reclamation is currently working on a Memorandum of Understanding with the U. S. Corps of Engineers which will lay out a process to develop a strategy for 404 compliance for LCR MSCP covered actions. Reclamation is also meeting with state resource agencies to examine options for developing compliance for LCR MSCP covered activities and conservation actions under the Fish and Wildlife Coordination Act. Reclamation will be developing land use agreements and other mechanisms to secure resources.

**Pertinent Reports:** *Draft Implementation Report – Fiscal Year 2007 Work Plan and Budget, April 2006, Draft Implementation Report – Fiscal Year 2005 Accomplishments, April 2006, Draft Science Strategy, May 11, 2006, Draft Guidelines for the Screening and Evaluation of Potential Conservation Areas, May 15, 2006,* posted on the LCR MSCP website.

# WORK TASKS
# SECTION B

# FISH
# AUGMENTATION

## Work Task B1: Lake Mohave Razorback Sucker Larvae Collections

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $175,000 | $143,000 | $201,823 | $225,000 | $200,000 | $200,000 | $200,000 |

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY04 **Expected Duration:** FY55

**Long-Term Goal:** Develop and maintain razorback sucker broodstock and provide fish for augmentation program.

**Conservation Measures:** RASU3, RASU5, and RASU8

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

**Purpose:** To develop the razorback sucker (RASU) broodstock in Lake Mohave, maintain that broodstock, and harvest offspring for rearing as needed to accomplish the LCR MSCP Fish Augmentation Program.

**Connections with Other Work Tasks (past and future):** This Work Task was previously included in the FY04 Work Task as Electro-Fishing Boat Procurement (A3). 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 as Lake Mohave larvae.

**Project Description:** The RASU broodstock 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. Target capture is 60,000 to 75,000 larvae annually. Work includes biweekly helicopter surveys to locate spawning groups; nighttime 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 mid to late January. 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 station 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 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. The goal of the NFWG was to develop a population of 50,000 adult RASU. Various rearing techniques were tried between 1991 and 1993; in 1994 it was determined that capture of wild larvae from the lake and rearing them in captivity offered the best chance to successfully complete the program.

**FY05 Accomplishments:** Sixty thousand five hundred twelve (60,512) RASU larvae were captured from four areas of the lake: Nine Mile (30 percent), Tequila Cove (45 percent), Yuma Cove (24 percent), and Above Owl Point (1 percent).

**TABLE B1:** Distribution of the 60,512 wild razorback sucker larvae captured from Lake Mohave during 2005 (Number captured by month and zone).

| | 9-Mile | Tequila | Yuma | AOP | Total |
|---|---|---|---|---|---|
| **JAN** | 0 | 0 | 0 | 0 | 0 |
| **FEB** | 4,079 | 8,257 | 7,900 | 0 | 20,236 |
| **MAR** | 12,275 | 14,252 | 6,800 | 0 | 33,327 |
| **APR** | 1,750 | 4,543 | 135 | 521 | 6,949 |
| **TOTAL** | 18,104 | 27,052 | 14,835 | 521 | 60,512 |

**FY06 Activities:** Sixty-three thousand nine hundred seventy-five (63,975) RASU larvae were captured from four areas of the lake.

**Proposed FY07 Activities:** Target larvae collection of a minimum of 60,000 and a maximum of 75,000.

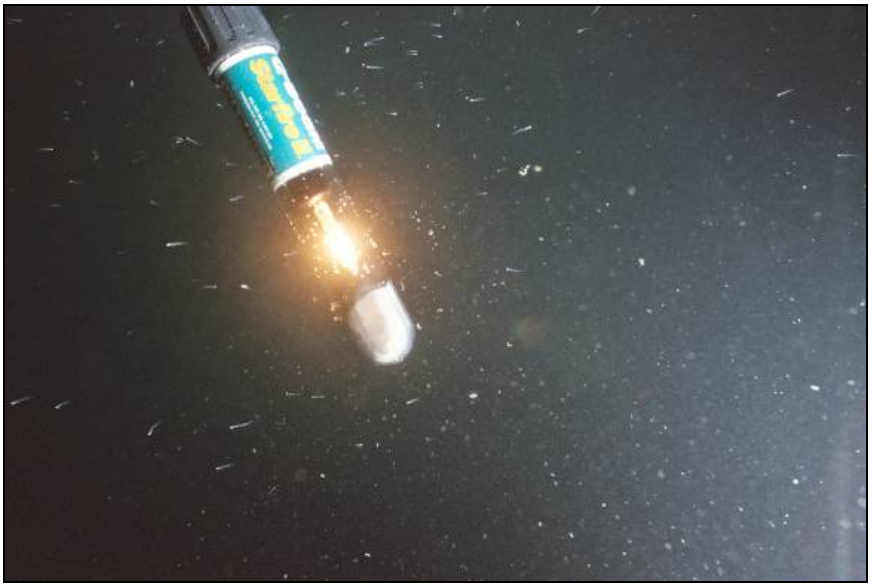


**Figure B1:** Razorback sucker larvae attracted to submerged light. (The translucent slivers are the 11 - 12 mm long larvae.)

## Work Task B2: Willow Beach National Fish Hatchery

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $170,000 | $180,000 | $180,000 | $200,000 | $225,000 | $225,000 | $225,000 |

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY05 **Expected Duration:** FY55

**Long-Term Goal:** Maintain and operate hatchery as an integral part of the LCR MSCP Fish Augmentation Program.

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

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

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

**Connections with Other Work Tasks (past and future):** Much of the activity at Willow Beach NFH is related to other Work Tasks in Section B, because most of the RASU and BONY being reared for the LCR MSCP Fish Augmentation Program spend some time at Willow Beach NFH. (For further information, please see the Fish Augmentation Plan, which provides an overview of the program and shows the inter-relationships between the various hatcheries). In addition, some of the fishery research actions described in Section C are ongoing at this facility, including Pen Rearing Tests (C9), Bonytail Rearing Studies (C11), and Humpback Chub Monitoring Program (C14).

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

1. Receive fish to be reared. Each year the facility is to receive wild RASU larvae collected from Lake Mohave by the NFWG. Also, the hatchery is to receive fingerling BONY (25-75 mm) from Dexter NFH.

2. Provide fish to other hatcheries. Each year Willow Beach NFH is to provide fingerling RASU to Bubbling Ponds SFH to be further reared and ultimately stocked into Reaches 3-5 of the lower Colorado River; provide fingerling RASU from wild-caught larvae to Dexter NFH for further rearing and eventual repatriation to Lake Mohave; and provide juvenile BONY to Achii Hanyo Rearing Facility for further rearing and ultimately for stocking into Reaches 3-5 of the lower Colorado River.

3. Rear up to 5,000 subadult RASU to 500 mm for repatriation to Lake Mohave. (These fish are being reared to accelerate brood stock development and provide test fish for C12.)

**Previous Activities:** This cold water trout hatchery began operation in 1962 to produce rainbow trout for recreational fishing. Between 1994 and 1997, FWS and Reclamation cooperatively added solar heating systems to the hatchery, converting 50 percent of its rearing capacity to warm-water fish production.

**FY05 Accomplishments:** Received 60,512 RASU larvae (B1) and reared to fingerling size. Twenty thousand (20,000) of these fingerlings were transferred to Bubbling Ponds SFH, and the remaining 38,000 placed in outside, solar-heated raceway loops (see Figure B2). During the year, 10,373 RASU from previous stocks (mostly from 2001 and 2002 year classes) were tagged and repatriated to Lake Mohave. Approximately 8,000 juvenile BONY were transferred to Achii Hanyo for rearing in open ponds. The majority of funds were for salary and consumable materials (fish feed, medicines, chemicals, etc.).

**Figure B2:** Solar heated raceway loop.

**FY06 Activities:** Received 63,975 RASU larvae from Lake Mohave; distributed fingerling RASU to Bubbling Ponds SFH and Dexter NFH for further rearing; rearing RASU juveniles for repatriation back to Lake Mohave and rearing fingerling BONY for future distribution to Achii Hanyo rearing facility.

**Proposed FY07 Activities:** Continue to rear RASU and BONY for LCR MSCP Fish Augmentation Program.

## Work Task B3: Achii Hanyo Rearing Station

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $50,000 | $50,000 | $100,000 | $25,000 | $50,000 | $100,000 | $100,000 |

**Contact:** Tom Burke, (702) 293-8711

**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:** Operate and maintain fish rearing facility and annually contribute bonytail (BONY) to the LCR MSCP Fish Augmentation Program for stocking into Reaches 3-5 of the lower Colorado River.

**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 BONY may be accomplished at this facility.

**Project Description:** This project has two specific actions:

1. The development of Achii Hanyo Rearing Facility as a grow-out site for BONY.
2. The rearing of BONY for release into Reaches 3-5 of the lower Colorado River.

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 Colorado River Indian Tribes Reservation, 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 over five years prior to being leased by the FWS. Five earthen ponds 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 and/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) are returned to a pond for continued rearing. New fish are then brought onto the station from Willow Beach NFH or Dexter NFH and the process is repeated. The annual Fish Augmentation Program production goal is 4,000 BONY subadults of 300 mm length for stocking into Reaches 4 and 5 of the lower Colorado River.

**Previous Activities:** The FWS and Reclamation have been cooperatively upgrading this facility through an interagency agreement initiated in FY04 which annually provides $50,000 for facility improvements. This agreement completes a commitment made under the SIA and will expire at the end of 2007.

**FY05 Accomplishments:** Purchased and erected new metal building (tank house) (Figures B3a and B3b) and installed new fiberglass fish tanks. Concrete slab was poured for new office, feed storage room, and restrooms (to be completed in FY06). A total of 6,275 BONY were tagged and stocked into Lake Havasu (Reach 3). This is the largest number of BONY produced in a single year at this facility. Production capacity has yet to be determined at this facility. Many of the recent upgrades result in improvements to the work environment (e.g. road gravel, shade structure, office space, and restroom).

**Figure B3:** New Tank House at Achii Hanyo Fish Rearing Facility under construction (Figure B3a, left and Figure B3b, right)

**FY06 Activities:** Complete construction of maintenance building, office, and bathrooms. Rear 4,000 BONY for release into Reaches 4 and 5.

**Proposed FY07 Activities:** Operate and maintain facility; rear 4,000 BONY for release into Reaches 4 and 5; and assess production potential for BONY.

## Work Task B4: Dexter National Fish Hatchery

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $142,000 | $122,000 | $122,000 | $110,000 | $125,000 | $125,000 | $125,000 |

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY05 **Expected Duration:** FY55

**Long-Term Goal:** Maintain fish rearing capability to provide razorback sucker and bonytail for the LCR MSCP Fish Augmentation Program.

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

**Location:** Off-River, Dexter, NM

**Purpose:** Operate and maintain fish rearing facility; annually contribute razorback sucker (RASU) and bonytail (BONY) to the LCR MSCP Fish Augmentation Program and maintain BONY broodstock through completion of 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, to Achii Hanyo Fish Rearing Facility, and Uvalde NFH. In addition, fish rearing research activities outlined in Work Tasks C10 and C11 may be conducted at Dexter NFH.

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

**Previous Activities:** FWS and Reclamation have past and ongoing interagency agreements to support rearing and research for RASU and BONY at Dexter NFH.

**FY05 Accomplishments: Bonytail.** FWS staff hand-stripped eggs and sperm from adult BONY females and males, producing 300,000 fry which were stocked into rearing ponds. After these grew to fingerling size, some 18,280 of these fingerlings were transferred to Willow Beach NFH. The remaining fingerlings were held for rearing. Reclamation and FWS staff tagged 556 juvenile BONY that were under the 300 mm target size and placed them into a pond to study tag retention. (These fish will be harvested in 2006.)

**Razorback Sucker.** During October 2005, FWS and Reclamation staff harvested a grow-out pond which had been stocked in March 2005 with 5,000 RASU from the 2001 year class of Lake Mohave fish. A total of 4,715 fish were harvested (94.3 percent survival over summer). Of these, 136 or 2.7 percent had grown to the target size of 350 mm. These 136 fish were PIT tagged and hauled to Lake Mohave and released. The remaining 4,579 RASU were returned to pond for continued grow-out. A subset of 556 individuals from these RASU was PIT tagged prior to being returned to the pond to evaluate growth, survival, and tag retention.

**FY06 Activities:** Maintain BONY broodstock; produce up to 75,000 fingerling BONY for distribution to Willow Beach NFH and Achii Hanyo Fish Rearing Facility; rear 500 to1,000 RASU, 50 cm in length, for repatriation to Lake Mohave; and rear 4,000 BONY, 300 mm in length, for distribution within Reaches 3. Analyze recapture of tagged fish and evaluate over-winter growth, survival and PIT tag retention.

**Proposed FY07 Activities:** Maintain BONY broodstock; produce up to 75,000 fingerling BONY for distribution to Willow Beach NFH and Achii Hanyo Fish Rearing Facility; rear 500 to 1,000 RASU, 50 cm in length, for repatriation to Lake Mohave; and rear 4,000 BONY, 300 mm in length, for distribution within Reaches 3-5.

**Pertinent Reports:** Study plan is available upon request for PIT tag retention work.

## Work Task B5: Bubbling Ponds Fish Hatchery

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $86,000 | $38,000 | $38,000 | $140,000 | $225,000 | $225,000 | $225,000 |

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY05 **Expected Duration:** FY55

**Long-Term Goal:** Maintain fish rearing capability and provide razorback sucker 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 described herein are closely related to Work Tasks B2, as Bubbling Ponds SFH receives early life stages of RASU from Willow Beach NFH. In addition, some of the fish rearing research activities outlined in Work Tasks C10 will be conducted at Bubbling Ponds SFH. Funds ($60,000) were reallocated to new Work Task B10 following approval from Steering Committee at the April 2006 meeting, and with concurrence of FWS.

**Project Description:** Bubbling Ponds SFH is managed and operated by AGFD. This is a warm-water rearing facility supplied by a continuous, year-round, 6 cubic feet per second spring flow of 68 degree Fahrenheit water. The facility has 10 acres of production ponds, a work shop, storage shed, a small laboratory, and sufficient fish distribution equipment to meet the delivery requirements for the LCR MSCP. Program funds will provide for salary, fish feed and supplies, facility operation and maintenance, and delivery of fish. Production goals are to annually produce 12,000 RASU of 300 mm length for release to Reaches 3-5 of the lower Colorado River.

**Previous Activities:** Reclamation and AGFD have cooperatively worked to upgrade and renovate this warm water fish rearing facility since 1998 and plan to continue these actions into the future.

**FY05 Accomplishments:** Received 20,000 RASU fingerlings from Willow Beach NFH; 4,814 RASU of 330-360 mm in length from previous production years were reared, tagged, and repatriated to the lower Colorado River (below Parker Dam); 4,177 razorback juveniles of 250-300 mm in length were on station for release into the lower Colorado River during spring 2006; and 18,800 RASU of 150-200 mm in length are on station being reared for release in 2006/2007. In addition to salary for this work, funds were expended to purchase feed, nets and materials for

live-trapping river otters, and for the contract for a professional trapper to assist with otter removal.

**FY06 Activities:** Operate and maintain facility; receive up to 25,000 fingerling RASU from Willow Beach NFH; rear 12,000 RASU for delivery to Reaches 3-5 of lower Colorado River; and initiate facility improvement projects needed for sustained production.

**Proposed FY07 Activities:** Operation and maintenance of facility; receive up to 25,000 fingerling RASU from Willow Beach NFH; rear 12,000 RASU for delivery to Reaches 3-5 of lower Colorado River; and initiate facility improvement projects needed for sustained production.

**Pertinent Reports:** Scope of work for facility improvement projects is being developed and will be available upon request.

**Figure B5:** Fish harvest at Bubbling Ponds State Fish Hatchery. Pond Harvest (top left); sorting (top right); Tagging (bottom left); and loading truck for stocking (bottom right).

## Work Task B6: Lake Mead Fish Hatchery

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $50,000 | $32,000 | $32,000 | $45,000 | $55,000 | $55,000 | $55,000 |

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY05 **Expected Duration:** FY16

**Long-Term Goal:** Operate and maintain fish rearing facility to provide razorback sucker 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 Biological and Conference Opinion subsumed under the LCR MSCP; 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 Work Tasks C13 and B11. Razorback sucker (RASU) larvae are captured from Lake Mead as part of the Lake Mead Razorback Sucker Study (Work Task C13) and reared at Lake Mead SFH. Once fish reach subadult size, they will be transferred to grow-out ponds at Overton WMA to complete the rearing process (Work Task 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 native fishes. Reclamation, Southern Nevada Water Authority (SNWA), and NDOW are cooperatively rearing RASU larvae captured from Lake Mead for future repatriation back to the lake. Funds from this Work Task will provide staff, equipment, feed and chemicals to rear these fishes and to complete ISG/SIA requirements.

In addition, space is available as a contingency to rear RASU for fish augmentation program needs for the lower Colorado River (Reaches 3-5). This additional rearing capacity is needed for years six through ten (FY11-FY16) of the LCR MSCP, 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.

**FY05 Accomplishments:** The new native fish room was plumbed and outfitted with fiberglass tanks (see Figure B6) and was used for rearing approximately 4,000 RASU larvae that were captured from Lake Mead.

**Figure B6:** New tanks installed in Lake Mead SFH native fish room.

**FY06 Activities:** Continue to rear RASU from 2005 year class; receive and rear up to 5,000 juvenile RASU from 2006 year class (These larvae were captured from both Lake Mead and Lake Mohave during March and April 2006.)

**Proposed FY07 Activities:** Rear RASU from larvae to subadult, and transfer subadult RASU to ponds at Overton WMA.

## Work Task B7: Lake Side Rearing Ponds

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $250,000 | $230,000 | $230,000 | $200,000 | $150,000 | $150,000 | $150,000 |

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY05 **Expected Duration:** FY16 decision point

**Long-Term Goal:** Maintain fish rearing capability; provide razorback sucker and bonytail for the LCR MSCP Fish Augmentation Program; 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 broodstock development.

**Connections with Other Work Tasks (past and future):** Activities described herein are related to Work Tasks 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 Work Tasks 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' vertical elevation range, filling to elevation 645.5' msl by mid-May and lowering to an elevation of 630.5' 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 ten such sandbars which have ponds behind them when the lake is full. Reclamation and its partners in the Lake Mohave Native Fish Work Group have been using these lakeside ponds since 1993 as rearing and grow-out areas for RASU and BONY (see Figure B7). 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 26,000 RASU have been reared and repatriated to Lake Mohave. The ponds have also been used to grow-out BONY; one of these ponds, North Nine Mile, is the only site where BONY juveniles were successfully reared from 50-250 mm during a single growing season.

**FY05 Accomplishments:** There were 1,691 RASU reared in nine lake side ponds and repatriated to Lake Mohave. These ponds were Yuma Cove, Nevada Larvae, Arizona Juvenile, Willow Cove, Nevada Egg, North Nine-mile, North Chemehuevi, Dandy Cove, and South Sidewinder. The average size of these fish was 375 mm and some fish were as large as 450 mm.

**FY06 Activities:** Approximately 2,000 juvenile RASU were stocked in March 2006 into eight of the same ponds used in 2005. Yuma Cove was not stocked, as it had not been completely harvested and some of the RASU from 2005 over-wintered in Yuma Cove. These fish spawned and produced numerous larvae, of which 4,500 were captured and transferred to Willow Beach NFH (see Work Task B1). Growth and survival of larvae and fingerlings that remain in the pond will be monitored throughout the summer. Routine monitoring and fertilization activities will be accomplished in 2006.

**Proposed FY07 Activities:** Ponds will be stocked with 2,000 to 4,000 juvenile RASU which will be monitored throughout the growing season. In addition, some ponds may be stocked with BONY to evaluate growth and survival.


**Figure B7:** Lakeside Rearing Ponds used for razorback sucker and bonytail grow-out.

## Work Task B8: Fish Tagging Equipment

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $75,000 | $88,700 | $143,462 | $45,000 | $75,000 | $75,000 | $75,000 |

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY04 **Expected Duration:** FY16 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 lower Colorado River by the LCR MSCP will be marked for identification purposes in order 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 described herein are related to all Work Tasks which 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 over 1.2 million native fish into the lower Colorado River over the 50-year term of program. Reclamation currently plans to mark these fish in order to assess distribution and survival, and to provide for effective research and monitoring. This information is required for decision making under the adaptive management program.

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 actions.

Under conservation measure RASU3, LCR MSCP will implement an experimental augmentation of 24,000 subadult RASU each year for 5 years (120,000 total) and conduct intensive follow-up monitoring. Under conservation measure BONY3, LCR MSCP will implement an experimental augmentation of 8,000 subadult BONY annually in the Parker-Imperial river reach (Reaches 4 and 5) for 5 consecutive years within the 50-year program (40,000 total augmentation) 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 released through augmentation stockings. This decision is expected to be made in FY17.

**Previous Activities:** Fish released into the lower Colorado River 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 fishes 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.

**FY05 Accomplishments:** Twenty thousand (20,000) PIT tags were purchased during FY05 at a cost of $70,000. A total of 19,332 BONY and RASU were tagged and released. In addition, six FS-2001ISO transceivers (scanners), one 11" circular antenna, and one 24" square antenna were purchased during the year at a cost of $18,700.

**FY06 Activities:** A decision was made within the Native Fish Work Group to begin use of the newest PIT tag technology. This requires a change from the old 400 kHz and 125 kHz frequency tags to the new 132.5 kHz frequency tags. These new tags have a significantly greater detection range. The 132.5 kHz PIT tags, tagging needles, and new tag readers will be purchased in quantity sufficient to mark RASU and BONY utilized in the LCR MSCP program.

**Proposed FY07 Activities:** Acquire tags, tagging equipment, and tag detection equipment sufficient to mark and monitor RASU and BONY released through the LCR MSCP Fish Augmentation Program. The FY07 cost estimate reflects an increase due to the cost of equipment and new equipment/technology.

## Work Task B9: Boulder City Wetland Ponds

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $35,000 | $3,800 | $3,800 | $35,000* | $0 | $0 | $0 |

*Funds reassigned to Work Task B11 (Overton WMA) at April 2006 Steering Committee Meeting

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY05 **Expected Duration:** Closed in FY06

**Long-Term Goal:** Develop and maintain off-site rearing areas for grow-out of razorback sucker to augment production at state and federal hatcheries and to provide areas for species research.

**Conservation Measures:** RASU3, RASU4, and RASU6

**Location:** Off-River, Boulder City, NV

**Purpose:** Provide additional rearing and grow-out areas for RASU which allow juvenile fish to adapt to a more natural feeding regime, and to experience ambient environmental conditions.

**Connections with Other Work Tasks (past and future):** In FY05 this work was related to Work Tasks B1, B2, B6, and C13. The FY06 funds were reallocated to Work Task B11.

**Project Description:** The Boulder City Wetland Ponds were used to grow-out juvenile RASU for repatriation to Lakes Mead and Mohave. Typically, fish were introduced as fingerlings in the spring and harvested in the fall. Following harvest, the ponds were drawn down for weed control. A brush fire during the fall of 2004 destroyed the liner of pond #4. Plans were made with the City of Boulder City to replace the liner during 2005. In the summer of 2005 mosquitoes bearing West Nile virus were captured around these ponds. Following meetings with the City, it was concluded that the threat of West Nile virus was too great, and as the ponds were adjacent to Veterans' Park and numerous ball fields, the City opted to discontinue the program.

**Previous Activities:** The Boulder City Wetland Ponds were first developed in 1996 as a cooperative effort to polish treated effluent (gray water) for use at Veterans' Memorial Cemetery and Veterans' Park. Razorback sucker fingerlings were first introduced into the ponds in June 1997. Between 1997 and 2004 over 10,000 RASU fingerlings were reared to target size of 300 mm and returned to Lake Mohave.

**FY05 Accomplishments:** Pond #1 was used to hold juvenile RASU from Lake Mead. Repair work for pond #4 was postponed until winter 2005/2006 due to availability of City maintenance staff.

**FY06 Activities:** None. At the request of the City of Boulder City, fish rearing activities at these ponds were terminated. After acquiring Steering Committee and FWS concurrence, project funds were reassigned to Work Task B11.

## Work Task B10: Uvalde National Fish Hatchery

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $60,000 | $260,000 | $60,000 | $60,000 |

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY06 **Expected Duration:** FY16

**Long-Term Goal:** Maintain fish rearing capability to provide razorback sucker and bonytail for the LCR MSCP Fish Augmentation Program.

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

**Location:** Off-River, Uvalde, TX

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

**Connections with Other Work Tasks (past and future):** This new Work Task was added in April 2006 following approval of Steering Committee, with concurrence from FWS. Funds were allocated to this Work Task from Work Task B5. This work is related to Work Task B4, as RASU and BONY for Uvalde NFH will be supplied by Dexter NFH. The work is also related to Work Tasks B1 and B2, as Uvalde NFH may also rear RASU for repatriation to Lake Mohave. Finally, the work is related to Work Tasks 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 warm water fish culture facility established in southwest Texas in 1934. The facility has 47 ponds totaling over 50 surface acres for fish production. Water is supplied by two deep wells which provide 72 degree Fahrenheit water year round. A third, undeveloped well (Wilson Well) will be available once developed. 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 will share costs for upgrading water supply systems (rehab Burkett Well and develop Wilson Well) and for rearing native fishes. The LCR MSCP will utilize the facility to assess rearing capacity for BONY; rear RASU for broodstock development at Lake Mohave; and conduct research on fish hauling and transportation (Figures B10a, B10b, B10c, and B10d).

The LCR MSCP has a requirement to stock 24,000 RASU and 12,000 BONY each year for five consecutive years. This is beyond the current capacity of the LCR MSCP Fish Augmentation Program. However, as described in the introduction to Section B, Reclamation is working with LCR MSCP partners to expand native fish rearing capacity by FY10 to implement the

accelerated augmentation stockings. Uvalde NFH is one of the facilities which may provide additional rearing capacity.

**Previous Activities:** Prior to being shut down for renovation, Uvalde NFH had fifteen years experience rearing native fishes, including Comanche Springs pupfish, paddlefish, Yaqui catfish and fountain darters. During the 1990's, 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 rehab of the Spurgeon Well, one of two deep wells developed on station.

**FY05 Accomplishments:** This is a new start in FY06.

**FY06 Activities:** During April 2006, BONY and RASU were brought on station from Dexter NFH for initial rearing; both groups of fishes were from hand-spawning of broodstock on station at Dexter NFH. The goal is to assess the growth rate and rearing capacity of Uvalde NFH for these species. Fish are monitored monthly for growth and this will continue through November 2006. The plan is to move these fish inside during the coldest three months of the year (December through February). Rehabilitation of the Burkett Well (replace pump, column pipe, and well head) will be completed, and preliminary work (parts list, selection of installer, etc.) for development of the Wilson Well will be initiated.

Reclamation initially planned to utilize Uvalde NFH to develop a backup brood stock of BONY. Reclamation and FWS will first evaluate BONY growth and survival at Uvalde NFH before making any long-term commitment to broodstock development. During September 2006, RASU fingerlings from Willow Beach NFH (originally captured as larvae from Lake Mohave) will be transferred to Uvalde NFH via Dexter NFH for rearing to 500 cm (20 inches) for replacement broodstock. This need only developed in April 2006 following decision by Lake Mohave NFWG to increase target size of RASU.

**Proposed FY07 Activities:** Continue rearing RASU and BONY from the 2006 year class; receive RASU and BONY young (2007 year class) from Willow Beach NFH and Dexter NFH for rearing; evaluate growth and survival to date; and calculate production loads and schedules for future work. Develop the Wilson Well (new pump, well-head, motor, backup power supply, and alarm system). Design and implement research investigation regarding fish hauling techniques for BONY.

**Pertinent Reports:** Scope of Work for Interagency Agreement between Reclamation and FWS will be available following execution of the agreement.

**Figure B10a:** Reclamation and FWS staff inspecting lined rearing pond at Uvalde NFH.

**Figure B10b:** Unlined rearing ponds at Uvalde NFH.

**Figure B10c:** Well house and power head for Burkett Well (to be refurbished).

**Figure B10d:** Uvalde NFH, Wilson Well (pipe in center) to be developed in FY07.

## Work Task B11: Overton Wildlife Management Area

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $35,000 | $75,000 | $75,000 | $45,000 |

**Contact:** Tom Burke, (702) 293-8711

**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; 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 Steering Committee and FWS. Funds were reallocated from Work Task B9. This work is closely related to Work Task 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 ISG/SIA 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, Nevada. The Overton WMA was established in 1953 under a joint agreement with Reclamation and National Park Service (NPS). The wildlife area is managed solely for fish and wildlife and their habitats and has limited public access. The Overton WMA covers over 17,000 acres, and includes three primary waterfowl management ponds, all of which are available for native fish culture.

The LCR MSCP project activities planned for this site are the rearing of RASU for repatriation to Lake Mead in order to complete the ISG/SIA BO requirements set out in 2001. Fish will be transferred to Overton WMA ponds from Lake Mead SFH, another Nevada Division of Wildlife facility.

After these ISG/SIA 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 50 cm for repatriation to Lake Mohave in order to maintain the adult broodstock there; and rearing of RASU for

Reaches 3-5 of the lower Colorado River to affect accelerated stocking needs during program years FY11-FY16. Finally, Overton WMA may provide opportunities to conduct species research which may be required by LCR MSCP's adaptive management program.

**Previous Activities:** This is a redirection of funds originally planned for pond renovations at Boulder City Wetland Ponds. Concerns over West Nile Virus resulted in the Boulder City ponds no longer being available for native fish work. These funds are now being used to expedite a project planned for FY2007 in the Overton WMA located in Clark County, Nevada, at the upper end of Lake Mead.

**FY05 Accomplishments:** N/A

**FY06 Activities:** Planned activities for FY06 include the rehabilitation of the water supply system for Upper and Middle ponds. These ponds receive water from the Muddy River. During spring 2005, flooding of the Muddy River damaged the inflow works and water supply system to these ponds. Repair and replacement of canal flumes, valves and gates is required. Also planned for FY06 is the draining of Upper Pond in late summer following the waterfowl nesting season in order to repair lateral dikes and outlet structures. Upper Pond will be renovated during the drawdown to remove any non-native fishes in anticipation of receiving RASU from Lake Mead State Fish Hatchery in FY07.

**Proposed FY07 Activities:** The Overton WMA will receive RASU from Lake Mead (supplied from Lake Mead SFH) and begin grow-out activities in Upper Pond. Work will continue on the repair and maintenance of water supply canals to Middle Pond, and similar activities for the water supply to Lower Pond will be started. Middle Pond will be drained and renovated following the waterfowl nesting season and readied to receive RASU in FY08.

**Pertinent Reports:** Scope of Work will be available following award of an agreement.

**Figure B11a:** Upper Pond, Overton WMA (looking west)

**Figure 11b:** Middle Pond, Overton WMA (looking southwest).

**Figure B11c:** Lower Pond, Overton WMA (Looking north)

**Figure B11d:** Damaged water supply canal to Middle Pond.

# WORK TASKS
# SECTION C

# SPECIES
# RESEARCH

## Work Task C1: Brown-Headed Cowbird Trap Assessment

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $80,000 | $52,464 | $52,464 | $85,000 | $0 | $0 | $0 |

**Contact:** John Swett, (702) 293-8574

**Start Date:** FY05 **Expected Duration:** FY06

**Long-term Goal:** Species research to evaluate brown-headed cowbird (BHCO) control program.

**Conservation Measures:** MRM4

**Location:** Alamo Lake State Wildlife Area (SWA), Bill Williams River NWR, AZ

**Purpose:** Assess the effectiveness of BHCO trapping on southwestern willow flycatcher (SWFL) and other neotropical birds' productivity and nest success.

**Connections with Other Work Tasks (past and future):** This work task was previously listed as C2 in FY05 Draft Work Tasks. This study will provide information necessary for managing created habitats proposed under Work Tasks outlined in Section E that target covered species susceptible to BHCO parasitism. Additional BHCO trapping studies are being conducted at SWFL life history study sites being conducted under Work Task D2.

**Project Description:** BHCO control may become necessary to reduce parasitism rates for covered species, especially SWFL. The FWS issued a BO on the SIA in 2001, which calls for initiation of a BHCO trapping program under Reasonable and Prudent Measure 5 (RPM5) if:

1. Nest monitoring of SWFL nests found between Parker and Imperial Dams show a 40 percent or greater parasitism rate in any one year or averages more than 20 percent in any two or more consecutive years.
2. No nesting covered species can be detected at occupied sites due to poor sub-population stability.

In addition, the LCR MSCP states that research be conducted to determine and address the effects of BHCO parasitism on reproduction of covered species. In order to effectively and efficiently conduct BHCO control, trapping effectiveness needs to be determined. Post-trap monitoring will be conducted until BHCO population numbers and/or parasitism rates reach pre-trap numbers. These data will enable Reclamation to determine potential BHCO trapping intervals to protect LCR MSCP covered species.

**Previous Activities:** From 1998-2001, Reclamation implemented a BHCO control program in accordance with the 1997 Biological and Conference Opinion. BHCO traps were placed at

Alamo Lake SWA, Bill Williams River NWR, and Havasu NWR (1998 only). Trapping was suspended after the 2001 breeding season and post-trap monitoring was implemented in 2002 to measure the effectiveness of the control program and to determine when BHCO populations, parasitism rates, and host nest success reached pre-trap levels. Data obtained will help determine trapping interval for future BHCO control programs.

**FY05 Accomplishments:** Activities in FY05 included conducting a series of point counts to document BHCO and host species abundance in areas within Alamo SWA and the Bill Williams River NWR where BHCO trapping occurred from 1998-2001. Host species nests were monitored, when detected, and parasitism rates and nest success recorded. Data was analyzed to determine any change in BHCO abundance, BHCO/host species ratios, and nest success.

Data collected during the BHCO control follow-up study at Alamo Lake SWA and Bill Williams River NWR showed an increase in BHCO abundance through 2005. In addition, the number of SWFL nests detected decreased in 2005. Parasitism rates and BHCO/host ratios increased through 2004, causing a decrease in host nest success. Parasitism rates and BHCO/host ratios decreased slightly during the 2005 breeding season. Throughout the study, BHCO parasitism rates for SWFL nests found at Alamo Lake SWA and Bill Williams River NWR remained relatively low.

Results from the 2005 breeding season indicated that BHCO parasitism rates remained relatively low four years after trapping was halted. An additional year of data collection was proposed to see if BHCO abundance and parasitism rates approached pre-trap numbers five years after cession of BHCO control.

**FY06 Activities:** Point counts are being conducted at Alamo Lake SWA and Bill Williams River NWR to record density of cowbirds and passerine species susceptible to cowbird parasitism. Monitoring nests of passerine species susceptible to cowbird parasitism, including the SWFL, is being conducted throughout the breeding season.

**Proposed FY07 Activities:** This Work Task will be closed in FY06.

**Pertinent Reports**: *Brown-headed Cowbird Control Program: Results of Follow-up Monitoring-Years 2002-2005* will be posted on the LCR MSCP website.

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

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $25,000 | $11,000 | $11,000 | $11,000 |

**Contact:** John Swett, (702) 293-8574

**Start Date:** FY06 **Expected Duration:** FY30

**Long-term Goal:** Species research

**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 that are beyond the permit requirements of the Clark County MSHCP. Funding may be advanced for up to five years, depending on availability, to keep administrative costs at a minimum.

**FY05 Accomplishments:** This is a new start in FY06.

**FY06 Activities:** Funds are anticipated to be transferred to the NPS for implementation. Initially the HCP was interpreted to require $20,000 per year; however, after reviewing language in cost feeder tables, it was determined that, in fact, only $10,000 per year is required. A report will be provided to Reclamation summarizing activities completed with this funding.

**Proposed FY07 Activities:** It is anticipated that funds will be provided to the NPS for implementation.

**Pertinent Reports:** Scope of Work between Reclamation and NPS will be available upon request.

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

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $50,000 | $47,847 | $47,847 | $100,000 | $15,000 | $15,000 | $15,000 |

**Contact:** John Swett, (702) 293-8574

**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,LEBI1, BLRA1, BLRA2, YBCU1, YBCU2, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, FTHL1, FTHL2, FLSU1, MNSW1, MNSW2, CLNB1, CLNB2, PTBB1, PTBB2, CRTO1, CRTO2, CRTO3, LLFR1, LLFR2, and LLFR3

**Location:** System-wide

**Purpose:** Assess existing knowledge for each LCR MSCP covered species to determine research needs and habitat requirements for future habitat creation projects.

**Connections with Other Work Tasks (past and future):** In Draft FY05 Work Tasks, this work was identified under Development of Backwater Rating Criteria (C3). Information collected during this literature review will be used to develop future research 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 profiles must be developed. Extensive literature searches will be conducted to accumulate existing knowledge on each covered species. Species profiles will be written, including known habitat requirements and management concerns. Data gaps will be identified in order to direct covered species research priorities.

**FY05 Accomplishments:** FY05 activities were designed to provide information for the development of backwater rating criteria for LCR MSCP covered species. These data and models will be 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 razorback sucker, bonytail, and flannelmouth sucker included sections on distribution, historical habitat modifications, systematics and morphomethrics, 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.

**FY06 Activities:** Literature searches, data compilation, and species profile development for the remainder of the 26 LCR MSCP covered species and five evaluation species will be completed in FY06. Research priorities will be determined as data gaps are identified. Data gleaned from the species accounts completed in FY05 are being used to design a backwater ratings system to evaluate and prioritize backwater and marsh restoration for the LCR MSCP through the site selection process (Work Task E15 and E16).

**Proposed FY07 Activities:** An annual review of the LCR MSCP and other conservation programs will occur and pertinent information will be incorporated into existing species profiles.

**Pertinent Reports:** *Colorado River Backwaters Enhancement: Species Profiles Report* is posted on the LCR MSCP website.

## Work Task C4: Relict Leopard Frog

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $15,000 | $11,000 | $11,000 | $11,000 |

**Contact:** John Swett, (702) 293-8574

**Start Date:** FY06 **Estimated Duration:** FY15

**Long-term Goal:** Species Research and Conservation Measures

**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 ten years, will be contributed to the Relict Leopard Frog Conservation Team to implement planned, but unfunded, conservation measures. Funding may be advanced for up to 5 years, depending on availability, to keep administrative costs at a minimum.

**FY05 Accomplishments:** This is a new start in FY06.

**FY06 Activities:** It is anticipated that funds will be transferred to the NPS for implementation. A report will be provided to Reclamation summarizing activities completed with this funding.

**Proposed FY07 Activities:** Funds will be provided to the NPS for implementation.

**Pertinent Reports:** Scope of Work between Reclamation and NPS will be available upon request.

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

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $90,000 | $90,000 | $90,000 | $90,000 |

**Contact:** Bill Wiesenborn, (702) 293-8699

**Start Date:** FY06 **Expected Duration:** FY09

**Long-Term Goal:** Species Research

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

**Location:** Palo Verde Ecological Reserve (E4) and Cibola Valley Conservation Area (E5)

**Purpose:** Evaluate insect populations at PVER and CVCA by varying irrigation and fertilization rates.

**Connections with Other Work Tasks (past and future):** This Work Task developed from Southwestern Willow Flycatcher Prey Base Study (C20). This previous study identifies insects and spiders utilized as food source by the SWFL. This new study also parallels Insect Population Biology in Riparian Restoration Sites (C6). C6 currently is examining source habitats (riparian, upland, or aquatic) of insects eaten by riparian birds covered by the LCR MSCP, and is developing a method for monitoring their populations. Plant water and nitrogen contents also likely affect populations of MacNeill's Sootywing being investigated in Survey and Habitat Characterization of MacNeill's Sootywing (C7). The same laboratory procedure will be used to measure plant nitrogen in C5 and C7. Information obtained in these studies will be used in the design and implementation of future habitat creation projects detailed in Section E.

**Project Description:** Eight species of birds (southwestern willow flycatcher, yellow-billed cuckoo, gilded flicker, gila woodpecker, vermilion flycatcher, bell's vireo, sonoran yellow warbler, summer tanager) and four species of bats (western red bat, western yellow bat, California leaf-nosed bat, pale Townsend's big-eared bat) covered in the LCR MSCP consume insects. Creating and maintaining habitat for these species requires providing an adequate supply of insects for food. This may be more difficult at the LCR MSCP habitat creation sites being developed, because riparian vegetation is being planted in non-riparian farmland (i.e. where water tables are lowered and spring flood flows are absent). 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.

Insect densities will be estimated on different species of restored plants grown under a variety of 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. Field work will be performed at the LCR MSCP habitat creation sites listed above.

**FY05 Accomplishments:** This Work Task is a new start in FY06.

**FY06 Activities:** A literature review is being conducted on the effects of plant water and nitrogen contents on insect populations. Information obtained from the literature review is being used to develop a method for measuring total nitrogen in plant tissue.

**Proposed FY07 Activities:** Field work will be conducted at CVCA when plants become large enough to support insect populations. We anticipate using plant species (*Salix exigua, Salix gooddingii, Populus fremontii*), and varying irrigation and fertilizer treatments.

**Pertinent Reports:** Study design is available upon request.

## Work Task C6: Insect Population Biology in Riparian Restoration Sites

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $126,000 | $30,000 | $40,000 | $40,000 |

**Contact**: Bill Wiesenborn, (702) 293-8699

**Start Date:** FY06 **Expected Duration:** FY09

**Long-Term Goal:** Species Research

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

**Location:** Topock Marsh (E17), Beal Lake Riparian and Marsh (E1), Palo Verde Ecological Reserve (E4), Cibola Valley Conservation Area (E5), and AZ/CA.

**Purpose:** Develop a simple to use monitoring method that is specific to insect species eaten by LCR MSCP covered birds and bats.

**Connections with Other Work Tasks (past and future):** This Work Task developed from Southwestern Willow Flycatcher Prey Base Study (C20). This previous study, identifies insects and spiders utilized as a food source by the SWFL. Abiotic factors affecting insect populations in riparian restoration sites is being studied under Work Task C5.

**Project Description:** Eight species of birds (southwestern willow flycatcher, yellow-billed cuckoo, gilded flicker, Gila woodpecker, vermilion flycatcher, Bell's vireo, Sonoran yellow warbler, summer tanager) and four species of bats (western red bat, western yellow bat, California leaf-nosed bat, pale Townsend's big-eared bat) covered in the LCR MSCP consume insects. Creating and maintaining habitat for these species requires providing an adequate supply of insects for food. This may be more difficult at the LCR MSCP habitat creation sites being developed, because riparian vegetation is being planted in non-riparian farmland (i.e. where water tables are lowered, and spring flood flows are absent). Growing plants will not by itself guarantee insect abundances large enough to feed and support bird and bat populations. In addition, earlier work determined 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 their abundances, and developing methods for monitoring their populations.

The initial objectives of this project are to:

1. Determine host plant species for insects utilized as a food source by LCR MSCP vertebrates.

2. Recommend activities for increasing their abundances.
3. Develop a method for monitoring their populations.

Sources of insects will be determined by sampling and identifying populations. Activities for increasing their 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.

**FY05 Accomplishments:** This is a new start in FY06.

**FY06 Activities:** A preliminary study, comparing trap designs (attractant colors) for monitoring riparian insects in different restored plant communities at Beal Lake (Havasu NWR), has been completed. Reclamation and University of California, Davis are identifying flower-visiting insects eaten by SWFL at Topock Marsh to determine their sources. From these data recommendations will be made for increasing populations of these insect species at Topock Marsh and at LCR MSCP habitat creation sites.

**Proposed FY07 Activities:** Continue testing of insect-monitoring traps at CVCA. Continue determining (from literature) sources of flower-visiting insects eaten by birds and developing recommendations for increasing their abundances. Additional work determining insects other than those that visit flowers, such as aquatic insects, that are utilized as a food source by birds will also be performed.

**Pertinent Reports:** Study plan available upon request.

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

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $150,000 | $160,000 | $160,000 | $80,000 |

**Contact:** Bill Wiesenborn, (702) 293-8699

**Start Date**: FY06 **Expected Duration:** FY09

**Long-Term Goal:** Species research

**Conservation Measures**: MNSW1 and MNSW2

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

**Purpose:** Survey the butterfly's distribution along the lower Colorado River and determine its habitat requirements.

**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 detailed in Section E.

**Project Description:** The species' historical range included the lower Colorado River and near the river along its tributaries in southeastern California, western Arizona, southern Nevada, and southern Utah. The species was first described along the California side of the Parker Strip.

Surveys will be conducted for the insect and its host plant (*Quailbush*) within the LCR MSCP boundaries (historical floodplain of LCR from upstream end of Lake Mead to SIB). Surveys will record GPS coordinates of surveyed stands of *Quailbush* and estimate the plant's area. *MacNeill's sootywing skipper* will be detected as eggs, larvae, pupae, or adults on host plants and as adults on nearby nectar sources. Surveys will be conducted April to October when adults are intermittently present (two to three generations occur per season). Sootywings will be digitally photographed and their GPS coordinates recorded. Densities, recorded as individuals of each life stage per plant or plant area ($m^2$), will be estimated.

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

1. Plant water content (estimated by weighing, drying and reweighing branches).
2. Availability of nearby nectar sources (distances, amounts, species).
3. Area of *Quailbush* stand.

4. Plant genome (native plant or U.S. Department of Agriculture National Resources. Conservation Service (USDA-NRCS) revegetation variety).
5. Elevation.
6. Latitude.

**FY05 Accomplishments:** This is a new start in FY06.

**FY06 Activities:** Monthly surveys are being conducted for the butterfly, its eggs, and larvae between Interstate 10 and the north end of Imperial NWR, with a focus on the levee and bankline areas along the river and Cibola NWR. Concurrent investigations include adult behaviors, identifying nectar sources, examining relationships between plant, water and content, nitrogen contents, butterfly occurrence, and examining the species' predators and parasites.

**Proposed FY07 Activities:** Research to determine the species' habitat requirements will continue; and surveys of either the northern part of the river (from Lake Mead to Parker Dam) or the southern part of the river (from Imperial NWR to Mexico) will be conducted.

**Pertinent Reports:** Study plan available upon request

## Work Task C8: Razorback Sucker Survival Studies

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $250,000 | $237,979 | $237,979 | $190,000 | $190,000 | $190,000 | $45,000 |

**Contact:** Tom Burke, (702) 293-8711

**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 Mile 50 – 175, Imperial Dam to Parker Dam

**Purpose:** Assess survival and distribution of razorback suckers (RASU) released into the lower Colorado River.

**Connections with Other Work Tasks (past and future):** The work is connected to Work Task B5, as fish being studied are reared at Bubbling Ponds SFH and implanting of radio and sonic tags occurs at the hatchery prior to delivery at the river.

**Project Description:** Reclamation has stocked more than 50,000 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 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 FWS to rear and stock 50,000 RASU into the Colorado River downstream of Parker Dam. During Endangered Species Act consultations in 2002 aimed at extending the regulatory relief of the 1997 BO, Reclamation agreed to assess the survival of the released fish. This study began in 2003.

**FY05 Accomplishments:** Portions of the lower Colorado River from Parker Dam downstream to Imperial Dam were surveyed using electro-fishing, trammel netting, and hoop netting equipment. The survey sites primarily encompassed areas of known RASU occupation, including main river channel and confluent, watercraft-accessible backwaters, and side channels.

(Due to access restrictions by the Colorado River Indian Tribes, no surveys were conducted within the boundaries of the CRIT Reservation.)

Fish surveys resulted in the total capture of 31,122 fish, representing at least 22 species and including 654 RASU. Of the 654 RASU captured, 62 were recaptures; so only 592 individual RASU were located during the surveys. All of these RASU were assumed to have been stocked fish, as all had detectable marks (wire tags or PIT tags). Of the 592 individual RASU handled during the surveys, 500 wire-tagged fish were given PIT tags in order to assess growth and short-term survival should they be recaptured. The remaining 92 fish already had PIT tags received at the hatchery prior to release during prior year captures. Growth of recaptured fish was unremarkable and similar to growth of subadult RASU released into Lake Mohave. However, short-term survival of RASU stocked into backwaters was extremely poor. Over summer survival in Backwater A-10 of fish stocked March-May 2005 was less than 17 percent based on September survey data; and winter survival of fish stocked into backwater A-7 in November and December 2004 was only 10 percent, based on January 2005 survey data.

The original 2003 agreement was modified in 2005 to provide $60,000 to conduct telemetry work. In April, 20 fish were surgically implanted with radio tags (6-month battery life) and monitored for one month prior to the summer sampling hiatus. During this one month period, the fish stayed in the backwater. The fish could not be located in September when sampling reconvened.

**FY06 Activities:** Monthly monitoring of stocked fish using nets and electro-fishing equipment was conducted from January to May, and again from September through December. In addition, radio-tracking will again be attempted with newly tagged fish. To assist with this work, a circular radio antenna was installed in the throat of a modified hoop net, and this hoop net was then inserted into the culvert which connects backwater A-10 to the main river (see Figures C8a, C8b). This should provide data to assess movement between the river and backwater.

**Proposed FY07 Activities:** Monthly monitoring of stocked fish using nets and electro-fishing equipment will be conducted from January to May, and again from September through December.

**Pertinent Reports:** FY05 annual report will be posted to the LCR MSCP website. Study plans for FY06 and FY07 are available upon request.

**Figure C8a:** Circular antenna installed in the throat of a modified hoop net to serve as a tracking gate for radio-tagged fish stocked into Backwater A-10.

**Figure C8b:** Hoop net in culvert separates the backwater from the river. Tracking equipment inside the metal barrel is protected from damage by armor plating.

## Work Task C9: Razorback Sucker and Bonytail Pen Rearing Tests

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $62,000 | $42,000 | $ 42,000 | $48,000 | $35,000 | $35,000 | $35,000 |

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY05 **Expected Duration:** FY09

**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 razorback suckers (RASU) and bonytail chub (BONY) in the LCR at Willow Beach National Fish Hatchery (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 Work Task B2, as work is being accomplished at Willow Beach NFH using fish reared at that facility.

**Project Description:** This project has two main objectives. The first objective is to determine whether juvenile and subadult RASU and BONY will continue to grow if placed into net pens within the Colorado River adjacent to Willow Beach NFH. Field studies have shown a direct positive relationship between survival in the lake and size of fish at time of release. Field studies also show that juvenile RASU released into Lake Mohave do exhibit some growth between October and March, the coolest period of the year. If RASU and BONY will increase in size in river water (routinely measured at 56 degrees F), then this would provide additional rearing capacity at the hatchery. The second objective is to assess use of net pens to acclimate fish to be released into Lake Mohave to ambient river conditions (temperature and flow). Field data indicate that conditioning of hatchery fish increases survival in the wild. Field data also suggest that post-stocking handling stress can be reduced by acclimation of fish to ambient water temperatures prior to release. This program will construct rearing pens in the river at Willow Beach NFH for the purposes of evaluating both of these objectives. Evaluations will continue through FY09 at which time the project will be assessed and either incorporated into routine operation at Willow Beach NFH or discontinued.

**Previous Activities:** This is a new start in FY05.

**FY05 Accomplishments:** 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 river bottom for assessment of anchor placements and test installations of docking materials were both accomplished utilizing the Reclamation Dive Team.

**FY06 Activities:** Assembly and installation of net pens has been accomplished (see Figures C9a, C9b); 500 RASU with a mean length of 325 mm were stocked into one of the pens (see Figures C9c, C9d); Reclamation and FWS staff will monitor growth and condition of fish over the summer and into the fall.

**Proposed FY07 Activities:** During FY07 Reclamation propose to continue monitoring growth and survival of RASU; to harvest any fish reaching 500 cm total length and distribute them to stocking sites in Lake Mohave for repatriation; and to initiate growth and acclimation study on BONY.

**Pertinent Report:** Study Plan is available upon request.

**Figure C9a**. Putting together docking materials

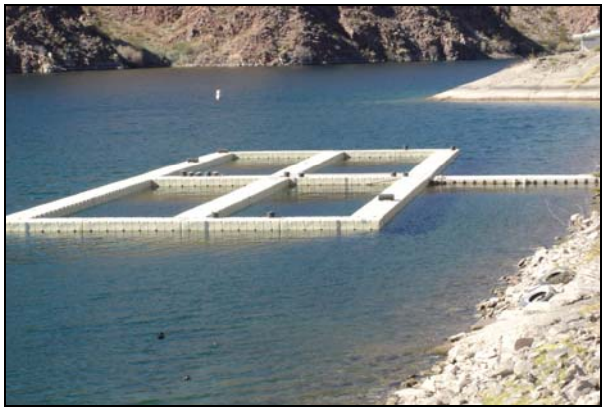


**Figure C9b:** Assembled docking place alongside hatchery.

**Figure C9c.** PIT tagged razorback suckers being transferred from raceway to rearing pen.

**Figure C9d:** PIT tagged razorback suckers in net pen.

## Work Task C10: Razorback Sucker Growth Studies

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $ 0 | $125,000 | $125,000 | $125,000 | $125,000 |

**Contact:** Tom Burke, (702) 293-8711

**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:** RASU3, RASU4, and RASU6

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

**Purpose:** Evaluate factors affecting growth of subadult razorback sucker (RASU) in order 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 Work Task C11 and shares some activities (concurrent studies at same locations). Also, a workshop for fish culturists planned for FY07 will be held jointly for RASU (C10) and BONY (C11).

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

The species is a rare fish for which only limited life-history data exist, and that which does exist is 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 over 50 years. It was

only during the past decade that it was 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 population, and assumed that the adult RASU were only bottom feeders. This information may be vital in determining where feed should be introduced within the water column during the culturing process. Should diet formulations sink, float, or remain in suspension? These types of observations need to be recognized, then hypotheses developed, and finally tests of the hypotheses designed and conducted.

Literature reviews will be conducted to compile information on rearing these fish. This will include site visits to facilities actively culturing RASU to document successes and failures. Also to be included are inquiries to field biologists and technicians to document nuances of the fishes in the wild (e.g., the existing knowledge and observations of daily activities within natural habitat like feeding, resting, use of cover, etc). And finally, ideas and hypotheses will be formulated into numerous small experiments, testing one variable at a time.

**FY05 Activities:** This is a new start in FY06.

**FY06-10 Activities:** During FY06, Reclamation is contracting with the Research Branch at Arizona Game and Fish Department to begin work on this five-year effort. The research objectives are to accomplish the following tasks:

1. Collect background information regarding RASU rearing techniques in both hatcheries and natural rearing areas. (FY06 and FY07)
2. Summarize this information in a descriptive report to be shared among those conducting RASU culture. (FY07)
3. In cooperation with Reclamation, facilitate a workshop with RASU culturists in order to share information and ideas concerning improved production of species, particularly with regard to improving growth rate. (FY07)
4. Design and construct a research facility at Bubbling Ponds SFH appropriate for testing new ideas developed at the workshop. (FY07)
5. Conduct the research, and report results to Reclamation and to RASU culturists. (FY08 – FY11)

**Pertinent Reports:** Scope of Work for this multi-year cooperative study will be available following award of agreement.

## Work Task C11: Bonytail Rearing Studies

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $24,000 | $0 | $ 0 | $165,000 | $165,000 | $165,000 | $165,000 |

**Contact:** Tom Burke, (702) 293-8711

**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 sub-adult bonytail (BONY) in order 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 parallel or companion study to Work Task C10 and may share some of the same locations, source data, and testing staff during implementation. A workshop planned for FY07 will focus on culture needs for both RASU (C10) and BONY (C11). Also, some of the investigations to be carried out under this Work Task may be conducted at hatcheries identified in Section B.

**Project Description:** This is a five-year investigation into rearing and culture of BONY to determine cost effective techniques to rear BONY to 300 mm for stocking into the lower Colorado River. BONY exhibit many of the same culture problems shown by RASU (see C10), especially the extremely varied growth in captivity, even for fish from the same family lot. However, BONY are even rarer than RASU, and have even less culture history. Diet formulation, feeding rates, best time of day to feed, effects of temperature on food conversion, effects of day length on food conversion, effects of prophylactic treatments on food conversion, and effects of handling on food conversion are just some of the fish culture variables that need investigation. Like RASU, BONY exhibit some nocturnal tendencies both as juveniles and as adults. However, unlike RASU, subadult BONY will eat large insects like crickets, bees, and grass hoppers, and adult BONY will eat other fish and possibly are cannibalistic on their own young. If this is indeed a fact, it must be taken into consideration during the culturing process. It may be necessary to rear bait fish to feed the larger BONY or at least to develop a different diet formulation for larger fish.

The extreme variation in growth presents another problem to the fish culturist. Because this is a protected species, fish culturists do not routinely kill off the small fish following sorting and tagging operations, but instead these small fish are returned to the pond to continue growing.

After a few such operations, the small BONY in the grow-out pond may be some of the oldest fish in the pond. Since it appears that age, not size, determines sexual maturity for this species and since two year old males and three year old females have been shown to be sexually mature, the fish begin reproducing in the pond before they reach target size for stocking. Each spawning event results in thousands of more fish in the pond, and upsets the food conversion balance (more mouths to feed). The end result is that very few of the initial stock reach target size in a reasonable period of time.

This Work Task evaluates the current culture practices for BONY through literature reviews, survey questionnaires, site visits to culture facilities, and interviews with fish culturists. A workshop will be held among fish culturists to review survey findings and to prioritize research actions. Research hypotheses will be formulated into study designs and investigations will be carried out. Findings and results will be documented and reported.

**FY05 Accomplishments:** This project was delayed and is a new start in FY06.

**FY06 Activities:** Reclamation contracted with ASU to conduct literature reviews on BONY culture practices; query fish culturists and staff at fish rearing facilities currently raising BONY; and conduct site visits to these facilities.

**Proposed FY07 Activities:** Begin field testing and evaluations of relationship between fish density and fish growth; conduct a workshop among fish culturists to review survey findings and to prioritize research needs for BONY; and design additional field and laboratory trials to test hypotheses.

**Pertinent Reports:** Study plans are available upon request.

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

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $185,000 | $185,000 | $185,000 | $ 60,000 |

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY06 **Expected Duration:** FY09

**Long-Term Goal:** Species Research

**Conservation Measures:** RASU5

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

**Purpose:** Assess population structure for repatriated RASU and develop population demographic model to predict survival rate and replacement rate in order to maintain broodstock over life of 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. Over 100,000 fish have been reared and repatriated to date, yet brood stock population estimates remain below 5,000 fish. This Work Task initiates a three-year study to assess the cause of this low population survival. The study will determine whether this low population estimate is real or a result of monitoring techniques used. If the population estimate is real, the study will assess causes for such 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.

**FY05 Activities:** This is a new start in FY06.

**FY06 Activities:** This work is being conducted by ASU. Work this year includes: review of rearing, stocking and recapture data for RASU stocked into Lake Mohave since 1992; conducting field investigations during spawning and post-spawning seasons to assess distribution; conducting radio and sonic telemetry work on RASU; and to begin ecological modeling of population data to assess data inferences.

**Proposed FY07 Activities:** FY07 will be the second year of a three-year study. Field investigations from the previous year will continue, as will demographic modeling activities. Stocking of RASU from Willow Beach NFH (B2) that have attained 500 mm will be coordinated with ASU field staff to maximize observations of dispersal and survival.

**Pertinent Report:** Annual report to be posted to LCR MSCP website. Study plan is available upon request.

## Work Task C13: Lake Mead Razorback Sucker Study

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $198,000 | $98,000 | $98,000 | $350,000 | $300,000 | $100,000 | $100,000 |

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY05 **Expected Duration:** FY09

**Long-Term Goal:** Determine conditions which allow for natural recruitment of razorback sucker.

**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 ISG/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:** SNWA began a monitoring program for RASU in Lake Mead in 1995, partnering with NDOW and Reclamation. Between 1995 and 2004, some 200 adult and 30 juvenile RASU were captured. Aging data showed that a low-level of recruitment has occurred

in at least 22 of the past 30 years. This remarkable recruitment has happened in the face of extensive non-native fish populations.

**FY05 Accomplishments:** In 2004, the spawning area at Las Vegas Wash (Blackbird Point) became exposed as the lake's surface elevation declined during the summer and fall. An investigation of the Las Vegas Bay spawning population began in January 2005 to determine if these fish established a new spawning at another location in Las Vegas Bay. However, the area was wetted by rising lake levels in the spring and these RASU returned to the original site and successfully spawned. RASU also spawned at the Echo Bay spawning area. A third spawning site was located in 2005 at Fish Island, near the mouth of the Virgin and Muddy Rivers.

A multi-agency staff representing all study partners participated in the capture of over 4,000 larvae during 2005. These RASU larvae are being reared at Lake Mead SFH (B6). Reclamation's helicopter was used to conduct aerial searches for spawning aggregations during March and April.

**FY06 Activities:** FY06 activities are similar to those for FY05. Monitoring of spawning sites was conducted during February, March and April; attempts were made to capture larvae once spawning began; trammel-netting and electro-fishing were conducted to capture juveniles and adults; radio-telemetry work will continue; and a long-term monitoring plan will be developed. Additionally, potential repatriation sites will be evaluated for future release of young fish currently being reared at Lake Mead Hatchery.

**Proposed FY07 Activities:** FY07 marks a decision point for the future level of effort for these studies. Plans for FY07 include completing a ten-year review of the study program and determining the need and funding for a long-term monitoring program. This review will then be evaluated to determine the need for and the level of future studies.

**Pertinent Report:** Annual report for 2005 will be posted to the LCR MSCP website. Study plan is available upon request.

## Work Task C14: Humpback Chub Program Support

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $10,000 | $0 | $0 | $15,000 | $10,000 | $10,000 | $ 10,000 |

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY05 **Expected Duration:** FY55

**Long-Term Goal:** Provide $10,000 per year to support humpback chub conservation.

**Conservation Measures:** HUCH1

**Location:** Varied – 2005, Grand Canyon, AZ; 2006 - Willow Beach, AZ

**Purpose:** Provide financial support to the Glen Canyon Dam Adaptive Management Program (AMP) for conservation of humpback chub.

**Connections with Other Work Tasks (past and future):** This work task was previously included in the Draft FY05 Work Tasks as Humpback Chub Monitoring Program (D10). This work is connected to Work Task B2 as money will be transferred to FWS 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 FWS, to support implementation of planned, but unfunded species conservation measures.

**FY05 Accomplishments:** This work was delayed and will be a new start in FY06.

**FY06 Activities:** During FY06, Reclamation will provide funds to Willow Beach NFH to support maintenance of humpback chub adults currently being held at that facility.

**Proposed FY07 Activities:** Continue support for maintaining humpback chub at Willow Beach NFH.

**Pertinent Report:** Study plan is being developed and will be available upon request.

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

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $58,000 | $52,000 | $52,000 | $80,000 | $80,000 | $80,000 | $ 80,000 |

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY05 **Expected Duration:** FY11

**Long-Term Goal:** Support flannelmouth sucker conservation.

**Conservation Measures:** FLSU2 and FLSU3

**Location:** Reach 3, AZ/NV/CA

**Purpose:** Provide funding to support existing flannelmouth sucker (FLSU) conservation and research below Davis Dam and to develop a management needs strategy for this species.

**Connections with Other Work Tasks (past and future):** This work task was previously included in the Draft FY05 Work Tasks as Flannelmouth and Razorback Sucker Monitoring below Davis Dam (D9). The FLSU in FY06 is now being done under C15 and the razorback sucker portion of the work has been included under D8.

**Project Description:** Financially support 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. This support will be provided for five years. Once completed, research results will be used through the adaptive management process to assess main channel and backwater management needs and to develop management strategies to benefit the FLSU.

**Previous Activities:** FLSU were reintroduced into the Colorado River below Davis Dam by Arizona Game and Fish Department 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.

**FY05 Accomplishments:** Monitoring was conducted between January 24 and April 14. This work was combined with monitoring activities for RASU. The field work was led by Reclamation staff from Denver Technical Service Center with support from the Lower Colorado Regional Office. Thirty-three nights of trammel netting (368 net sets) yielded a total of 12,119 fish, including 124 FLSU. Unlike RASU, which tend to frequent off-channel and backwater habitats, the FLSU seem to spend much of their day out in swift flowing, main channel habitats.

New fyke-nets, having a low-profile, D-shaped opening, were designed and tested to see if they could be deployed in these swift water habitats to increase FLSU captures. The nets deployed and fished acceptably; however, the FLSU spawning season had passed by the time these tests were conducted. Results of this work are captured within a report covering a three year period from 2003 – 2005.

**FY06 Activities:** Reclamation staff continued monitoring using trammel-nets, hoop-nets, electro-fishing, and visual float counts. During seven field sampling trips between January and April, 365 FLSU were captured. Electro-fishing proved to be the best collection technique (260 fish), followed by trammel nets (104 fish), and hoop-nets (one fish). Modified hoop nets were not able to capture fish in the main, swift flowing river channel. In addition, these nets were often ripped apart by the high water volume. Research actions included sonic-tagging of 15 fish and videoing fish from a helicopter. These actions will continue into the fall. Data will be analyzed to assess population structure, range and distribution of fish and physical and chemical habitat components.

**Proposed FY07 Activities:** Continue monitoring and research actions from FY06; begin modeling population structure and distribution to determine habitat preferences and needs. Incorporate beach seining and backpack electro-shocking techniques to focus on numbers and distribution of juvenile life stages.

**Pertinent Report:** Annual report will be posted to the LCR MSCP website.

## Work Task C16: Evaluation of Past Bonytail Stockings

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $0 | $60,000 | $0 | $ 0 |

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY07 **Expected Duration:** FY07

**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 five facilities actively rearing BONY: Dexter NFH, Willow Beach NFH, Achii Hanyo Fish Rearing Station, CRIT, Wahweap State Rearing Station (Utah Division of Wildlife), and Ouray NFH. It is expected that all facilities will be visited during this research.

**FY05 Accomplishments:** This is a new start in FY07.

**FY06 Activities:** This is a new start in FY07.

**Proposed FY07 Activities:** Review records of past stockings of BONY and compile the information into a report. It is expected that the report will summarize the information and present recommendations to the LCR MSCP Fish Augmentation Program as to best management practices for stocking BONY.

**Pertinent Report:** Scope of Work will be available upon request.

## Work Task C17: Senator Wash Razorback Sucker Stock Assessment

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $45,000 | $45,000 | $ 45,000 | $0 | $0 | $0 | $0 |

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY05 **Expected Duration:** FY05 - Closed

**Long-Term Goal:** There are no long-term plans for this work. The population of razorback sucker in Senator Wash Reservoir may be monitored periodically to assess long-term survival.

**Conservation Measures:** RASU6

**Location:** Reach 5, Senator Wash Reservoir, CA

**Purpose:** Assess status of RASU released into Senator Wash Reservoir.

**Connections with Other Work Tasks (past and future):** This work task was previously included in the Draft FY05 Work Tasks as Senator Wash Razorback Sucker Stock Assessment (C10).

**Project Description:** Senator Wash Reservoir was constructed by Reclamation in 1966 as a pump-back storage facility. It is located along the LCR just upstream of Imperial Dam and is approximately 460 acres in size. In 1973, CDFG captured RASU in the new impoundment, presumably entrained from the main river during initial filling. Between 1987 and 1991, some 4,800 juvenile RASU were released into Senator Wash from varying sources. In 2001, larval RASU were captured. A cooperative investigation by CDFG, Reclamation, and AGFD began in 2003 to assess the population and determine if any natural recruitment had occurred.

**FY05 Accomplishments:** AGFD and CDFG conducted trammel netting, electro-fishing, and light trapping surveys in Senator Wash Reservoir. Surveys during 2005 resulted in a total of 125 individual RASU being captured and PIT tagged. Fifty-five of these were later recaptured, generating a population estimate of 280 adult RASU. Survival of the 4,800 original stock is six percent.

**Pertinent Report:** Project Completion report will be posted to the LCR MSCP website.

## Work Task C18: Point Count Design and Sample Size Evaluation

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $50,000 | $49,920 | $49,920 | $0 | $0 | $0 | $0 |

**Contact:** John Swett, (702) 293-8574

**Start Date:** FY05 **Expected Duration:** FY06

**Long-term Goal:** Research to develop monitoring design.

**Conservation Measures:** MRM1 and MRM2

**Location:** System-wide

**Purpose:** System monitoring is required by the LCR MSCP to monitor existing covered species populations and their habitats. To initiate a system monitoring program for riparian obligate birds, data must be collected to determine sample size.

**Connections with Other Work Tasks (past and future):** This work task was previously included in the Draft FY05 Work Tasks as Point Count Design and Sample Size Evaluation (C1).

**Project Description:** The LCR MSCP includes 26 covered species and five evaluation species. Some individual species, such as the SWFL and the YBCU, have system monitoring programs established utilizing single species protocols. Some single species monitoring protocols have been previously established and are required by existing compliance documents subsumed under the LCR MSCP. Other single species protocols monitor species representing certain habitat types within the LCR MSCP. However, it is inefficient to monitor every covered species individually throughout the entire LCR MSCP planning area so multi-species protocols will be utilized, where applicable.

Monitoring bird populations, especially neo-tropical migratory birds within riparian habitats, is an effective way to monitor ecosystem health. Reclamation has worked with the GBBO, USGS, and other state and federal agencies to develop a system monitoring program for the State of Nevada, through Nevada Partners in Flight. By utilizing the Great Basin Bird Observatory (GBBO) monitoring protocol and design, data from the LCR can be incorporated into a larger, regional database for more powerful data analysis. Population trends can be derived over time, thus enabling Reclamation to monitor existing covered avian species and their habitat. This work task was anticipated to provide the necessary data to design an effective and efficient multi-species system monitoring program for riparian obligate avian covered species.

**FY05 Accomplishments:** Eighteen-point count transects were randomly selected along the LCR. Avian data was collected, utilizing the GBBO protocol, during June 2005. Vegetation at

each point count plot was characterized using the Anderson and Ohmart classification system. Point count transects were randomly placed within three vegetation types along the LCR. Six transects began in mixed saltcedar-mesquite stands, six transects began in monotypic saltcedar stands, and six transects began in cottonwood-willow stands. Transects crossed several vegetation classifications due to the small patch size typically found along the LCR. Sixty-eight avian species, totaling 2,938 individuals, were observed, including four LCR MSCP covered species.

Data were collected during 2005 to determine sample size for the riparian obligate covered avian species system monitoring program. After completion of the 2005 field work, it was determined that data collected were not sufficient to design the point count monitoring program.

**FY06 Activities:** Point count transects are being completed during the breeding season to provide the additional data needed to design the avian system monitoring program, using funding approved under Work Task D6. A draft program design will be completed by USGS in September 2006, with the final design anticipated by December 2006.

**Proposed FY07 Activities:** This Work Task will be closed in FY06. Implementation of system-wide surveys will be initiated under (D6).

**Pertinent Reports:** Scope of Work, detailing study design expectation, is available upon request**.** *Lower Colorado River Point Count Transects,* will be posted to the LCR MSCP website.

## Work Task C19: Southwestern Willow Flycatcher Feather Colorimetry

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $21,000 | $20,970 | $20,970 | $0 | $0 | $0 | $0 |

**Contact:** Theresa Olson, (702) 293-8127

**Start Date:** FY05 **Expected Duration:** FY05

**Long-term Goal:** Species research to determine if SWFL can be identified to subspecies in the field by using colorimetry methodology.

**Conservation Measures:** MRM1 and MRM2

**Location:** SWFL life history study sites and Monitoring Avian Productivity and Survivorship (MAPS) stations along the LCR (Work Tasks D2 and D5, respectively). SWFL study sites are located at: (1) Pahranagat NWR in east-central Nevada; (2) along the Virgin River at Mesquite, Nevada; (3) along the Virgin River, near Mormon Mesa, Nevada; and (4) Reach 3, Topock Marsh section of Havasu NWR, Arizona. The MAPS stations are located at: (1) Reach 3, Havasu NWR, Arizona and (2) Reach 4, Cibola NWR, Arizona.

**Purpose:** Evaluate the use of colorimetry as a potential technique to determine subspecies of willow flycatchers encountered while banding during potential migration periods. This technique may enable subsequent surveys to identify subspecies in the field versus testing genetically, thus enabling biologists to distinguish migrating versus resident flycatchers in the field at the moment of capture.

**Connections with Other Work Tasks (past and future):** This work task was previously included in the Draft FY05 Work Tasks as Southwestern Willow Flycatcher Feather Colorimetry Study (C4). This work was completed in conjunction with the Southwestern Willow Flycatcher Presence/Absence Surveys and Life History Studies and MAPS (Work Tasks D2 and D5, respectively).

**Project Description:** The willow flycatcher is a polytypic species, with four subspecies generally recognized. At least two, and possibly three, subspecies utilize the LCR during migration. One subspecies, the SWFL (*Empidonax traillii extimus*), is listed on federal and state endangered or sensitive species lists and is a LCR MSCP covered species.

Distinguishing subspecies in the field has been problematic. Recently, new technology (colorimetry) has been described as a reliable method for characterizing plumage coloration differences in birds and may be useful in distinguishing willow flycatcher subspecies in the field. A colorimeter is a device that measures the color of an object, such as a bird's plumage, and produces a standardized value that can be analyzed statistically.

SWFL arrive on the breeding grounds in late April. Migrant willow flycatchers use the LCR corridor from late April through at least mid-June, often utilizing the same habitat as breeding willow flycatchers. Habitat use may be determined early in the breeding season utilizing colorimetry, thus concentrating survey effort on areas being utilized by SWFL, especially below Parker Dam where nesting has yet to be documented, and within habitat creation sites.

Fall migration begins in late July while breeding SWFL are still present along the LCR. Currently, willow flycatchers detected late in the breeding season for the first time cannot be distinguished between early migrants and resident birds not detected during previous surveys.

This study consists of obtaining multiple samples using a Minolta Colorimeter on captured willow flycatchers, both along the LCR and across the Southwestern states, in cooperation with other researchers. This process is a non-invasive (does not harm the bird) technique that takes a reading of the color of the bird's plumage. Samples will be statistically analyzed to see if the technique can correctly predict the subspecies of willow flycatchers with little error. This technique, if statistically accurate, can then be deployed in future surveys in areas below Parker Dam during migration, to determine where the SWFL is utilizing habitats as residents. This can be done instantaneously in the field without having to complete costly and time consuming genetic analysis. This will help further refine areas of resident versus migrant flycatcher habitat in a timely and more economical manner, and inform the adaptive management process for use in the evaluation criteria for future habitat creation.

**Previous Activities:** Colorimetry studies began in 2004 in cooperation with several agencies and non-profits. Reclamation, through non-LCR MSCP funding, provided a colorimetry unit to begin these studies. Sampling and data was collected using other partner funding. From spring 2004 to December 2005, 464 willow flycatchers were captured and sampled. Samples were obtained at 76 sites in 13 U.S. states and at 24 sites in three Latin American countries. Preliminary analysis revealed that the colorimeter can detect substantial plumage variation between willow flycatcher subspecies. Preliminary modeling suggests colorimeters have the potential to be a powerful tool in assigning subspecies status to individuals of unknown origin.

**FY05 Accomplishments:** Colorimetry samples were collected from birds captured at life history study sites and MAPS stations during spring migration and breeding season along the LCR using LCR MSCP funding. During the summer of 2005, 15 sites in California, Arizona, and Nevada were sampled using colorimetry and data was collected on 160 individual flycatchers. This data was analyzed, with additional data collected collaboratively at sites throughout the willow flycatcher range, to determine the effectiveness of this technology.

**FY06 Activities:** All field work was completed for this study in 2005. A final, peer-reviewed publication is being prepared in 2006, utilizing partner funding, which will evaluate the potential benefits of this new technology.

**Pertinent Reports:** *Assessing Variation of Plumage Coloration within the Willow Flycatcher: A Preliminary Analysis* is posted on the LCR MSCP website. Final report will be posted on LCR MSCP website when available.

## Work Task C20: Southwestern Willow Flycatcher Prey Base Study

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $65,000 | $63,949 | $104,981 | $0 | $0 | $0 | $0 |

**Contact:** Bill Wiesenborn, (702) 293-8699

**Start Date:** FY04 **Expected Duration:** FY06

**Long-Term Goal:** Species research

**Conservation Measures:** WIFL1 and WIFL2

**Location:** SWFL life history study sites at: (1) Pahranagat NWR in east-central Nevada; (2) along the Virgin River at Mesquite, Nevada; and (3) Reach 3, Topock Marsh, Havasu National Wildlife Refuge, Arizona, three miles east of River Mile 243.

**Purpose:** The purpose of this study is to determine diets of the SWFL at three geographically separate localities. Creating and maintaining habitat for the SWFL will require 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 (i.e. where water tables are lowered, soil salinities are elevated, and spring flood flows are absent). Growing plants will not by itself guarantee insect abundances large enough to feed and support bird and bat populations.

**Connections with Other Work Tasks (past and future):** This work task was previously included in the FY04 as SWFL-Prey Base Study (B2) and Draft FY05 Work Tasks as Southwestern Willow Flycatcher Prey Base Study (C5). Information obtained during this study will be used, in conjunction with data gathered in Work Task C6 and Work Task C5, to develop methods of monitoring and potentially increasing populations of insects eaten by LCR MSCP covered riparian birds, including the SWFL. Knowledge gained during these studies will help guide future habitat creation projects detailed in Section E.

**Project Description:** Life history studies have shown that abiotic conditions within SWFL habitat may influence habitat selection, especially the presence of standing water or saturated soils. Other biotic components, such as insect distribution and abundance, may also influence habitat quality. This study will investigate SWFL diet by acquiring fecal samples from mist-netted birds and sampling insects within prey occupied SWFL breeding habitat. Insect parts in fecal samples will be identified and compared with insects collected at the same localities using Malaise traps and sweep nets. Bird diets are being compared among localities and with field-collected insects.

**FY05 Accomplishments:** Fecal samples were collected from birds during banding at the three localities listed above. Insects at the same localities were collected using sweep nets and Malaise traps. University of California – Davis UCD scientists began identifying insect parts from fecal samples and insects that were concurrently collected. Reclamation and UCD began data analysis. Preliminary results show that flycatchers are generalist feeders, consuming a range of insects including dragonflies, cockroaches, beetles, wasps, and midges. Study was extended because of the larger than expected number of field-collected insects and difficulty in identifying insect parts in fecal samples. Project will be completed during 2006.

**FY06 Activities:** Identifications of insect parts in fecal samples and insects collected in the field are being completed. Data analysis will be completed and a final report will be posted on the LCR MSCP website.

## Work Task C21: Yellow-Billed Cuckoo Demographics Study

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $115,000 | $112,964 | $112,964 | $0 | $0 | $0 | $0 |

**Contact:** John Swett, (702) 293-8574

**Start Date:** FY05 **Estimated Duration:** FY05

**Long-Term Goal:** Species research

**Conservation Measures:** AMM1, AMM2, AMM3, AMM5, AMM6, MRM1, MRM2, YBCU1, and YBCU2

**Location:** San Pedro River, AZ

**Purpose:** Conduct demographic studies of YBCU to better understand life requisites, especially necessary habitat requirements. Information obtained from this study will be used to develop a system monitoring program for YBCU and to plan future LCR MSCP riparian habitat creation projects.

**Connections with Other Work Tasks (past and future):** This work task was previously included in the Draft FY05 Work Tasks as Yellow Billed Cuckoo Demographics Study (C6). Information obtained in conjunction with C23 helped define the survey protocol being used in FY06 under D7. In addition, data defining habitat requirements will be used in the future to develop cottonwood-willow habitat for YBCU planned in E1, E3, E4, and E5.

**Project Description:** In 2002, a life history study of YBCU began along the San Pedro River in southeast Arizona. Populations along the LCR have not been adequately defined, so this study was conducted where known populations of YBCU occur. Presence/absence surveys were conducted along the San Pedro River, near Sierra Vista, Arizona. After YBCU were detected, mist nets were used to capture individual cuckoos and radio telemetry transmitters were attached to monitor their behavior. Data was collected to determine nest success, territoriality, intra-specific interactions, diet, and other important demographics.

**Previous Activities:** The first three years of this study were implemented by Reclamation prior to LCR MSCP initiation.

**FY05 Accomplishments:** Tasks completed during this phase of the study included surveys, telemetry, nest searching, survey methods testing, and video monitoring of nests. One hundred and sixty-three cuckoo detections were recorded, representing an unknown number of pairs. Observations confirmed that YBCU move hundreds of meters every day, making population estimates extremely difficult. Analysis of current methodology found a 37 percent detection rate

from tape playback surveys. This methodology detected up to four times the numbers found during comparable point count surveys. Video monitoring recorded a variety of prey items, including arthropods, caterpillars, and lizards.

Information obtained from the San Pedro River will be incorporated into a refined protocol for presence/absence surveys using the tape playback method. Demographic data will be used to define habitat characteristics to guide future creation and management of habitat.

**FY06 Activities:** While this work was completed in 2005, the final report is anticipated in 2006. The report preparation was funded in FY05.

**Proposed FY07 Activities:** This Work Task is closed.

**Pertinent Reports:** *Surveys and Life History Studies of the Yellow-billed Cuckoo: Summer 2005* will be posted on the LCR MSCP website.

## Work Task C22: Yellow-Billed Cuckoo Surveys, Demographic Study, and Survey Protocol Evaluation

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $51,000 | $50,971 | $50,971 | $0 | $0 | $0 | $0 |

**Contact:** John Swett, (702) 293-8574

**Start Date:** FY05 **Expected Duration:** FY05

**Long-term Goal:** Species Research

**Conservation Measures:** AMM1, AMM2, AMM3, AMM5, AMM6, MRM1, MRM2, YBCU1, and YBCU2

**Location:** Cibola NWR, Imperial NWR, Picacho State Recreation Area, Mittry Lake WMA, Quigley Pond WMA, and other lands managed by BLM, AGFD, Reclamation, AZ, and CA.

**Purpose:** Conduct surveys to determine existing YBCU populations on lands managed by BLM, FWS, AGFD, California State Parks, and others near Yuma, Arizona; test the proposed survey protocol; and determine habitat requirements to guide riparian habitat creation efforts.

**Connections with Other Work Tasks (past and future):** This work task was previously included in the Draft FY05 Work Tasks as Yellow Billed Cuckoo Surveys, Demographic Study, and Survey Protocol Evaluation (C7). Information obtained, in conjunction with C21, helped define the survey protocol being used in FY06 under D7. This Work Task also began system-wide surveys for YBCU in Reaches 4-7. In addition, data defining habitat requirements will be used to conduct cottonwood-willow habitat creation activities described in E1, E3, E4, and E5.

**Project Description:** Presence/absence surveys were conducted for YBCU in selected areas near Yuma, Arizona, to help determine breeding habitat selection and preference, identify requirements for breeding and migration stopover habitats, and evaluate the effectiveness of the proposed survey protocol. This study, in conjunction with information obtained in C21, provided a standardized survey protocol for YBCU for future system monitoring efforts. In addition, data collected will enable Reclamation to design habitat creation sites for YBCU and/or recommend future demographic studies necessary to further understand YBCU populations along the LCR.

**FY05 Accomplishments:** Surveys for YBCU were initiated in areas managed by BLM, Reclamation, USFWS, and AGFD. Twenty-eight sites were surveyed twice during the migration season, between 15 May and 11 June, and 42 sites were surveyed four times during the breeding season, between 16 June and 13 August. Across all sites and all visits, 27 YBCU detections were recorded. No YBCU were detected during the migration season and only four detections occurred during the first breeding season survey. The majority of detections occurred in July,

with the greatest number of detections occurring during the second breeding season survey (11 detections). Detections fell sharply during the fourth breeding season survey. The YBCU were detected in 12 of 42 sites (28.6 percent ). One individual detection occurred in a site dominated by exotic vegetation. Most detections were single individuals, with only one pair being recorded. Breeding was not confirmed. Information obtained during this study was used, in conjunction with data from Work Task C21, to develop YBCU monitoring protocol.

**FY06 Activities:** None. The information gathered during the 2005 work was used to initiate system-wide surveys and life history studies under Work Task D7.

**Proposed FY07 Activities:** This Work Task is closed.

**Pertinent Reports:** *Yellow-billed Cuckoo Distribution and Abundance, Habitat Use, and Breeding Ecology along the LCR (Yuma, AZ, United States/Mexico Border), Cibola NWR, Imperial NWR, Picacho State Recreation Area, CA, Mittry Lake WMA, Colorado/Gila River Confluence, Gila River and Quigley Pond WMA, 2005* will be posted on the LCR MSCP website.

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

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $0 | $145,000 | $145,000 | $ 0 |

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY07 **Expected Duration:** FY08

**Long-Term Goal:** Conduct long-term system monitoring and adaptively manage augmentation stockings of razorback sucker and bonytail.

**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 manner.

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

**Project Description:** This is a two-year evaluation of monitoring equipment. Reclamation will purchase and test effectiveness of flat plate, circular, and directional antennae and associated hardware, and software for remote sensing of PIT tagged RASU and BONY. Project will evaluate designs for weir-type guidance at spawning areas and methods for storing and retrieving collecting contact data. Current efforts to contact repatriated fish are labor intensive and require handling of fish during the spawning season. Remote sensing may be less costly, more efficient, and less stressful on the fish.

**FY06 Activities:** This is a new start in FY07.

**Proposed FY07 Activities:** This research will acquire and test various PIT tag detection equipment for remote sensing of RASU and BONY. Equipment will be deployed under both laboratory and field applications for testing. Laboratory testing will occur at Willow Beach NFH in conjunction with fish tagging operations. Flat plate PIT tag receiver antennae will be set on the bottom of holding tanks with tagged fish being introduced above the antennae. Netting will be set at measured distances (0, 2, 4, and 6") above the antennae to separate fish from receiver and detection counts will be recorded. In the field, flat plate antennae will be deployed on the lake bottom at RASU spawning sites to detect tagged RASU which swim over the antennae. Data will be evaluated in a final report with recommendations for application to system monitoring program.

**Pertinent Reports:** Study plan is available upon request.

# WORK TASKS
# SECTION D

# SYSTEM
# MONITORING

## Work Task D1: Marsh Bird Surveys

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $50,000 | $34,920 | $34,920 | $25,000 | $25,000 | $25,000 | $25,000 |

**Contact:** John Swett, (702) 293-8574

**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):** This Work Task was previously included in the Draft FY05 Work Tasks as Marsh Bird Surveys (D2). Data obtained from Work Task F2 will also be used in the marsh bird system monitoring program described in Work Task D1. Protocol developed for Work Task D1 will also be used for Work Task F2.

**Project Description:** Yuma clapper rail surveys have been conducted annually along the LCR since the 1980s. Prior to implementation of the LCR MSCP, the U of A conducted a study 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 new multi-species protocol for all marsh birds, including the LCR MSCP covered species (CLRA, BLRA, and LEBI). Reclamation tested the multi-species protocol in 2005. Marsh bird surveys will continue at designated survey points to track detections of covered species, utilizing the multi-species protocol.

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

**FY05 Accomplishments:** During March, April, and May of 2005, CLRA surveys and multi-species marsh bird surveys were completed along the LCR, between the I-40 Bridge near Needles, California, and Lake Havasu. Total CLRA detections ranged between 38-44 individuals when the single-species CLRA protocol was used. The multi-species protocol was tested during the April and May survey periods, with 24 and 32 CLRA detections recorded, respectively. Although fewer CLRA detections were recorded during the multi-species surveys, differences were not statistically significant. While using the single species CLRA protocol, nine LEBI were recorded during the April survey and 13 during the May survey. The LEBI

detections increased to 20 during the April survey and 33 during the May survey using the multi-species protocol. No BLRA were detected during these surveys.

**FY06 Activities:** A new multi-species protocol, expanded to include CLRA, BLRA, LEBI, Virginia rail has been implemented in 2006. Reclamation conducted surveys, using the new multi-species protocol, in March, April, and May 2006.

**Proposed FY07 Activities:** Conduct marsh bird surveys in Topock Gorge and the upper reaches of Lake Havasu, using the multi-species marsh bird survey protocol. Data will be submitted to the FWS. Information obtained through this Work Task may be used in planning future marsh habitat creation activities.

**Pertinent Reports:** *Yuma Clapper Rail Surveys along the LCR at Topock Gorge, 2005* will be posted on the LCR MSCP website.

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

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $785,000 | $784,594 | $784,594 | $880,000 | $925,000 | $950,000 | $950,000 |

**Contact:** Theresa Olson, (702) 293-8127

**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 Pahranagat NWR. Life history study sites are located at: (1) Pahranagat NWR in east-central Nevada; (2) along the Virgin River at Mesquite, Nevada; (3) along the Virgin River, near Mormon Mesa, Nevada; and (4) Topock Marsh, Havasu NWR, Arizona.

**Purpose:** Monitor SWFL life history along the LCR; and conduct demography studies in four study areas to understand life requisites, habitat characteristics, and population trends.

**Connections with other Work Tasks (past and future):** This Work Task was previously included in the Draft FY05 Work Tasks as Southwestern Willow Flycatcher Presence/Absence Surveys (D3). Information gathered under this Work Task, C19, D3, and D4 all 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 previous BO. In 2003, Reclamation entered into a five-year contract to conduct presence/absence surveys along the LCR from the Southerly International Boundary 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 to conduct life history and cowbird control studies at four known population areas.

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

**FY05 Accomplishments:** Presence/absence surveys were conducted at 101 sites along the Lower Colorado River and its tributaries in 2005. Life history studies were conducted at four sites, including Pahranagat 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 continuing at all life history sites.

Willow flycatchers were detected on at least one occasion at 61 sites. Resident, breeding SWFL were detected at 15 sites, none south of Parker Dam. Individuals were banded at the four life history sites and along the LCR below Parker Dam, when possible. In 2004, 104 SWFL adults were identified through color bands. Forty-two were detected again in 2005; 37 adults returned to the same site and five were detected at other sites within the study area. Only 5 percent of the juveniles banded in 2004 were recaptured in 2005.

Nest success was calculated on 81 SWFL nests observed at the four life history study sites. Thirty-six percent were successful. Depredation was the major cause of nest failure, accounting for 64 percent of all failed nests and 73 percent of nests that failed after flycatcher eggs were laid. Brown-headed cowbird brood parasitism was observed in 32 percent of the nests monitored. Trapping occurred at the four life history sites. The proportion of flycatcher nests parasitized during the pre-trapping and post-trapping periods did not statistically decline. Vegetation and microhabitat data were collected from occupied and non-use habitats to further define habitat characteristics.

**FY06 Activities:** Presence/absence SWFL surveys are being conducted at approximately 100-120 sites, in 15 study areas, along the Virgin River, Pahranagat 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 Pahranagat NWR, Nevada; Mesquite, Nevada; Mormon Mesa, Nevada; and Topock Marsh, Arizona. Studies include banding, nest monitoring, extensive vegetation analysis, and microclimate analysis. The brown-headed cowbird trapping study is also continuing at all life history sites, except for Mormon Mesa. A road closure made trap placement prohibitive. Change in funding between FY05 and FY06 is specifically related to contract costs.

**Proposed FY07 Activities:** Conduct presence/absence SWFL surveys along the Virgin River, Pahranagat NWR, Grand Canyon below Separation Canyon (excluding Hualapai tribal lands), and the LCR to the Southerly International Boundary. Presence/absence surveys will be conducted at approximately 100-120 sites in 15 study areas. Conduct extensive life history studies at Pahranagat NWR, Nevada; Mesquite, Nevada; Mormon Mesa, Nevada; and Topock Marsh, Arizona. Studies include banding, nest monitoring, extensive vegetation analysis, and microclimate analysis (including temperature and relative humidity within the habitat). Continue the brown-headed cowbird trapping study at life history sites. The current contract extends through 2007. At that time, Reclamation will re-evaluate the level of effort needed for future studies and surveys. Costs will be adjusted accordingly.

**Pertinent Reports:** *Southwestern Willow Flycatcher Surveys, Demography, and Ecology along the LCR and Tributaries, 2005* posted to LCR MSCP website.

## Work Task D3: Southwestern Willow Flycatcher Habitat Monitoring

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $160,000 | $159,969 | $159,969 | $90,000 | $90,000 | $90,000 | $90,000 |

**Contact:** Theresa Olson, (702) 293-8127

**Start Date:** FY05

**Expected Duration:** Five years after implementation of all water transfers covered under the Secretarial Implementation Agreement (SIA)

**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 (SWFL) 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 five years after implementation of all water transfers covered under the SIA.

**Connections with other Work Tasks (past and future):** This Work Task was previously included in the Draft FY05 Work Tasks as Southwestern Willow Flycatcher Habitat Monitoring (D4). This Work Task, in conjunction with surveys conducted under D2, will provide information necessary for the habitat maintenance program (H1). Data collected may also be used in future habitat creation projects listed under Section E.

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

**Previous Activities:** In 2001, Reclamation received a BO on the SIA for the change in point of diversion of up to 400,000 acre-feet of water between Imperial and Parker Dams. This work is being implemented through the LCR MSCP. Reduced river flows, created by the change in the point of diversion, may affect SWFL breeding habitat located between these two dams.

**FY05 Accomplishments:** 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. Preliminary analysis indicates groundwater levels within the floodplain are related to river elevations. Data does not show a correlation between piezometer water levels and temperature or absolute humidity within the habitat monitoring sites.

**FY06 Activities:** Monitor the previously identified 372 acres of SWFL breeding habitat 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 so that data can be compared.

**Proposed FY07 Activities**: Monitor 372 acres of SWFL breeding habitat between Parker and Imperial Dams by collecting and analyzing microclimate data, groundwater monitoring, and vegetation monitoring utilizing similar protocols as those in place for the life history studies so data can be compared. Analyze data collected and provide conclusions, if applicable.

**Pertinent Reports:** *Southwestern Willow Flycatcher Surveys, Demography, and Ecology along the LCR and Tributaries, 2005* is posted to LCR MSCP website.

## Work Task D4: Southwestern Willow Flycatcher Presence/Absence Survey Hualapai Tribe

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $65,000 | $64,657 | $64,657 | $68,000 | $76,000 | $78,000 | $0 |

**Contact:** Theresa Olson, (702) 293-8127

**Start Date:** FY05 **Expected Duration:** FY08 decision point

**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; 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):** This Work Task was previously included in the Draft FY05 Work Tasks as Southwestern Willow Flycatcher Habitat Monitoring in the Grand Canyon (D5). 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 a grant agreement 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.

**FY05 Accomplishments:** The Hualapai Tribe surveyed 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). One single singing male was detected during these surveys. Although habitat has declined in quality in many areas, suitable habitat was still present in 2005.

**FY06 Activities:** Tribal biologists will conduct presence/absence surveys on sensitive Hualapai lands below Separation Canyon. The Hualapai biologists coordinate banding and nest monitoring activities with SWCA.

**Proposed FY07 Activities:** Hualapai Tribal biologists will conduct presence/absence surveys on sensitive Hualapai tribal lands below Separation Canyon and will continue to coordinate with SWCA banding and nest monitoring activities.

The current agreement between Reclamation and the Hualapai Tribe extends through 2008. At that time, Reclamation will re-evaluate the level of effort needed for future studies and surveys.

**Pertinent Reports:** *Southwestern Willow Flycatcher Surveys in Lower Grand Canyon, FY2005* is available upon request.

## Work Task D5: Monitoring Avian Productivity and Survivorship

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $300,000 | $293,845 | $293,845 | $300,000 | $300,000 | $300,000 | $300,000 |

**Contact:** John Swett, (702) 293-8574

**Start Date:** FY05 **Expected Duration:** FY55

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

**Conservation Measures:** MRM1 and MRM2

**Location:** Havasu NWR and Cibola NWR AZ.

**Purpose:** Monitor breeding bird long-term population trends and use of different habitat types along the LCR using the MAPS protocol.

**Connections with other Work Tasks (past and future):** This Work Task was previously included in the Draft FY05 Work Tasks as Monitoring Avian Production and Survivorship (MAPS) (D6). Data collected at MAPS stations located at habitat creation sites may also be used for post-development monitoring.

**Project Description:** The MAPS monitors avian populations, using a standardized protocol, throughout the U.S., 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. These data may be used to help determine trend as part of the system monitoring program instituted for the LCR MSCP. In addition, site-specific information can be derived from MAPS data after five years of continuous data collection.

In 2002, prior to LCR MSCP implementation, Reclamation established a MAPS station at the Cibola Nature Trail Riparian Restoration Demonstration site on Cibola NWR. In 2005, an additional MAPS station was established on Havasu NWR, near South Dike, in mixed cottonwood and 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 MAPS station located at the Cibola Nature Trail site will be run through at least 2006. The Havasu MAPS station will continue through at least 2009.

Data on fall migration and winter use is also being recorded at the Cibola Nature Trail site and at the Pratt Restoration site, using an adapted MAPS protocol similar to migration banding projects conducted 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:** The Cibola Nature Trail MAPS station began in 2002, prior to LCR MSCP implementation. In addition, a MAPS station was run for five years on Colorado River Indian Tribes lands, near Headgate Rock Dam (2000-2004), in mixed native and exotic habitat.

**FY05 Accomplishments:** The Cibola Nature Trail and Havasu MAPS sites were conducted in FY05. Thirty-nine species, including 25 potential resident breeders, were captured at the Cibola site between 3 May through 2 August 2005. Twenty-seven species, including 21 potential resident breeders, were captured at the Havasu site during this same time period. Area searches were conducted at both sites to record species not prone to being captured using mist netting techniques. Species diversity was slightly higher at the Havasu site due to the proximity of open water and marsh habitats. Capture rates varied between species at each site. Data were collected, entered into a database, and sent to the Institute for Bird Populations.

Fall migration banding was conducted on two restoration sites (Cibola Nature Trail and Pratt) to document bird use during migration, site persistence for resident birds, and bird condition during migration. Four two-day periods of constant mist-netting were conducted during August-September 2005. Twenty-seven species were captured at the Cibola site at a rate of 134 individuals per 100 net hours. Twenty-seven species were also captured at Pratt; however, only 38 individuals per 100 net hours were caught. Willow flycatchers (subspecies unknown) and Sonoran yellow warblers were captured at the Cibola and Pratt sites during fall migration.

Winter banding and area searches were accomplished on the two sites to document year-round use, site persistence, and bird condition at restoration sites. Twenty-four species were recorded using the Cibola site whereas 16 species were detected at Pratt.

**FY06 Activities:** Data collection is being accomplished at the Cibola and Havasu MAPS stations during the FY06 breeding season.

**Proposed FY07 Activities:** Continue collecting data at the Cibola and Havasu MAPS stations. Conduct fall migration banding and winter banding utilizing a revised MAPS protocol at the same sites as above. All data will be recorded and sent into the Institute for Bird Populations for regional and national trend analysis, and also will be analyzed by Reclamation biologists to determine trends at both restoration sites and along the LCR. In 2007-08, the MAPS program will be evaluated for effectiveness achieving system and post-development monitoring goals and objectives.

**Pertinent Reports:** *Operation of Two Monitoring Avian Productivity and Survivorship (MAPS) Stations on the LCR, 2005 Breeding Season* posted on the LCR MSCP website.
*Winter Monitoring by Constant Effort Mist-Netting at the Nature Trail and Pratt Restoration Sites: Winter 2004-2005* posted on the LCR MSCP website. *Fall Migration Monitoring at the Cibola Nature Trail and Pratt Restoration Sites, 2004* posted on the LCR MSCP website.

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

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $100,000 | $100,000 | $100,000 | $100,000 |

**Contact:** John Swett, (702) 293-8574

**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 trend and habitat use.

**Connections with other Work Task (past and present):** Sample transects, completed under Work Task C18, will be used to design this monitoring project. Information obtained through this Work Task will be used in conjunction with data from Work Task 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 five evaluation species, including nine neo-tropical migratory bird species. It is inefficient to monitor every covered species individually throughout the entire LCR MSCP planning area. Many bird populations can be monitored effectively using multi-species survey protocols.

Reclamation has worked with the GBBO, USGS, and other state and federal agencies to develop a point count system monitoring design for the State of Nevada, through Partners-in-Flight. By utilizing the GBBO monitoring system, 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.

**FY05 Accomplishments:** See Work Task C18.

**FY06 Activities:** It was anticipated that implementation of this Work Task would begin in FY06. However, additional sample transects are being conducted to obtain the data necessary to successfully design this monitoring plan. It is anticipated that a draft monitoring plan will be completed in September 2006. As a result, full implementation of the system monitoring program for riparian obligate avian species was delayed until 2007.

**Proposed FY07 Tasks:** Monitoring plan will be finalized in the fall of 2006. Begin implementation of a system monitoring program for avian species. Select point count transects. Collect point count data on designated transects within the LCR corridor approximately three times during the breeding season. Data will be entered into Reclamation's LCR MSCP database.

**Pertinent Reports**: Draft study design will be available upon request when completed.

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

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $500,000 | $500,000 | $500,000 | $500,000 |

**Contact:** John Swett, (702) 293-8574

**Start Date:** FY06 **Expected Duration:** FY55

**Long-term Goal:** System monitoring

**Conservation Measures:** AMM1, AMM2, AMM3, AMM6, MRM1, MRM2, and YBCU2

**Location:** General presence/absence surveys will be conducted in approximately 40-60 sites in suitable habitat within the LCR MSCP project boundary, potentially including the portions of the Virgin River as it enters into Lake Mead, and the Grand Canyon, from Separation Canyon to the delta with Lake Mead.

**Purpose:** Conduct surveys to determine existing yellow-billed cuckoo (YBCU) populations along the LCR from the Grand Canyon to the Southerly International Boundary with Mexico and to 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:** YBCU 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 have not been determined along the LCR as systematic surveys have not been conducted over the project area. This Work Task will assess existing YBCU populations and evaluate required habitat characteristics. Data collected will enable Reclamation to design restoration sites for YBCU and/or recommend future demographic studies necessary to understand more about the YBCU populations along the LCR.

**FY05 Accomplishments:** This is a new start in FY06.

**FY06 Activities:** Presence/absence surveys and demographic studies are being conducted along the LCR at approximately 58 sites.

**Proposed FY07 Activities:** Presence/absence surveys and demographic studies will be conducted along the LCR. In 2007-2008, the avian monitoring program will be evaluated and changes recommended through the science strategy process.

**Pertinent Reports:** Statement of Work available upon request.

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

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $180,000 | $166,000 | $166,000 | $285,000 | $325,000 | $325,000 | $325,000 |

**Contact:** Tom Burke, (702) 293-8711

**Start Date:** FY05 **Expected Duration:** FY55

**Long-Term Goal:** Conduct long-term system monitoring of razorback sucker and bonytail.

**Conservation Measures:** RASU6 and BONY5

**Location:** Lower Colorado River within the LCR MSCP planning area, including its reservoirs and connected channels, from Grand Canyon to Imperial Dam.

**Purpose:** Supplement and maintain sufficient knowledge and understanding of razorback sucker (RASU) and bonytail (BONY) populations within the LCR MSCP planning area to have an effective Adaptive Management Program.

**Connections with other Work Tasks (past and future):** Monitoring data for RASU and BONY have been and/or will be gleaned from work accomplished under Work Tasks C8, C12, C13, C15, and C23.

**Project Description:** This project collects and organizes RASU and BONY population and distribution data in order to maintain up-to-date, system-wide, stock assessments for these species. Data acquisition work will be accomplished by application of two strategies: (1) gleaning information from ongoing fish monitoring and fish research activities, and (2) direct data collection through field surveys within the LCR MSCP planning area that are not being evaluated by other activities. These data will be organized to show the current, end-of-year status for distribution and abundance for each LCR MSCP river reach.

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.

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 one 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 this 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 the cool water releases from Lake Mead).

In some cases, LCR MSCP fishery staff conducted 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. LCR MSCP staff 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 also conducted within different river reaches throughout the year. Other specialized equipment and techniques are periodically utilized for monitoring, such as aerial and underwater photography and video recordings.

Project costs include all costs associated with conducting field surveys, gleaning or capturing data from ongoing research actions and monitoring programs (both internal and external to the LCR MSCP), transfer of these data into record archives, and organizing these data into a cohesive report.

**Previous Activities:** Reclamation has cooperatively conducted fish surveys with Nevada and Arizona on Lake Mead each fall since 1999, and has provided funding and support to the Lake Mead Razorback Sucker Study (C13) since 1995. Interagency cooperative native fish roundups have been occurring since 1987 on Lake Mohave and since 1999 on Lake Havasu (including the river reach below Davis Dam). Fish monitoring on Reaches 4 and 5 has been conducted 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.

**FY05 Accomplishments:** Reclamation conducted spring and fall netting surveys on Lake Mead with NDOW and AGFD; conducted monthly trammel netting on Lake Mohave (over 225 net nights); participated in spring and fall RASU roundups on Lake Mohave; participated in spring BONY roundups on Lake Mohave and Lake Havasu; participated in spring RASU survey on Lake Havasu; participated in electro-fishing surveys and ocular surveys for RASU between Davis Dam and Lake Havasu; conducted low-elevation surveys of Lakes Mead, Mohave, and Havasu for spawning RASU with Reclamation's helicopter; and conducted low elevation videography of the Colorado River from Imperial Dam to Davis Dam (both winter low flow and

summer high flow) by helicopter. All contact data for RASU and BONY through these surveys were provided to ASU for inclusion in the lower Colorado River native fish database.

**FY06 Activities:** Participation in ongoing multi-agency surveys and round-ups continues, as do monthly surveys for repatriated fishes in Lake Mohave (data provided to ASU to be used in accomplishing C12). Surveys for RASU below Davis Dam were completed and monitoring of sonic-tagged fish is being carried out. Reclamation is making digital video recordings with GPS reference of the entire lower Colorado River downstream of Hoover Dam (both banklines) as a reference tool for logistical support to system monitoring. Data consolidation is being initiated in order to produce the first comprehensive system monitoring summary for RASU and BONY this fall. The report will detail relative population size and distribution by river reaches and establish a baseline to monitor against in future years. All tagging data are provided to ASU for inclusion into native fish database.

**FY07 Proposed Activities:** Continue native fish monitoring; update the river-wide status report for RASU and BONY, detailing population size and distribution by river reach and highlighting observed changes.

**Pertinent Report:** Results are catalogued by Reach and available upon request.

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

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $55,000 | $110,000 | $100,000 | $100,000 | $100,000 |

**Contact:** Theresa Olson, (702) 293-8127

**Start Date:** FY04 **Expected Duration:** FY55

**Long-term Goal:** System monitoring and species research will be conducted for the western red bat and the western yellow bat 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):** This Work Task was previously included in the FY04 Work Tasks as Bat Surveys and Monitoring Protocol (B1). 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:** Indigenous bat species were surveyed annually along the LCR from 2001-2006 by Brown and Berry. A survey protocol was developed to conduct system-wide distribution and demography monitoring of covered bat species. 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.

**FY05 Accomplishments:** This work task was continued in FY06.

**FY06 Activities:** Coordinate with state and federal resource agencies and other interested parties to refine bat protocols and to determine best approach for system-wide monitoring of bat

populations along the LCR. Prepare and implement the protocol developed and monitor effectiveness of protocol. Initiate system monitoring for covered bat species.

**Proposed FY07 Activities:** Conduct acoustic surveys for covered bat species at Havasu NWR, Bill Williams River NWR, Cibola NWR, and Imperial NWR. Conduct mist netting surveys at cottonwood restoration sites on Imperial NWR, or a similar habitat creation site, to attempt capture of LCR MSCP covered species or riparian indicator species. Monitor bat populations at maternity sites, at least twice in FY07, to determine abundance and distribution of covered bat species. Maternity sites include the Homestake, Jackpot, Islander, Californian, Mountaineer, Stonehouse, Eureka, and 3C mines; and the Palo Verde Bridge. Collect and analyze guano from the mine roosts for analysis of pesticide residues and insect prey species.

**Pertinent Reports:** *Draft Lower Colorado River Bat Monitoring Protocol* will be posted to the LCR MSCP website.

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

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $60,000 | $65,000 | $65,000 | $65,000 |

**Contact:** Theresa Olson, (702) 293-8127

**Start Date:** FY06 **Expected Duration:** FY55

**Long-term Goal:** System monitoring, distribution, habitat and genetics studies to help provide data to design habitat creation projects for small mammal covered species.

**Conservation Measures:** AMM1, AMM6, MRM2, DPMO1, CRCR1, CRCR2, YHCR1, 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.

**Connections with other Work Tasks (past and future):** System monitoring data will be used in conjunction with post-development monitoring (F3) to determine habitat needs and characteristics of covered small mammal species. Data will be used in future habitat creation project design under Section E.

**Project Description:** Studies are 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. These species have previously been captured at the Pratt and Cibola Nature Trail restoration sites. Samples will be sent to a genetics lab for chromosomal/DNA analysis to determine the species of each animal sampled. Genetic differentiation of animals captured along the LCR may also be compared with animals of different sub-species located within Arizona, east of the LCR MSCP planning area, to obtain genetic markers. This data will be used to compare and contrast specific subspecies.

In conjunction with the above, Reclamation will also initiate a three-year study to determine the general distribution and habitat usage of these species along the LCR. This study will better

define the habitat characteristics utilized by the two species of cotton rats, and used to design future habitat creation projects.

**FY05 Accomplishments:** This is a new start in FY06.

**FY06 Activities:** Coordinate with state and federal resource agencies and other interested parties to develop system-wide small mammal surveys to determine populations and habitats for the covered species. Once protocols have been developed, they will be field tested and refined.

**Proposed FY07 Activities:** Trap in various habitats along the LCR and in previously established restoration sites, such as the Cibola Nature Trail and Pratt Restoration sites, to collect genetic samples from. Compare the genetic differentiation of animals captured along the LCR with animals of different subspecies captured in eastern Arizona to determine if genetic differentiation occurs between species found outside the LCR MSCP planning area and covered species. Results may influence habitat creation priorities. Determine the distribution and habitat use of these two species along the LCR through a trapping and vegetation sampling protocol.

**Pertinent Reports:** *Summary of Preliminary Mammal Trapping Efforts at Cibola National Wildlife Refuge and at the Pratt Agricultural Restoration Site 2004-05* posted on the LCR MSCP website. A study plan will be available upon request.

## Work Task D11: Vegetation Type Mapping

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $327,000 | $325,873 | $725,873 | $0 | $0 | $0 | $0 |

**Contact:** John Swett, (702) 293-8574

**Start Date**: FY04 **Expected Duration:** FY05

**Long-term Goal:** System monitoring

**Conservation Measures:** AMM1, AMM3, AMM5, AMM6, MRM1, and MRM2

**Location:** System-wide

**Purpose:** Determine the extent and distribution of land cover types that provide habitat for covered species by mapping riparian plant community, marsh plant community, and structure type along the LCR and its tributaries. Information will be used as a basis for the existing habitat maintenance program, as a basis to help determine survey areas for system-wide surveys such as SWFL and YBCU, for use in determining habitat development, and as a base layer in GIS mapping.

**Connections with other Work Tasks (past and future):** This Work Task was previously included in the FY04 Work Task as Vegetation Type Mapping and Backwater Evaluation (C1) and Draft FY05 Work Tasks as Vegetation Type Mapping (D1). Information obtained during this project will be used for the existing habitat maintenance program (H1); in mapping and monitoring/research site placement for system-wide studies such as D1, D2, D3, D4, D6, D7, D8, D9, and D10; and for habitat development mapping in Section E.

**Project Description:** Riparian and marsh communities have been delineated along the LCR since 1976, using the Anderson and Ohmart classification system. Periodic updates have been conducted along the LCR to help monitor changes in the riparian and marsh communities. The most recent vegetation type maps were created using imagery acquired in 1997. These acreage figures were used throughout the LCR MSCP planning process. This project will enable Reclamation to document changes in vegetation community and structure type.

**FY05 Accomplishments:** Digital aerial photography was acquired and triangulation, orthorectification, color balancing/image mosaicing, and draft vegetation type mapping was completed. This vegetation type mapping project utilized new digital technology that will provide comparable data for future system-wide habitat monitoring. All information will be stored in Reclamation's Lower Colorado Regional Office.

**FY06 Activities:** Accuracy assessment, final type maps, and the final report will be completed in FY06. While funding for this Work Task was authorized in FY05, the final products will not be completed until 2006 due to delays caused by using this new digital technology.

**Proposed FY07 Activities:** This project will be completed in FY06, with updates on an intermittent basis throughout the life of the program.

**Pertinent Reports:** *2004 LCR Vegetation Type Mapping, Backwaters Delineation, Orthophotography, and GIS Development* will be posted on the LCR MSCP website.

# WORK TASKS
# SECTION E

# CONSERVATION AREA DEVELOPMENT AND MANAGEMENT

## Work Task E1: Beal Lake Riparian and Marsh

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $293,000 | $393,000 | $1,625,267 | $200,000 | $358,000 | $210,000 | $210,000 |

**Contact:** Barbara Raulston, (702) 293-8788

**Start Date:** FY04 **Expected Duration:** FY09 decision point

**Long-term Goal:** Restoration research

**Conservation Measures:** CLRA1, WIFL1, WRBA2, WYBA-3, CRCR2, YHCR2, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, and, MNSW2

**Location:** Reach 3, Havasu NWR, ½ mile east of RM 237, AZ

**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 that allows testing of various planting and seeding methods while potentially creating habitat. Results of this project are expected be used elsewhere on the LCR in the creation and management of backwater and riparian habitats.

**Connections with Other Work Tasks (past and future):** This Work Task was previously included in both FY04 Work Tasks and Draft FY05 Work Tasks as Beal Lake, Havasu National Wildlife Refuge (D1) and (E1) respectively. 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 FWS 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, as well as the creation of over 100 acres of native riparian land cover types. Planning includes clearing, root plowing, and leveling areas previously comprised of sparse arrowweed and saltcedar, and replanting 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 perimeter of the field to block wind-borne weed seeds, and to naturally seed center of field when mature (Figures E1b and E1c). Monitoring will determine if these methods can produce the desired results:

1. Densities of cottonwood and willow high enough to shade out competing non-native 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/or maintain high vegetation density (Figure E1a). 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 (56 acres), and site preparation for Phase 2 (50 acres) were completed prior to FY05. Phase 3 (80 acres) was cleared during dredging and has developed into a mix of screwbean mesquite, salt grass, 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.

**FY05 Accomplishments:** Fifty-six (56) acres of cottonwood and willow planted in Phase 1 were irrigated during the growing season. Twenty-one (21) acres of Phase 2 were planted with cottonwood and willow (7,000 combined), and mesquite (1,500), including perimeter plantings. Approximately eight acres of ground in existing mesquite areas were seeded with a salt-tolerant mix of three shrub species. The interior of fields in Phase 2, which received perimeter plantings, were planted with a cover crop. All 50 acres of Phase 2 are now planted and were irrigated during the growing season. Honey mesquite seed pods were collected and scattered in Phase 3. Land cover types were monitored. At this time, no additional work is planned for Phase 3.

**FY06 Activities:** Improvements to Phase 2 were completed in December 2005 and January 2006 when water retention features were installed to create micro-habitats with wet soil within the site to attract SWFL. Irrigation of the site continues, with newly planted areas requiring more water than established vegetation. Monitoring of groundwater levels, irrigation, vegetation, birds, bats, and small mammals will continue. Establishment of a small (13 acres) wetland demonstration site for rail species is in the planning stage. A draft design is anticipated during the summer of FY06 and, if acceptable, is tentatively scheduled to be constructed in FY07.

**Proposed FY07 Activities:** Approximately 106 acres of native plant species created in Phases 1 and 2 will be irrigated throughout the growing season. The FY07 proposed budget includes the estimated cost of creating and monitoring 13 acres of California black rail habitat being designed in FY06. If the wetland is not created the costs would be reduced accordingly.

**Pertinent Reports:** *Beal Lake Habitat Restoration, April 2005* is posted on the LCR MSCP website. *Beal Riparian Restoration, Annual Report*, and a study plan for future actions, such as the rail wetland development, will be posted to the LCR MSCP website.

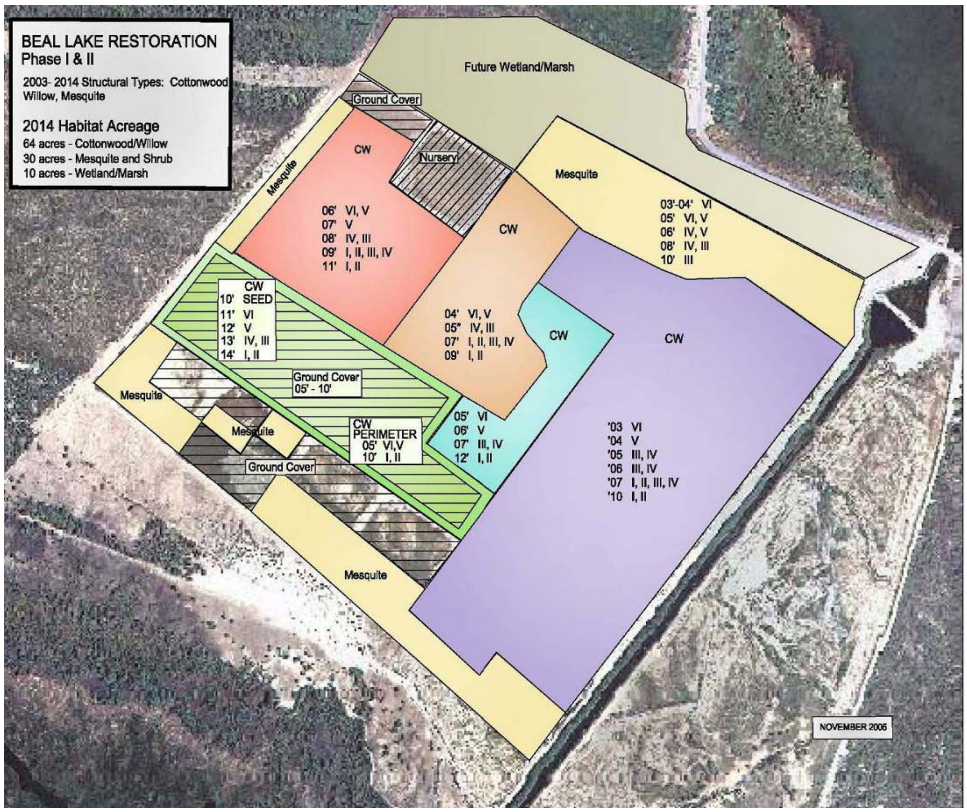



**Figure E1a:** Possible structural type changes, projected through 2014, due to management activities.

**Figure E1b:** Trees planted in January 2005 around the perimeter of the field (July 2005).

**Figure E1c:** Trees planted in January 2005 around the perimeter of the field (May 2006).

## Work Task E2: Beal Lake Native Fish

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $250,000 | $214,572 | $214,572 | $210,000 | $100,000 | $50,000 | $50,000 |

**Contact:** Gregg Garnett, (702) 293-8644

**Start Date:** FY05 **Expected Duration:** FY55

**Long-term Goal:** Habitat Creation

**Conservation Measures:** BONY2 and RASU2

**Location:** Reach 3, Arizona, Havasu NWR, ½ 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 to advance knowledge in backwater habitat function and maintenance requirements. Information from this research will be used to adaptively manage the backwater and will be used to increase efficiency and effectiveness in future backwater habitat creation projects.

**Connections with Other Work Tasks (past and future):** This Work Task was previously included in the Draft FY05 Work Tasks as a portion of Beal Lake, Havasu National Wildlife Refuge (E1). Monitoring of native fish is being addressed under F5.

**Project Description:** A substantial investment was made in the restoration of Beal Lake prior to the implementation of the LCR MSCP. Located on Havasu NWR, Beal Lake was approximately 225 acres of shallow, low-quality aquatic habitat that was dredged to deepen it, 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 protected native fish habitat first agreed to as a portion of the BO. The obligation for the continued maintenance and management of Beal Lake as well as current and future research and development of the backwater as native fish habitat have been included in LCR MSCP activities.

A component of the restoration research and management of Beal Lake included the installation of a cylindrical wedge wire screen system. As the preferred alternative for backwater habitat creation, Beal Lake was initially isolated from Topock Marsh with a passive rock filtration system. After several months of poor performance (specifically, inability 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 continue to be effective in excluding all life stages of non-native fishes. A cylindrical wedge-wire screen system was selected because of several advantages in terms of ease of maintenance and long-term performance. Because cylindrical wedge-wire screen technology had never been used in this particular 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 be more efficient, a number of the existing water control structures at Beal Lake were replaced during the screen system installation. These features operated poorly and were not sized adequately to supply the necessary water volume to the irrigation pump or to Beal Lake.

Additional improvements have been proposed to allow for more effective management of water in Beal Lake. A water management system that would enable large-scale water removal, water level control for fisheries management, and large scale-water circulation capabilities is preferred. The system would consist of a permanent platform, ramp, and discharge pipe that allow for the intermittent deployment of various pumps, depending on the specific management need. Specifically, the water management system will be used to assist the irrigation pump in lowering the water level in Beal Lake for lake renovation (this process includes pre-treatment fish salvage, chemical treatment of the water to kill remaining non-native fish, post detoxification sampling, and restocking with native fish). In addition, it 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. Without the ability to provide water exchange, native fish populations and their associated biological communities in Beal Lake may be impacted. In order to maintain adequate water quality in Beal Lake over the long-term, there must be a mechanism for large-scale water circulation.

**Previous Activities:** The costs of initial backwater creation, including dredging and isolating the backwater with a semi-permeable rock structure prior to FY05, were incurred prior to the LCR MSCP.

**FY05 Accomplishments:** Improvements to the water management system were completed and included the replacement of stop-log water control structures between Topock Marsh and the irrigation pump bay with a series of 18" gated culverts to provide adequate water volume for the irrigation pump, and to maintain Beal Lake.

A cylindrical wedge-wire screen system was installed in spring 2005. The system consists of three 18" diameter PVC pipes installed through the existing rock structure with cylindrical wedge-wire screens installed on each end of the pipes using standard flange connections. An additional 18" pipe was installed which could be screened at a later date if capacity was deemed insufficient. This essentially means that each pipe and screen combination will represent an independent system. An in-line valve was installed in each pipe to allow the pipe to be closed when necessary (i.e., repair or replacement of screens, etc.).

The screens were custom fabricated and purchased from Johnson Screens. The screens are approximately three feet in diameter and approximately three feet long. They are constructed of Z-Alloy, an anti-biofouling nickel-copper alloy developed by Johnson Screens, and are equipped

with an internal diffuser and 3" air backwash system. The screen slot size is 0.6 mm and each screen has a capacity of 1,500 gallons per minute.

The screen system was evaluated after installation to determine the effectiveness and efficiency of the system with respect to screening capabilities, hydraulic performance, and maintenance requirements. This also included a test of the screens' internal backwash systems. The testing involved three independent sampling events during different seasonal conditions and over a number of different flow scenarios. In addition, continuously sampling water level sensors were installed to provide remotely accessible data to assess future screen performance.

Results indicate that the screen system is more than adequate to provide water to balance evaporative losses in Beal Lake. Results also suggest that the system has relatively low maintenance requirements, best handled through regular low-tech cleaning of the screens. Based on the exceptional performance of the contracted services for these evaluations, Phase 2, evaluation of the screen system's biological exclusion capabilities, would be funded in FY06.

Actual expenditures in FY05 were less than projected because the installation of the water management system was rescheduled for FY06 to allow adequate time for compliance permitting; however, preliminary designs and permitting activities were initiated in FY05.

**FY06 Activities:** In March FY06, a water management system was constructed on the south end of Beal Lake and a 50 cubic feet per second hydraulic pump was deployed. Due to successful installation and testing of the water management system, promising performance of the screen system, and availability of native fish for stocking, renovation plans for Beal Lake were accelerated with cooperation from the FWS. Immediately after installation, the water management system was used to lower water levels in Beal Lake in preparation for renovation. A salvage effort was conducted prior to renovation with cooperators from AGFD, FWS, and Reclamation to remove any remaining razorback suckers and significant game species. Beal Lake was then treated with a new formulation of rotenone, called CFT legumine. This formulation of rotenone uses a plant-based carrier (surfactant), rather than a petroleum distillate carrier, and has a reported lower toxicity to periphery habitats. This treatment also represents the first large-scale use of this product in the United States. The rotenone was applied to the surface of the lake by helicopter in two treatment events in April 2006 to increase the likelihood of complete removal of non-native fish. If post-renovation surveys and sampling indicate that the renovation was successful, subsequent native fish species stocking will be coordinated with the FWS.

Phase 2 of the screen system evaluation is currently ongoing. Larval stages of threadfin shad and two other non-native species (or appropriate surrogates) are being introduced into the vicinity of a scale model screen system in a laboratory setting. Samples from the downstream end of the screens will be examined to determine the percent exclusion and condition. Study results will be made available on the LCR MSCP website.

**Proposed FY07 Activities:** Major improvements to isolate and renovate the backwater are anticipated to be complete prior to FY07. A post renovation assessment will be made to determine if the facilities present at Beal Lake are functioning properly. Future work may

include upgrades to improve the integrity of the rock structure and/or the installation of additional screens to increase flow capacity. The budget estimate for FY07 allows for continued project coordination with the Havasu NWR and FWS fisheries resource office, as well as, the operation, maintenance and management of the backwater for native fish. Part of the operation and maintenance funding would support on-site staff to conduct regular maintenance activities including, inspection and routine cleaning, monitoring, evaluation, and repair (if necessary) of the wedge-wire fish screens, and related water control structures, as well as regular inspection of the rock structure. In addition, part of the FY07 proposed budget will cover regular calibration/maintenance of the water level sensors and data loggers at Beal Lake, as well as follow-up research reporting.

**Pertinent Reports:** *Evaluation of a Cylindrical Wedge-Wire Screen System at Beal Lake, Arizona, 2005* is posted on the LCR MSCP website.

Figure E2a: Assembling the wedge-wire fish screen system.

Figure E2b: In situ hydraulic testing of the wedge-wire screens.

Figure E2c: Installation of the wedge-wire fish screen system.

## Work Task E3: Ahakhav Tribal Preserve

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $120,000 | $43,928 | $1,081,719 | $120,000 | $60,000 | $60,000 | $160,000 |

**Contact:** Barbara Raulston, (702) 293-8788

**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 over 200 acres of cottonwood, willow, mesquite, and marsh.

**Connections with Other Work Tasks (past and future):** This Work Task was previously included in the FY04 Work Tasks and Draft FY05 Work Tasks as Ahakhav Tribal Preserve, Colorado Indian Tribes (D4) and (E5) respectively. Vegetation and species monitoring are being addressed in F1-F4.

**Project Description:** In September 2004, Reclamation finalized a 5-year agreement with the CRIT to conduct habitat restoration at the Ahakhav Tribal Preserve, located just south of Parker, Arizona. The 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, the CRIT established the Ahakhav Tribal 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, planting cuttings of various sizes, etc. 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 re-vegetation projects. Maintenance and management of approximately 135 acres of riparian land cover types created since 2003 is ongoing, and an additional 120 acres of restoration are planned.

**Previous Activities:** Work began in 2003 by way of restoring CRIT 9 with native riparian plant species. This involved site preparation (clearing, root-ripping, leveling), soil testing,

installation of irrigation infrastructure, and planting. Monitoring has been on-going throughout the process.

**FY05 Accomplishments:** Under the 2004 Cooperative Agreement, funding from this Work Plan was used for the following activities on the Preserve:

1. Irrigation and monitoring of approximately 135 acres of cottonwood, willow, and mesquite land cover types established on CRIT 9.
2. Maintenance activities on irrigation infrastructure (repair and/or replace as necessary) to allow for continued flood irrigation.
3. Weed control implemented by planting of a cover crop of native understory species.
4. Fertilization of native vegetation using foliar application.
5. Vegetation monitoring for survival and condition.
6. Surveying for LCR MSCP targeted species.
7. Clearing of CRIT 11 (herbicide application, root ripping and burning of debris piles).

Expenditures in FY05 were less than anticipated, due, in part, to the delay in initiating any habitat creation at CRIT 12, and an overestimate of staff time. Future cost estimates for FY06-08 have also been reduced accordingly.

**FY06 Activities:** Irrigation and monitoring of approximately 135 acres of cottonwood, willow, and mesquite land cover types ranging in age from one to four years previously established on CRIT 9 is anticipated in FY06. Disking and burning of debris piles; purchase and installation of irrigation infrastructure; and other site preparations are underway at CRIT 10. Planning and installation of irrigation infrastructure are underway at CRIT 11. The administrative process is underway to allow the Preserve to potentially restore and manage CRIT 12 as LCR MSCP habitat. Reclamation and CRIT are in discussions regarding whether this area and/or others can be included as LCR MSCP projects.

**Proposed FY07 Activities:** Irrigation and monitoring of approximately 135 acres of cottonwood, willow, and mesquite land cover types established on CRIT 9 are proposed in FY07. Irrigation will be directed to the areas with the densest vegetation to create moist soil conditions for southwestern willow flycatcher (SWFL). Cutting, thinning, clearing, and replanting under- to mid-story vegetation to create microhabitats suitable for the SWFL and other species is anticipated. CRIT 10 will be planted using cottonwood-willow cuttings and mesquite seed. Reclamation will monitor habitat, survey for LCR MSCP targeted species, and report results. Site preparation of CRIT 11 continues (installation of irrigation infrastructure), to be followed by planting using a variety of techniques and irrigation methods.

**Pertinent Reports:** 2005 Summary Report, *'Ahakhav Tribal Preserve: CRIT 9 Restoration* and study plans for future actions will be posted on the LCR MSCP website.


Figure E3a: Re-vegetation of the Colorado River Indian Tribes' Ahakhav Tribal Preserve, CRIT 9 and CRIT 10 Projects, November 2005.

## Work Task E4: Palo Verde Ecological Reserve

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $66,745 | $66,745 | $310,000 | $976,000 | $770,000 | $1,405,000 |

**Contact:** Gail Iglitz, (702) 293-8138

**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 Work Tasks F1-F4. Insect populations evaluated under C5 and C6.

**Project Description:** The Palo Verde Ecological Reserve (PVER) encompasses over 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 (over four miles) is adjacent to the Colorado River; the western boundary is adjacent to active agricultural fields. PVER has an extensive infrastructure consisting of miles of lined irrigation ditches, roads, and a pump. Currently, the acreage is leased to a contract farmer and is planted with crops of alfalfa and wheat. Each year a portion of the active crop acreage will be taken out of production in order to develop the next phase of native habitat (Figure E4a). The intent is to create as much riparian habitat as practical. Phase 2 is targeted for SWFL, YBCU, and other covered species.

To date, standard farming practices are an efficient and effective way to convert agricultural cropland to habitat. Costs for development and maintenance of the habitat include such farming methods as land leveling, disking, irrigation of crops, repair and maintenance of the irrigation system, 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.

The mass transplanting technique has shown to be a cost effective method for planting riparian trees and shrubs. This method includes the collection of plant material, propagation, and planting of native species.

It is essential to have a mosaic of habitats which consist of areas of riparian species (including mesquite), and ground covers or open areas. Ground cover is an effective method of controlling non-native 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 one-gallon planted tree.

Agricultural areas have irrigation systems in place which 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.

**FY05 Accomplishments:** Discussions were initiated with CDFG to define future restoration actions at PVER. An environmental assessment for compliance was completed, as well as cultural resources compliance for the entire 1,438 acres (approximately 1,300 irrigable acres). A preliminary phase schedule for conversion of agricultural crops to native habitat was developed (Figure E4a).

**FY06 Activities:** The phase schedule has been developed and is being reviewed with CDFG. The schedule was made available to the contract farmer, so that each year a known amount of acreage will come out of agricultural production and be made available for habitat restoration. Party responsibilities and securing an interest in the land and water for the LCR MSCP is being documented in a restoration agreement between Reclamation and CDFG, which is currently under development.

The plan and design for Phase 1 development of a native plant nursery was drafted and posted on the website early in FY06. In Phase 1, a native nursery was planned, designed, and planted. This nursery will provide plant material for future restoration activities. A total of 31 acres consisting of 2,200 riparian trees and shrubs (Figures E4b and E4c), along with a ground cover of salt grass were planted in the spring. The trees and shrubs were planted on 20-foot on center allowing easy access for future collection of seeds, poles, whips, and leaf material.

The *Palo Verde Ecological Reserve Restoration Development Plan: Overview*, a general document describing the entire project including an adaptive management plan and a monitoring plan, has been drafted and is expected to be available in FY06. In Phases 2-3 (FY06-08), cottonwood-willow land cover type will be established to provide habitat for SWFL, in accordance with the 2001 SIA obligations being accomplished by the LCR MSCP. The plan and design for Phase 2 (80 acres) has been developed and will be posted on the LCR MSCP website. Phase 2 includes three components: (1) habitat creation with a research component, (2) demonstrations of soil amendments and pond liner products, and (3) mass planting of trees and shrubs in a design that will integrate proximity of irrigation source with water requirements of native plants.

**Section 1 – Restoration of Riparian Habitat on the LCR: Implications of genetic and vegetation density factors on habitat properties of the Southwestern Willow Flycatcher**

The following habitat creation project includes a part of the research and development component identified in the FY06 PVER work plan and in Phase II of the *Palo Verde Ecological Reserve Development Plan*. This project is intended to serve as a research-based approach to habitat creation. As in other individual projects identified for Phase II at PVER, this project is specifically targeted as habitat creation for SWFL to fulfill part of the acreage designated by the SIA for the LCR MSCP. The project will be located on an approximately 17-acre field at PVER. Vegetation species composition, density, structure, and moisture regime will be established and managed for SWFL. In addition, research will be conducted on this acreage to provide information specific to increasing our knowledge in how to effectively create habitat for SWFL. This information will be used to increase our effectiveness in future habitat creation projects.

As Reclamation moves forward into implementation of the LCR MSCP, is it essential to establish repeatable methods for habitat creation early-on. Unlike a purely scientific experiment, this project blends habitat creation with an organized, systematic approach to filling some of our knowledge gaps. There are advantages to this approach as wells as tradeoffs. The most notable advantage is achieving part of the acreage goals for our SIA commitment; the most obvious tradeoff is the limitation of treatments and control due to high potential variability. Overall we believe that the project is a practical blend of habitat creation and scientific research that moves us closer to achieving program goals.

In essence, the research part of this project focuses on two treatments: riparian species composition/density and specific/combined genotype effects and how they influence the suite of physical habitat parameters and prey base for SWFL. In this way, we will gain insight into how altering riparian species density and composition (a habitat establishment technique) can improve habitat creation effectiveness for SWFL. Previous research has implicated genetic diversity in dominant riparian vegetation as important for the survival of associated rare and endangered species and has gone on to suggest that specific genotype effects can be vital for supporting particular species due to the trophic interactions that they permit. This study will allow us to determine if these effects are present in co-evolved riparian communities that influence LCR ecosystems and how important they are for SWFL in the context of practical habitat creation approaches. In addition, we will be including high genetic diversity within this created habitat for the added benefits of potential resistance to disease and insect outbreaks, and insight into specific genotype growth and survival performance in this setting.

Reclamation has entered into a 3 year cooperative agreement with NAU. NAU's contribution to this agreement includes: genetic screening of 3 riparian tree species at 51 sites across drainages with historical genetic influence to the LCR; collection, propagation, and establishment of an experimental garden (~ 20,000 trees) with replicated habitat mosaic treatment blocks and; three years of monitoring SWFL prey base (arthropod diversity and

abundance), monitoring of individual tree growth and performance, and measurement of physical habitat parameters per treatment block including tree density, percent canopy cover, and microclimate (soil moisture, relative humidity, etc.). NAU will provide annual reporting and management recommendations as the site develops. Reclamation's contribution to this agreement includes agreement administration, assistance with establishment of the experimental garden (site prep, cover crop, planting equipment), and site irrigation and maintenance costs.

**Section 2 – Demonstration of Ponding Techniques:** A 5-acre area near the irrigation gates will be used to demonstrate ponding techniques. This study will evaluate soil amendments and containers to promote areas of moist soil and standing water. Soil amendments and/or products will be placed in small areas (approximately 25 feet by 50 feet). Each treatment will be duplicated once. The containers and amendments will be shallow enough to allow flood irrigation to fill and move any residual salts out of the area (6-18"). The wet areas (amendments or containers) will range from small to medium in size and be arranged in clusters, to create large pockets of standing or saturated soil areas. This will create areas of humidity and for insect production needed for a food source for the Southwestern willow flycatcher and other covered species.

**Section 3 – Mass Transplanting Riparian Trees and Shrubs:** The remaining 55 acres will be planted using the mass transplanting technique. The preferred habitat parameters of the SWFL are incorporated into the design, including the maximization of the Goodding's willow/coyote willow edge relationship within the mosaic of riparian vegetation. Water intensive trees and shrubs are located closest to the irrigation gates to utilize the higher amount of water around the irrigation gates. Plants with the least water requirement (*Atriplex* and mesquite) will be planted farthest away from the gates.

A one-year contract with four optional years was awarded for the collection, propagation, and mass transplanting of native trees and shrubs. The contract will provide plantings of trees and shrubs for up to 1,100 acres of future habitat restoration sites over the next 5 years.

**Proposed FY07 Activities:** Site preparation for mass transplanting of riparian trees and shrubs on approximately 80 acres will be performed. Ponding techniques and NAU research will begin in spring 2007. Cottonwood-willow planting will begin in March. The mesquite trees will be planted in fall 2007, after one growing season at the nursery.
The soil amendments and water retention products will be in place in the spring. Monthly observations of the demonstration products will be recorded through the year. The plan and design for Phase 3 is being developed.

**Pertinent Reports:**
*Palo Verde Ecological Reserve Development Plan: Overview* will be posted to the LCR MSCP website.
*Palo Verde Ecological Reserve Development Plan: Phase 1* has been posted to the LCR MSCP website.
*Palo Verde Ecological Reserve Development Plan: Phase 2* will be posted to the LCR MSCP website and a study plan is available upon request.

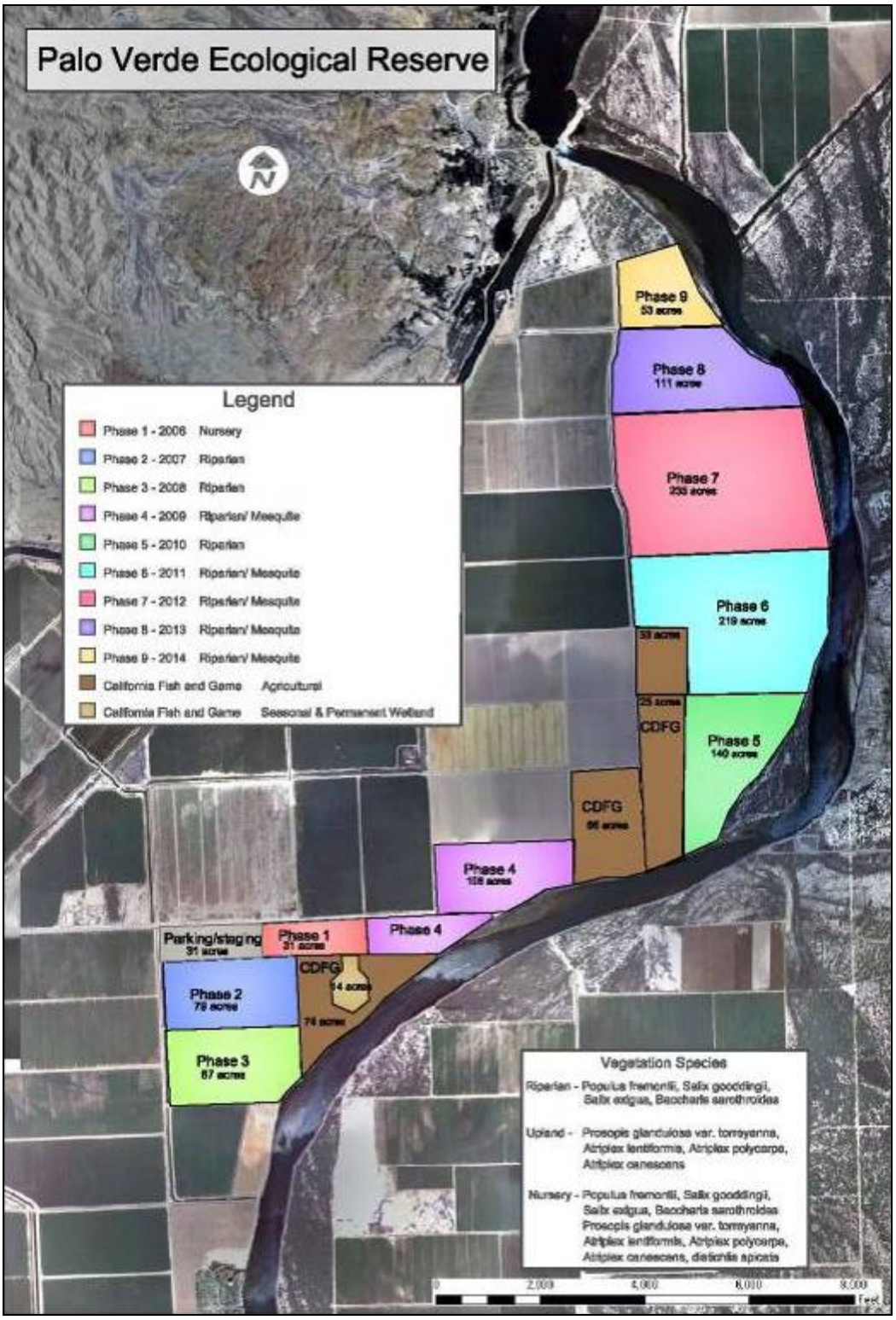



Figure E-4a: Proposed phasing schedule of agricultural crops to riparian habitat.

**Figure E4b:** Willow trees, with alfalfa as a cover crop, in the native plant nursery.

**Figure E4c:** Hand planting *Atriplex lentiformis* in the nursery.

## Work Task E5: Cibola Valley Conservation Area

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $120,000 | $117,716 | $117,716 | $1,633,000 | $2,656,000 | $1,594,000 | $1,566,000 |

**Contact:** Bill Singleton, (702) 293-8159

**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):** This Work Task was previously included in the Draft FY05 Work Tasks as Cibola Valley Conservation Area (E8). Vegetation and species monitoring are being addressed, F1-F4. Native trees are being established using techniques described in E7. Insect populations are being investigated as described in Work Task C5.

**Project Description:** Mohave County Water Authority (MCWA) owns and manages 1,019 acres of active agricultural lands serviced by the Cibola Valley Irrigation and Drainage District. MCWA has made the lands available for restoration by the LCR MSCP. These lands are referred to as the Cibola Valley Conservation Area (CVCA). Due to the size of the property, and to allow for implementation of the Adaptive Management Program, the property is being developed in annual phases.

Overall development of the property is discussed in a document entitled *Cibola Valley Conservation Area Restoration Development Plan: Overview* which will be posted on the LCR MSCP website in FY06. A specific "Phase Plan" will be developed and posted. These documents will include information discussing the various planting and monitoring concepts utilized.

Additionally, work is underway in conjunction with the University of Arizona, to determine the optimal quantity of irrigation water that should be supplied during native tree establishment. This research is exploring the relationships between soil water supply and tree physiological response and will conclude in February 2009.

In Phases 1-3 (FY06-08), cottonwood-willow land cover type will be established to provide habitat for SWFL, in accordance with the SIA obligations that are being addressed. The remaining lands will be developed as habitat, including buffers, depending on site conditions and water availability. Eighty-six (86) acres were selected for Phase I to establish a 22-acre native plant nursery and create 64 acres of cottonwood-willow habitat to be managed for SWFL. Phase 2, consisting of 76 acres of SWFL habitat, is scheduled for FY07 and is located due south of Phase 1. Phase 3 is scheduled for habitat creation in FY08.

**Previous Activities:** In anticipation of the implementation of the LCR MSCP, Reclamation evaluated the two primary planting methods utilized on restoration demonstration projects conducted prior to 2001 dormant poles and potted plants. With the exception of the Cibola Nature Trail at Cibola NWR, all demonstration projects were less than seven acres in size. While these methods are effective and result in a high survivability rate, these methods are labor-intensive and do not translate well to large-scale habitat creation. At the scope required to meet LCR MSCP obligations, past methods have proven too costly and labor intensive. The costs and effectiveness of alternative methods are being tested through other Section E Work Tasks and will be evaluated as results become available.

Over the last several years, Reclamation has conducted demonstrations to investigate the feasibility and effectiveness of various methods to achieve dense, rapid-growth plantings of native species; inhibit the establishment and growth of non-native plant species on restoration sites; and evaluate any potential cost benefit of the methods.

**FY05 Accomplishments:** Planning for development and creation of habitat on CVCA was initiated. Documents for ensuring long-term commitments of all parties and securing interest in land and water began.

*Cibola Valley Conservation Area: Restoration Development Plan: Phase 1*, which included the planning, design, and engineering for a 22-acre native plant nursery and 64 acres of cottonwood-willow habitat, was drafted.

Environmental compliance activities were completed to allow for planting of Phase 1 and included a class III cultural resources inventory for the entire 1,319 acres owned and managed by MCWA.

**FY06 Activities:** We are pursuing securing a long-term interest in land and water. A formal LCR MSCP technical workgroup meeting to discuss the *Cibola Valley Conservation Area: Restoration Development Plan: Phase I*, was held in Yuma in December 2006.

Phase 1, an 86-acre parcel, was planted using a vegetable mass transplanter, creating 64 acres of future SWFL habitat. A 22-acre native plant nursery was planted with labor assistance from the Nevada Conservation Corps. The nursery will provide plant material for future restoration activities. A local farmer was contracted to prepare the fields for planting, irrigate as required, and provide repairs as required to the irrigation system infrastructure. Further discussions on land ownership, water issues, and management options are in process.

Reclamation conducted an analysis of the CVCA irrigation system for Phases 1 through 3 (approximately 160 acres) to assess the current status of the irrigation infrastructure, and to recommend alternatives for irrigation rehabilitation/improvement that include itemized cost estimate and irrigation uniformity.

Irrigation research was conducted by the U of A in the Phase 1 location to gather data for future sites. This three-year field experiment will evaluate the response of three native tree species to two different surface irrigation regimes and fertilization. Before the experiment commenced, a local weather station was installed to collect local weather data. Phase 1 fields were thoroughly mapped using electromagnetic induction, which allows for spatial mapping of soil texture and salinity. Following this initial characterization, the fields were planted with an alfalfa cover crop, after which the trees were planted. Tentatively, the irrigation water regimes consisted of "baseline" (6 acre-feet per year) and "excessive" (150% of baseline) application. Soil moisture content, drainage, and tree response are being 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 have, and will continue to receive, periodic nitrogen fertilization, and plant response will be measured.

Soil/water content, drainage, and plant response are being measured for three growing seasons. Soil water content and drainage in each irrigation regime will be measured to a depth of 2.5 m by using an array of capacitance sensors. These sensors are equipped with telemetry; thus, the data will be available in near real-time (15 minute intervals). Plant response to the irrigation regimes will be evaluated on whole-plant and leaf bases. Whole plant measurements will be made four times per year and will include plant height, diameter, and leaf area index. During the growing season, leaf water potential and leaf gas exchange will be measured monthly. Plant transpiration (water use) will be monitored continuously by measuring sap flow. Leaf samples will be collected twice per year for analysis of carbon, which is related to water use efficiency.

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. The research and results will allow estimation of an appropriate irrigation regime for successful habitat restoration.

*Cibola Valley Conservation Area: Restoration Development Plan: Phase 2* is being drafted and will be available in FY06. The plan and design for Phase 2 has been developed, with approximately 76 acres being developed and maintained for riparian habitat. The environmental compliance process was initiated for developing the remainder of CVCA.

**Proposed FY07 Activities:** Provide irrigation and management Phase 1. Research, being conducted by the U of A, which began in FY06, would continue throughout FY08.

Plant and irrigate 76 acres of native plant species as described in the *Cibola Valley Conservation Area Restoration Development Plan: Phase 2*. Planting of Phase 2, combined with trees planted in Phase 1, will form a larger block of native vegetation with the intent of creating an integrated mosaic of habitats. All the acreage will be developed and maintained for riparian habitat

targeting SWFL. The irrigation infrastructure for Phases 1 and 2 will be modified to provide irrigation water for the next 20-30 years. Main access roads will be graveled with type II base to control dust, in accordance with local regulations. Create and post the document entitled *Cibola Valley Conservation Area Restoration Development Plan: Phase 3*, which includes design and planting plan of Phase 3 that would be established in FY08.

**Pertinent Reports:**

*Soil-Plant-Water-Nutrient Relationships of Populus Fremontii, Salix gooddingii, and Salix exigua During Native Habitat Restoration* study plan from the Soils Science Department of Soil, Water, and Environmental Science, University of Arizona, is available upon request.
*Cibola Valley Conservation Area Draft Report for Phase 1*
*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* will be posted on the LCR MSCP website.

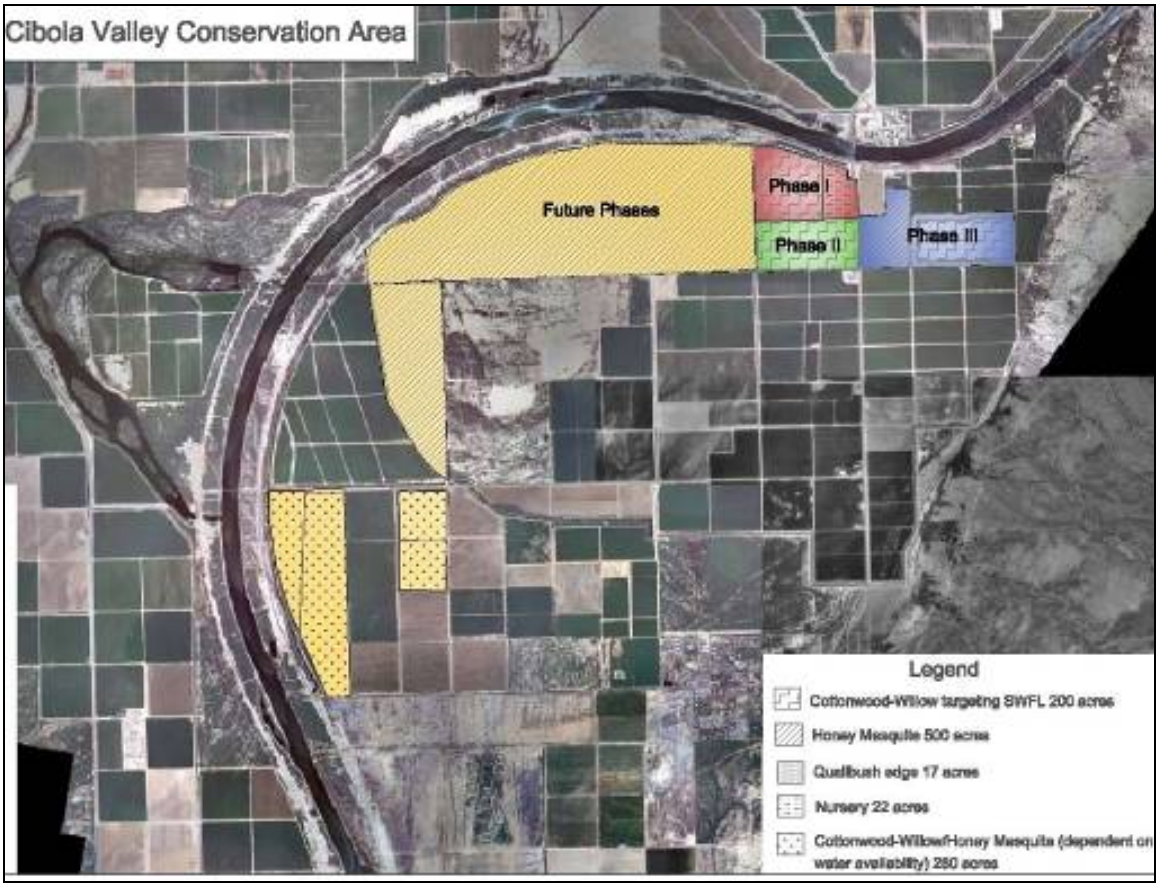



Figure E-5: Potential phasing of habitat creation, beginning with Phase 1 in FY06.

## Work Task E6: Cottonwood Genetics Study

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $50,000 | $109,927 | $219,931 | $25,000 | $15,000 | $15,000 | $15,000 |

**Contact:** Gregg Garnett, (702) 293-8644

**Start Date:** FY04 **Expected Duration:** FY09 decision point

**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, 1/2 mile east of River Mile 97, AZ

**Purpose:** This research project is designed to determine the relative levels of genetic diversity in the remaining stands of Fremont cottonwood (*Populus fremontii*) 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 themselves 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 is included in habitat creation projects.

**Connections with Other Work Tasks (past and future):** This Work Task was previously included in the FY04 Work Task as Farm Unit #1 (Cottonwood Genetics), Cibola National Wildlife Refuge (D3) and in Draft FY05 Work Tasks as a portion of Farm Unit #1 (Genetics, Mass Planting, Seed), Cibola National Wildlife Refuge (E6). All Work Tasks in Section E that target cottonwood-willow habitat.

**Project Description:** Reclamation has entered into a five-year land use agreement with the FWS to conduct restoration research in Farm Unit #1 at Cibola NWR. The agreement expires in FY09 at which point a decision will be made to continue research activities, manage land cover types as habitat created during the research for the 50-year life of the LCR MSCP program, or discontinue funding. 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. 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; as well as, 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 cooperative agreement was awarded in September 2004 (FY04) to initiate work in the amount of $110,004 were obligated.

**FY05 Accomplishments:** NAU researchers collected leaf tissue from 600 Fremont cottonwood trees distributed in five states. The researchers isolated DNA from approximately 250 trees and performed genetic screening and analysis of leaf tissue DNA. Preliminary results indicate that genetic diversity is high in Fremont cottonwood within particular locations and across the Southwest. At this time, it is unknown how these genotypes will express these differences when planted in the experimental garden.

Sixteen (16) genotypes were selected from various locations across the Southwest to be included in the experimental garden, and cuttings from these trees were propagated at NAU greenhouse facility (see figureE6a). A map was developed for the experimental garden's replicated planting design and addresses the interaction of spatial, genetic, and geographic effects on cottonwood communities and ecosystems. Over 10,000 trees were propagated to fulfill the planting design and compensate for potential mortality. Preliminary observations suggest that cottonwood genotypes differ in propagation success and dormancy behavior. Additional observations corroborate information regarding non-dormant collection and propagation success.

In July 2005, a modification was made to the cooperative agreement with NAU. The site selected at Cibola NWR included two fields with more acreage than anticipated in the original planting design (see figure E6b). In order to completely fill the site, the experimental garden had to be expanded. This change was considered beneficial because it would allow for a more robust study design and would maintain consistent coverage over the entire fields. To support this increase in project scope, additional funding was obligated to cover the costs for the additional trees (collection, propagation, and greenhouse space), and to cover the increased staffing to support the expansion of the experimental garden (increased planting and monitoring costs). This modification translated into an underestimate for the FY05 budget projection by roughly $60,000. Planting of the experimental garden (originally targeted for spring 2005) was delayed until fall 2005 (FY06) to ensure the propagated trees had adequate root development.

**Proposed FY06 Activities:** Planting of the experimental garden occurred in October/November 2005. Reclamation provided personnel to assist NAU in planting and a tractor and operator as part of contracted farming services. Cibola NWR supplied the tree planting equipment. Survivorship surveys will be conducted by NAU in FY06 as well as baseline arthropod monitoring and establishment of a reference collection of invertebrate species from adjacent cottonwood stands. Additional support from Reclamation is expected to be limited and may include staff time for agreement coordination and administration, equipment purchase or rental, and minor field support.

**FY07 Proposed Activities:** NAU is scheduled to perform any needed mortality replacements for the trees in the experimental garden in late winter/early spring of 2007. Data collection including trophic responses and measurement of physical parameters will continue through 2007. These data will include samples of soil microbes, invertebrate communities, and monitoring growth and development of trees. This information is necessary to determine if genotype differences important for restoration are being expressed. The majority of this portion of the study will be funded through NAU cost share. Support from Reclamation will be limited and may include staff time for agreement coordination and administration, equipment purchase or rental, and minor field support.

**Pertinent Reports:** A study plan is available upon request.

Figure E6a: Propagated Fremont cottonwoods at NAU greenhouse facility.

Figure E6b: Aerial view of fields selected and prepared for planting at Cibola NWR.

## Work Task E7: Mass Transplanting Demonstration

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $350,000 | $307,000 | $307,000 | $10,000 | $15,000 | $15,000 | $15,000 |

**Contact:** Gail Iglitz, (702) 293-8138

**Start Date:** FY05 **Expected Duration:** FY09 decision point

**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 National Wildlife Refuge, ½ mile east of River Mile 97, AZ

**Purpose:** This research project evaluates mass transplanting techniques for cottonwood and willow using commercially available mechanized transplanting equipment. Based on a cursory review of the species profiles being prepared for LCR MSCP covered species, combined with the requirement to create 5,940 acres of cottonwood-willow land cover type habitat, a significant amount 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):** This Work Task was previously included in the Draft FY05 Work Tasks as a portion of Farm Unit #1 (Genetics, Mass Planting, Seed), Cibola National Wildlife Refuge (E6). This applies to all Work Tasks in Section E that require terrestrial habitat creation.

**Project Description:** Reclamation has entered into a 5-year land use agreement with the FWS to conduct restoration research in Farm Unit #1 at Cibola NWR. The agreement expires in FY09, at which point a decision will be made to continue research activities, manage land cover types as habitat created during the research for the 50-year term of the LCR MSCP program, or discontinue funding. 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 in restoration of 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 non-native plant species and to achieve dense growth of native tree species. Up to 36 acres of cottonwood-willow habitat may be created as a result of the demonstration.

**Previous Activities:** In anticipation of the implementation of the LCR MSCP, Reclamation evaluated the planting methods utilized on restoration demonstration projects conducted prior to

2001. With the exception of the Cibola Nature Trail at Cibola NWR, all those demonstration projects were less than seven acres in size. Dormant poles and individual potted plants were used as the plant materials on these sites. These methods are labor-intensive and do not translate well to large-scale habitat creation. At the scope required to meet LCR MSCP obligations, past methods have proven too costly and labor intensive. The costs and effectiveness of other methods are being tested and will be evaluated as results become available.

Over the last several years Reclamation has conducted demonstrations to investigate the feasibility and effectiveness of various methods to achieve dense, rapid growth plantings of native species; inhibit the establishment and growth of non-native plant species on restoration sites; and evaluate any potential cost benefit of the methods. The demonstration of mass transplanting may be used as an alternative to planting either dormant poles or 1-gallon rooted stock and to evaluate density spacing of 1 – 3 feet.

**FY05 Accomplishment:** A contract for the demonstration of mass transplanting of cottonwood and willow utilizing commercially available equipment was awarded to two contractors. Each contractor detailed similar mass transplanting approaches with significantly different timing for collection of plant material and planting of trees and varied greenhouse facilities. The intent was to demonstrate and compare each of these techniques. Each technique was evaluated for the effectiveness of creating quality habitat and cost benefit. Currently, these methods are being utilized in the agricultural industry to produce high quality fruits and vegetables cost effectively.

The demonstration project took place on two existing alfalfa fields, each approximately 20-acres in size, and provided for the mass transplanting of cottonwood and willow. Each field was prepared in the same fashion with disking and ring rolling. Both fields were flood irrigated prior to planting, immediately after planting, and every three days for the first two months.

Plant material was collected by each contractor from areas along the LCR. One contractor collected in January 2005 when the trees were dormant; and the other collected in March 2005, when the trees were no longer dormant. The contractor who collected in January utilized a state-of-the-art greenhouse with a computer-controlled environment (heat, light, and moisture), rolling benches, shade systems, and high intensity discharge lighting to propagate the cuttings. The contractor who collected in March utilized only a basic greenhouse with shade covers to control lighting.

The trees collected in January were planted April 24 and 25, 2005. The ambient temperature was 75 degrees F with no wind. A total of 8.5 acres were planted with 46,000 trees, with either 1-foot or 3-foot in-line spacing in rows 38” apart. Irrigation was provided within 24 hours of planting. The fields previously had a crop of alfalfa growing in each, which had been disked prior to planting. Some alfalfa grew back and, although sparse, it provided some protection from competing vegetation. Water grass seed came in by way of the irrigation and grew robustly, causing some decrease in growth of the trees. However, by October 2005, the survival rate was approximately 95 percent.

Plant material collected in March and grown in an outdoor greenhouse was planted May 31, 2005. The ambient temperature at the time of planting was in excess of 110 degrees F with a

moderate wind. A total of 17 acres were planted with 76,000 trees, also with either 1- foot or 3-foot in-line spacing, in rows 38" apart. Irrigation was provided within 24 hours of planting. Within one week, there was no survival.

After one growing season, it was determined that the feasibility of mass transplanting of cottonwood and willow was shown to be a viable option for achieving dense rapid planting. The fields were planted at densities of 3,800 trees per acre and 5,200 trees per acre. Planting time was greatly reduced from previous restoration projects (Cibola Nature Trail) from a 2-week planting time to less than two days. Costs were significantly reduced from $7,700 per acre to $5,900 per acre.

The survival rates of the differing approaches employed by the two contractors were dramatically apparent. Survival rates may have been influenced by one or combinations of the conditions during collection, propagation, and planting. At the end of the first growing season, the surviving field of trees grew an average of 4 feet. Some of the trees were "trapped' under an invasion of water grass. Towards the end of the growing season, the water grass went dormant, giving the trees opportunity to grow. A few trees were girdled (rubbed or chewed), most likely by deer. However, those trees had already sprouted back by November. Almost all the trees appeared to be generally healthily.

**FY06 Activities:** Due to the unusual amount of rain and early warming in spring 2005, the collection time (dormancy) was narrowed for the first contractor. This limited the amount of plant material from cottonwood and willow collected in 2005; as a result only 8.5 acres were planted, which left a remaining 11.5 acres to plant in 2006. Plant material was collected in December of 2005 for propagation. In April 2006, the field was prepared by disking and pre-irrigation for mass planting. This field was planted with predominately willow along with cottonwood in a 4-hour period. The trees were spaced at 5-foot in-line spacing with rows 38" apart.

The mass transplanting methods have demonstrated a feasible option for planting trees at a high density, over large acreage in a short period of time. Based upon observations and comparison, mass planting appears to be an effective, efficient method of planting habitat.

**Proposed FY07 Activities:** Trees established in FY05 and FY06 will be irrigated and monitored for survivability and general condition.

**Pertinent Reports:** A final report is being drafted and will be posted on the LCR MSCP website in FY07

**Figure E7a**: Root growth, April 2005

**Figure E7b:** Mass transplanting of trees, April 2005

**Figure E7c:** Cottonwood over 8 feet tall, October 2005

**Figure E7d:** May 2006

## Work Task E8: Seed Feasibility Study

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $92,000 | $4,000 | $4,000 | $150,000 | $160,000 | $177,000 | $15,000 |

**Contact:** Barbara Raulston, (702) 293-8788

**Start Date:** FY05 **Expected Duration:** FY09

**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 National Wildlife Refuge, ½ 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):** This Work Task was previously included in the Draft FY05 Work Tasks as a portion of Farm Unit #1 (Genetics, Mass Planting, Seed), Cibola National Wildlife Refuge (E6). Many different planting techniques (seeding, various sized cuttings, various sized container plants), irrigation methods (sprinkler, flood, drip), and management activities (weed control, cutting, pruning, re-planting) have been demonstrated through Section E Work Tasks, with varying degrees of success. This study will take one of these methods, seeding for native riparian plants, and apply strict scientific methods to determine the usefulness to future LCR MSCP projects.

**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, and/or preserves the genetic diversity of the riparian habitat created under the LCR MSCP. The amount of non-native to native vegetation resulting from using seed for restoration will also be an important factor in determining the feasibility of this method. The preferred outcome of this study will be a series of protocols, developed from careful documentation, which can be used to create native riparian habitat.

Reclamation has entered into a 5-year land use agreement with the FWS to conduct restoration research in Farm Unit #1 at Cibola NWR. The agreement expires in FY09; at which point a decision will be made to continue research activities, manage land cover types as habitat created during the research for the 50-year life of the LCR MSCP, or discontinue funding.

**Previous Activities:** Preliminary investigations during Work Task E1 indicate that using seed for restoration warranted additional study.

**FY05 Accomplishments:** Market research to determine vendor availability was conducted in February 2005. Between February and June 2005, additional contracting issues were explored, including the type of contract to be used. From July to September 2005, a determination for a research and development contract was made, a Scope of Objectives was finalized, a requisition with an estimate of $400,000 for a 3-year study was developed, and a solicitation for this work was posted. Only a small portion of the estimated FY05 budget was expended.

**FY06 Activities:** A contract entitled *Feasibility Study Using Native Seeds in Restoration* was awarded in March 2006. Seeds have been collected from Cibola NWR and are currently being used in a series of experiments in a greenhouse and laboratory. Under controlled conditions, these experiments will determine germination rates, growth, and survival, as affected by seed collection, storage, seed treatment, planting method, planting density, soil type, irrigation, and soil treatments. Longevity will be tested by conducting germination trials every two weeks after collection.

**Proposed FY07 Activities:** Based on successful seeding methods and soil amendments from previous experiments in the lab and greenhouse, larger test plots will be planted on-site at Cibola NWR, to measure and document factors and conditions for successful germination, growth, and survival.

**Pertinent Reports:** A study plan is available on request. Annual reports will be posted on the LCR MSCP website.

**Figure E8a:** May 2006 seed collecting Cibola NWR

**Figure E8b:** May 19, 2006 these were grown from seeds in less that 2 weeks in the greenhouse.

## Work Task E9: Hart Mine Marsh

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $100,000 | $53,320 | $53,320 | $100,000 | $125,000 | $200,000 | $1,000,000* |

*The estimated cost of will be revised upon completion of final design.

**Contact:** Gregg Garnett, (702) 293-8644

**Start Date:** FY05 **Expected Duration:** FY07 decision point

**Long-Term Goal:** Habitat creation

**Conservation Measures:** CLRA1 and LEBI1

**Location:** Reach 4, Cibola National Wildlife Refuge, River Mile 92, AZ

**Purpose:** Create and manage marsh habitat for Yuma clapper rail and least bittern.

**Connections with other Work Tasks (past and future):** This Work Task was previously included in the Draft FY05 Work Tasks as Hart Mine Marsh, Cibola National Wildlife Refuge (E7). Species monitoring is being addressed under Work Task F2-F3 and D1.

**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.

In general, habitat requirements for marsh-covered species include areas of permanent open water and larger areas of adjacent emergent marsh vegetation with water depths ranging from 1 to12". Approximately 20 acres of the marsh will be deepened by dredging or excavating. At least 40 acres adjacent to the deepened 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 FWS, 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 website. The cost of construction and expected acreage of created habitat will be refined in FY07 and included in the FY08 Workplan, prior to implementation. In addition and prior to beginning construction, a land use agreement between FWS and Reclamation securing interest in land and water will be prepared.

**FY05 Accomplishments:** The conceptual design for marsh restoration was completed. Preliminary consultation with Refuge Manager and FWS regulatory personnel occurred in September 2005. Topographic surveys were initiated to provide data for engineering designs, but could not be completed due to areas of dense vegetation; they have been rescheduled for FY06. To gain access and allow the topographic survey to be completed, transects will need to be cut with heavy equipment. The need to cut transects to gather data will require additional environmental compliance prior to the clearing of transects. Cultural surveys will be conducted in conjunction with the topographic surveys to minimize any damage, and to document any areas of cultural significance that may be found. Expenditures in FY05 were less than anticipated due to these access issues.

**FY06 Activities:** NEPA compliance, cultural surveys, topographic surveys, and marsh bird surveys have been completed. Using the data from the surveys, an interagency agreement (IA) with FWS
has been developed. Under the conditions in the IA, the FWS will prepare a report detailing relative water balance estimates, hydrology, baseline hydraulic conditions, and requirements for restoration and habitat creation at Hart Mine Marsh. These baseline conditions will assist in setting limits for restoration design. Initially, the IA required the preparation of an engineering design for construction at Hart Mine Marsh. However, recent modifications and operational changes made to Hart Mine Marsh, as well as policy mandates from the FWS, indicated that a more thorough analysis of baseline conditions and longer-term data collection were necessary to properly evaluate the feasibility of habitat creation at Hart Mine Marsh, with respect to physical constraints and availability of the water resources. In order to meet these needs, the IA was modified to include this expansion of work scope; however, no significant changes in the FY06 budget are expected. The FWS intends to contribute matching funds and/or in-kind services to assist in this modification and will prepare a Comprehensive Conceptual Restoration Plan that details options for habitat creation at Hart Mine Marsh. This document is expected in March FY07.

**Proposed FY07 Activities:** A workshop will be conducted shortly after an initial review of the options in the Comprehensive Conceptual Restoration Plan, and will be used as a decision point for project continuation. The project time-line will be affected by these changes. FY07, FY08, and FY09 budgets and activities will be adjusted accordingly to reflect these changes. Based on

review of the Comprehensive Conceptual Restoration Plan and preliminary projected costs for design and construction, a decision will be made to continue the project into design or to cancel the project. If a decision is made to proceed, Reclamation will finalize the restoration design for marsh habitat early in FY08. Using the final design, a *Restoration Development Plan* and appropriate section 404 permit application would be prepared, and posted on the website. In addition, during FY08 and prior to beginning construction, agreements outlining party responsibilities and securing interest in land and water will developed. Completion of these activities would allow construction to begin early in FY09.

Figure E9: Aerial view of Hart Mine Marsh during flooded conditions.

## Work Task E10: Walker Lake

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $61,000 | $0 | $0 | $75,000 | $0 | $0 | $0 |

**Contact:** Gregg Garnett, (702) 293-8644

**Start Date:** FY05 **Expected Duration:** Closed in FY05

**Long-Term Goal:** Habitat Creation

**Conservation Measures:** CLRA1, BONY2, RASU2, LEBI1, and BLRA1

**Location:** Reach 5, Imperial National Wildlife Refuge, River Mile 85.5, CA

**Purpose:** Evaluate Walker Lake as a potential habitat creation project. Improvements will be targeted to provide consistent water to the site to maintain breeding habitat requirements for covered marsh, SWFL, and/or native fish.

**Connections with Other Work Tasks (past and future):** This Work Task was previously included in the Draft FY05 Work Tasks as Walker Lake, Imperial National Wildlife Refuge (E11). Walker Lake has been identified as a potential backwater creation project and will be evaluated using Work Task E15. Work Task E10 has been closed.

**Project Description:** Located on Imperial NWR, Walker Lake is a historically occupied SWFL site on the LCR. Currently, Walker Lake maintains a subsurface connection to the LCR. Seasonally, surface water is reduced in the area or not present in the lake. In addition, high evaporation rates have concentrated salts in the lake and the surrounding soil. The project includes dredging/excavating a shallow channel to provide continual surface flow into Walker Lake to maintain open water, marsh habitat, and flooded adjacent forested habitats throughout the breeding seasons of the Yuma clapper rail and SWFL.

With the concurrence of the Refuge Manager, Walker Lake is not being actively investigated, and will be removed from the FY06 and FY07 work plans. An alternate location was selected to meet the backwater creation commitments of the SIA. The lake will be evaluated along with other potential backwater projects using established backwater screening protocols. The costs for preliminary investigations in FY05/FY06 were not incurred by the LCR MSCP.

**FY05 Accomplishments:** Conceptual design and surveying was initiated, and preliminary project scoping and scheduling completed. An initial conceptual design and scoping meeting was conducted to prepare a number of options and approaches to present to FWS.

**FY06 Activities:** This Work Task is closed.

## Work Task E11: Draper Lake

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $100,000 | $0 | $0 | $70,000 | $0 | $0 | $0 |

**Contact:** Gregg Garnett, (702) 293-8644

**Start Date:** FY05 **Expected Duration:** Closed in FY05

**Long-Term Goal:** Habitat creation

**Conservation Measures:** CLRA1, BONY2, RASU2, LEBI1, and BLRA1

**Location:** Reach 5, Imperial National Wildlife Refuge, River Mile 82.5, CA

**Purpose:** Evaluate Draper Lake as a potential habitat creation project. Improvements will be targeted to provide protected backwater habitat for native fish. Evaluations will also determine if areas directly adjacent to Draper Lake will allow for the creation of marsh and riparian habitats targeted for other species covered under the LCR MSCP.

**Connections with Other Work Tasks (past and future):** This Work Task was previously included in the Draft FY05 Work Tasks as Draper Lake, Imperial National Wildlife Refuge (E10). Draper Lake has been identified as a potential backwater creation project; and will be evaluated using Work Task E15. Work Task E11 has been closed.

**Project Description:** Located on Imperial NWR, Draper Lake is an existing backwater. LCR inflow has been substantially reduced due to siltation and vegetation encroachment of a natural channel that runs between Draper Lake and the LCR. The project includes design work, regulatory compliance, and associated coordination involved in dredging/excavating a 0.3-mile long channel between Draper Lake and the LCR at RM 82.7. Passive fish barrier technology will be used to exclude non-native fish life stages from Draper Lake. This project will supply additional water capacity to Draper Lake permitting the survival and maintenance of native fish habitat in the protected backwater.

With the concurrence of the Refuge Manager, Draper Lake is not being actively investigated, and will be removed from the FY06 and FY07 work plans. An alternate location was selected to meet the backwater creation commitments of the SIA. The lake will be evaluated along with other potential backwater projects using established backwater screening protocols. The costs for preliminary investigations in FY05 were not incurred by the LCR MSCP.

**FY05 Accomplishments:** Conceptual design and surveying were initiated; preliminary project scoping and scheduling were completed. An initial conceptual design and scoping meeting was conducted to prepare a number of options and approaches to present to the land owner the FWS.

**FY06 Activities:** Initial FY06 activities included coordinating design and construction at Draper Lake with FWS. Reclamation conducted more detailed topographic and river cross-sectional surveys to determine the approach, estimated removal, and disposal quantities necessary to construct backwater habitat at Draper Lake. This information was to be provided to prepare engineering designs and final approaches to construction; however, after consultation with FWS entities, it was determined that Draper Lake was not an ideal candidate for habitat creation and that site screening and selection criteria may produce more desirable backwaters as candidates for habitat creation. The data collected will be filed and used in future screening and site selection processes. No costs for FY06 were incurred by the LCR MSCP for work conducted in FY06.

**Proposed FY07 Activities:** This Work Task is closed.

## Work Task E12: Butler Lake

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $55,000 | $70,893 | $77,566 | $140,000 | $120,000 | $200,000 | $40,000 |

**Contact:** Nathan Lenon, (702) 293-8015

**Start Date:** FY04 **Expected Duration:** FY07

**Long-term Goal:** Restoration Research

**Conservation Measures:** BONY2, RASU2, LEBI1, CLRA1

**Location:** Reach 5, Imperial National Wildlife Refuge, 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 are being addressed under Work Tasks F2 and F4.

**Project Description:** Backwaters are an expensive land cover type to create. Studies are being conducted on this backwater to develop technology to effectively restore existing backwaters to levels of sustainable backwater 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 will evaluate the water quality of the lake by conducting seasonal sampling, identify options to improve water quality in the eutrophic backwater, and develop 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 feet. 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.

**FY05 Accomplishments:** 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.

During FY05, Reclamation entered into a cooperative agreement with U of A to perform a limnological assessment of Butler Lake and provide recommendations on alternatives for habitat creation. The purpose of this assessment is to address the uncertainty related to restoring an 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 is being completed during FY06.

Higher than projected costs were incurred in FY05, because U of A's additional information was required to make an informed decision. A more comprehensive monitoring protocol was selected to address the concerns regarding uncertainty and is the source of the additional FY05 expenditures. This monitoring 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.

**FY06 Activities:** In consultation with Imperial NWR, Reclamation has scaled-back a planned boat ramp to provide minimal boat access. Staff cleared vegetation and made minor improvements to a restricted-access road to provide access for small boats. This decision is expected to reduce the actual expenditures for FY06.

The U of A has completed two quarterly monitoring trips during FY06 and has submitted a preliminary report of initial impressions. They will complete their first full year of monitoring and submit year-end report in FY07. Should the U of A's recommendations include experimental treatments other than dredging, the agreement provides for one year of post-treatment monitoring to evaluate the effectiveness of said treatment(s).

**Proposed FY07 Activities:** In FY07, the U of A will submit a final report to Reclamation. This report will include recommendations for the best course of action to restore the backwaters for native fish. These recommendations may include alternatives, which range from small scale treatments which could be implemented fairly quickly to large-scale alternatives such as dredging, and/or excavating inlet/outlet canals. Activities occurring in FY07 may vary greatly, depending on the recommended restoration techniques. After a review of the U of A's final report, Reclamation will decide, in consultation with the Imperial NWR, whether to pursue the project.

Should a small-scale experimental restoration technique (or combination of techniques) be proposed which would be feasible and cost-effective, Reclamation will prepare a design (if applicable), cost estimate, and restoration plan during FY07. Any required environmental compliance will be initiated in FY07. Implementation of the restoration plan would not occur until at least FY08. Because large-scale activities will not be occurring in FY07, costs associated with the project will be reduced.

Should a large-scale restoration technique, such as dredging and/or excavation of an inlet/outlet channel be proposed, Reclamation will add Butler Lake to Backwater Site Selection (E15).

Under this scenario, no further activity would occur in FY07, which would reduce expenditures for FY07.

**Pertinent Reports:** *Butler Lake Native Fish Refugium, Preliminary Assessment* is posted on the LCR MSCP website. A study plan is available upon request.

**Figure E12:** Aerial photo of Butler Lake, September 2004. The bright green color is caused by an overabundance of Cyanobacteria, known as "blue green algae". Cyanobacteria-dominated systems are considered to be impaired.

## Work Task E13: McAllister Lake

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Projected Estimate | FY09 Projected Estimate |
|---|---|---|---|---|---|---|
| $40,000 | $71,051 | $71,051 | $75,000 | $50,000 | $40,000 | $52,000 |

**Contact:** Nathan Lenon, (702) 293-8015

**Start Date:** FY05 **Expected Duration:** FY07 decision point

**Long Term Goal:** Habitat creation

**Conservation Measures:** BONY2, RASU2, and LEBI1

**Location:** Reach 5, Imperial National Wildlife Refuge, 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 Work Tasks 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 had 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 non-native 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, as well as the consistency of the groundwater supply through the river aquifer. This monitoring includes 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.

**FY05 Accomplishments:** 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.

To assist in making a better-informed decision on potential restoration alternatives, a cooperative agreement was executed with the U of A, to initiate limnological investigations at McAllister Lake. This agreement is funded for one year with an option for a second year. This effort will evaluate the sustainability of maintaining McAllister Lake as a backwater for native fish, and provide recommendations to Reclamation as to how best to manage the site.

Reclamation postponed the completion of the final report documenting the methodology and results of the pump-tests, so the scope of analysis could be expanded to include the entire project period up through the end of FY05, and to eliminate data gaps between reports. The expanded report is near completion, and will be posted to the LCR MSCP website once finalized. The expanded report will document 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. The costs incurred during FY05 were slightly higher than anticipated to allow for the additional sampling effort; however, mobilization costs were decreased by monitoring both Butler and McAllister Lake simultaneously with one contractor.

**FY06 Activities:** U of A is working cooperatively with Reclamation to evaluate the long-term sustainability of McAllister Lake. During FY06, Reclamation re-initiated experimental lake management by pumping the lake three times. U of A has completed the first two quarterly sampling events, in concert with the lake management, and has provided a preliminary report of their initial impressions. They will complete their first full year of monitoring.

**Proposed FY07 Activities:** A final report from U of A is due in FY07, with recommendations on management practices for long-term management of the lake for native fish. After a review of the final report, Reclamation will decide, in consultation with the landowner, on whether to continue to manage McAllister Lake for native fish.

Should this project be continued during FY07, Reclamation plans to design a permanent pumping system to maintain water quality, along with any other treatments necessary to maintain the lake. The final design will be selected in consultation with Imperial NWR.

The earliest date planned for construction of the pumping system would be FY08. This is needed to allow for adequate time to prepare a final design and cost estimate, solicit input from the LCR MSCP Steering Committee, complete any required environmental compliance, and draft the restoration plan and land use agreement.

**Pertinent Reports:** *Experimental Design Plan for McAllister Lake Study, Hydrologic Characterization of McAllister Lake, Arizona,* and study plan are available upon request.

These figures illustrate the changes in water quality and clarity observed at McAllister Lake during the study period.

**Figure E13a:** December 2002, prior to any pump-tests

**Figure E13b:** March 2003 following and 1 pump-test.

**Figure E13c:** September 2004, following 2 seasons of pumping (5 pump-tests).

**Figure E13d:** September 2005. After an 18 month gap between pumping events. The brownish-pink color is believed to be caused by a die-off of cyanobacteria, “blue green algae”.

## Work Task E14: Imperial Ponds

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Projected Estimate | FY09 Projected Estimate |
|---|---|---|---|---|---|---|
| $105,000 | $104,309 | $104,309 | $595,000* | $2,070,000* | $462,000 | $150,000 |

* Consistent with the April 2006 Steering Committee briefing on this project, the total expenditures for FY06 and FY07 are anticipated to be an estimated $4.1 million. However, due to the acceleration of the project, the FY06 costs have increased to $2 million and the FY07 have decreased to $2.1 million.

**Contact:** Nathan Lenon, (702) 293-8015

**Start Date:** FY05 **Expected Duration:** FY55

**Long-term Goal:** Habitat creation

**Conservation Measures:** CLRA1, BONY2, RASU2, LEBI1, and BLRA1

**Location:** Reach 5, Imperial National Wildlife Refuge, River Mile 59, AZ.

**Purpose:** Expansion of the existing ponds to satisfy the backwater requirements of the 2001 SIA.

**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:** In December 2004, an interdisciplinary group of subject matter experts, including members of the NFWG, developed recommendations for how to best manage the site. The group's guidance was to redesign and expand the site to address water quality concerns while providing additional backwater acreage in support of the LCR MSCP. Under the new design, the existing ponds would be deepened and enlarged by approximately 50 surface acres. The ponds would be deepened and divided into six ponds, each with their own independent water delivery and drainage system.

Soils excavated from the ponds during expansion will be incorporated into 104 acres of existing adjacent farm fields, raising them an average of 3-5 feet. This feature of the project was added during the post-conceptual design phase to provide a location to place approximately 500,000 cubic yards of fill. The existing field irrigation system will then be retrofitted and the fields will be re-leveled. This will result in an additional 34 acres of flood irrigated fields which will be planted for cottonwood-willow habitat. In addition, a 12-acre marsh field is planned for BLRA. This field is adjacent to a currently functional BLRA marsh field, and is anticipated to require minimal costs for design and construction.

**Previous Activities:** Located on Imperial NWR, the Imperial Ponds, previously referred to as the DU2 Ponds, were originally constructed to provide a mixture of habitat types, including isolated backwater for native fish, marsh, and riparian land cover types. The site consists of four

ponds which are connected by a single channel that supplies fish-free water from a dedicated well. The ponds were originally renovated in the fall of 2002, and stocked with RASU in the spring of 2003.

**FY05 Accomplishment:** An interdisciplinary group of 13 subject matter experts from four agencies collaboratively prepared a conceptual design for the re-construction and expansion of the ponds. Subject matter experts in the fields of fisheries, hydrology, wetland science/botany, and engineering participated. This report was finalized in July 2005. Reclamation initiated detailed planning and engineering for the site in FY05.

The design will provide a superior water management system from the existing system. Each of the ponds will have an independent supply and drain, which will allow for greater management control over water quality, as well as reduce the potential for cross-contamination of any introduced non-native fish species from establishing in the entire system. All drainage culverts, which connected the adjacent fields to the ponds, will be severed, to greatly enhance habitat management at the site.

The new design duplicates many physical properties of Cibola High Levee Pond, while using groundwater as the source for fresh water delivery, rather than passive subsurface flow. The ponds will increase the maximum depth of the ponds from approximately 6 feet to 12 feet, which is anticipated to improve water quality conditions, reduce nuisance aquatic weeds, as well as provide greater protection for native fish against predation by birds.

The new design will also provide complex, diverse habitat conditions. Planting beds for bulrush and cattails, called hummocks, have been incorporated, based on their success at other wetland creation projects. These features are anticipated to provide shade and cover, as well as reduce mosquito levels by providing habitat for mosquito-predator insects. Additional features include gravel spawning beds, rip-rap (cover for bonytail, as well as structural support for artificial “cut banks”), fish collection kettles (to facilitate fish harvesting), and boat access ramps (to facilitate fisheries management and water quality monitoring).

**FY06 Activities:** Construction was originally scheduled for FY07. However, the opportunity arose to start construction in June 2006, which would allow excavation activities to be conducted and completed in the winter, during low-flow river conditions. As a result, significantly higher costs are being incurred in FY06 than originally estimated, however, the total cost of the project has not changed. To date, Reclamation has completed all environmental compliance activities for this project, conducted a harvest of the remaining razorback suckers, and dewatered the ponds. Imperial NWR has conducted a prescribed burn, which reduced the volume of vegetation around the ponds. Engineering design drawings were completed, construction rental equipment procured. Construction on the ponds was initiated in June 2006. Funding for FY06 is anticipated to be an estimated $2 million.

**Proposed FY07 Activities:** Excavation of the ponds is scheduled to be completed early in FY07. After excavation, the water delivery and drainage system for each pond can be completed. Leveling of the fill areas and replacement of the existing irrigation system will

follow. Establishment of the 12 acres of marsh habitat for BLRA is targeted for the spring 2007. Ground preparation and mass transplanting of cottonwood-willow is targeted for FY08.

**Pertinent Reports:** *Imperial National Wildlife Refuge, Imperial Native Fish Habitat Reconstruction, Design Workshop Final Report, Clean Water Act, Section 404 Permit - Final Site Plan* have been posted to LCR MSCP website.

**Figure E-14a:** The pre-construction DU pond configuration.


**Figure E-14b:** The proposed configuration, per the conceptual design plan.

## Work Task E15: Backwater Site Selection

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $200,000 | $430,000 | $775,000 | $400,000 |

**Contact:** Nathan Lenon, (702) 293-8015

**Start Date:** FY06 **Expected Duration:** FY10

**Long-term Goal:** Habitat creation

**Conservation Measures:** BONY2, RASU2, and FLSU1

**Location:** Reaches 3-6; California, and Nevada, River Mile 22-276, AZ, CA, and NV

**Purpose:** To establish and validate a consistent standardized technique for evaluating and selecting backwaters with the highest probability of success, based on their biological and physical attributes. 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):** E16 is used with this work task to identify projects for habitat creation.

**Project Description:** Reclamation is developing 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 will be completed in two phases. The first phase, scheduled to start in FY06 and completed in FY08, is the inventory and evaluation of backwaters in Reaches 5 and 6. The second phase, scheduled to start in FY07 and completed in FY09, is the inventory and evaluation of backwaters in Reaches 3 and 4. Projected activities in FY10 are minimal and intended to close out the backwater inventory process. Upon completion of the inventory and evaluation, backwaters selected for restoration will be addressed under site specific Work Tasks.

For planning purposes, each phase of the backwater inventory process is divided into three steps. The first step is the inventory of existing backwaters. Basic information which can be obtained without visiting the sites will be 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.

During the second step, approximately 30 backwaters will be visited during the summer, with one site visit to each backwater. Physical and biological data will be collected to generate biological ranking scores and habitat opportunity rankings as described in the *Draft Guidelines for the Screening and Evaluation of Potential Conservation Areas*. Trip reports will be 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 $12,500 per backwater.

In the third step, habitat assessments will be completed for the final high priority 4-5 sites, which would include four quarterly monitoring trips. These sampling and assessment methodologies will be included in the updated *Draft Guidelines for the Screening and Evaluation of Potential Conservation Areas*. At the conclusion of these assessments, final reports will be completed and reviewed by a technical work group. The estimated cost for one year of quarterly sampling is $50,000 per backwater.

**FY05 Accomplishment:** This was a new start in FY06.

**FY06 Activities:** In FY06, Reclamation will complete the *Draft Guidelines for the Screening and Evaluation of Potential Conservation Areas*, which will include guidelines specific to selecting backwaters. To validate the model for accuracy and applicability, Reclamation will apply these guidelines to approximately six sites with known histories of razorback sucker introductions, which will include those with high, moderate, and poor success rates to determine whether the draft guidelines are appropriate for selecting sites with a high probability for success.

Using in-house staff and data resources, Reclamation will complete the backwater inventory data review of Reach 5 and 6 backwaters and generate the list of approximately 30 backwaters for site visits to be conducted during summer FY07. An integrated GPS-sonar system was procured to facilitate the data collection for this effort.

**Proposed FY07 Activities:** The Model Validation Report will be finalized. At that time, Reclamation will update the parameters and/or values for generating the biological rating for backwaters, as appropriate.

Reclamation will conduct helicopter surveys in Reach 5 and 6 to determine the degree of permanence of the proposed 30 backwaters selected and use this information to finalize the list for site visits. Right-of-entry permits will be developed with the appropriate landowners to allow for the initial site visits. Site visits will be conducted in the summer of FY07.

Reclamation will complete the data review of Reach 3 and 4 backwaters and generate the list of backwaters for site visits in summer of FY08, using in-house staff and data resources.

**Pertinent Reports:** *Draft Guidelines for the Screening and Evaluation of Potential Conservation Areas* will be posted on the LCR MSCP website.

## Work Task E16: Conservation Area Site Selection

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $134,814 | $134,814 | $200,000 | $50,000 | $200,000 | $200,000 |

**Contact:** Terry Murphy, (702) 293-8140

**Start Date:** FY05 **Expected Duration:** FY30

**Long-term Goal:** Develop and utilize a standardized process to identify and prioritize potential conservation areas to develop the most cost-effective areas to fulfill the habitat creation requirements of the LCR MSCP.

**Conservation Measures:** None

**Location:** Program-wide, Reaches 1-7, AZ, CA, and NV

**Purpose:** Develop and utilize guidelines to provide Reclamation with a consistent and transparent method for screening and evaluating the suitability of lands that are made available to Reclamation 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 will be developed to describe the process for working with interested parties to identify sites for screening and evaluation to determine their suitability to become Conservation Areas for creating and maintaining habitat over the term of the LCR MSCP. After the development of the guidelines, screening of the sites that are identified will be conducted under this Work Task.

Reclamation intends to work with willing partners to secure an interest in land and water sufficient to create and maintain LCR MSCP habitats. It is anticipated that willing landowners will enter into some type of long-term agreement that secures an interest in land and water through the 50-year term of the LCR MSCP.

**FY05 Accomplishments:** A contract was awarded in September 2005 to develop the guidelines for Conservation Area site selection. Drafting of the guidelines, review and acceptance by the Steering Committee, and finalization of the guidelines is scheduled for FY06.

**FY06 Activities:** Preliminary draft guidelines for the site selection of potential Conservation Areas were drafted and reviewed by a Steering Committee technical work group. The draft is currently being revised to incorporate comments. A final draft is anticipated to be distributed in

August 2006. These final draft guidelines will remain in draft form through one cycle, to allow time to validate their accuracy and applicability.

**Proposed FY07 Activities:** In an effort to identify additional properties available for development, Reclamation will begin implementing the conservation area site selection process. Fewer properties are expected to be screened in FY07 as Reclamation is currently engaged in developing several habitat creation sites (E4, E5, and E14).

**Pertinent Reports:** *Draft Guidelines for the Screening and Evaluation of Potential Conservation Areas* will be posted on the LCR MSCP website.

## Work Task E17: Topock Marsh Pumping

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $70,000 | $70,000 | $70,000 | $70,000 |

**Contact:** Terry Murphy, (702)-293-8140

**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, Arizona, Havasu NWR, River Miles 235-244

**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 the gravity diversion of water, along with supplemental pumping to maintain the water surface elevation, would avoid negative effects on the groundwater elevation.

**FY05 Accomplishments:** This is a new start in FY06.

**FY06 Activities:** The specific actions required to satisfy AMM2 have not been determined at this time. The FWS prepared a water management plan which far exceeds the mitigation described in the LCR MSCP. Reclamation is in the early stages of discussing options for completing conservation measure AMM2 with the FWS. Options identified include, but are not limited to:

1. Installing pumps at the inlet canal and providing for their operation as described in the LCR MSCP HCP.
2. Developing and analyzing an alternative approach acceptable to all parties to maintain marsh levels.

3. Providing funding directly to the FWS equivalent to the amount estimated in the LCR MSCP HCP.

**Proposed FY07 Activities:** Based on the current level of activity, it is anticipated the funds approved for FY06 will not be expended until FY07.

**Pertinent Reports:** *Draft Havasu National Wildlife Refuge Water Management Plan* has been prepared by the FWS.

## Work Task E18: Law Enforcement and Fire Suppression

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $50,000 | $75,000 | $75,000 | $75,000 |

**Contact:** Terry Murphy, (702)-293-8140

**Start Date:** FY06 **Expected Duration:** FY55

**Long-term Goal:** Constructed habitat protection

**Conservation Measures:** CMM1

**Location:** Lower Colorado River 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 habitat created through Section E Work Tasks.

**Project Description:** Fund law enforcement and fire protection for created habitat. It is assumed that BLM, FWS, AGFD, CDFG, NDOW and other local 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 (land that was not already in public ownership). There is a need to develop a comprehensive approach to address these issues along the Colorado River.

**FY05 Accomplishment:** This is a new start in FY06.

**FY06 Activities:** Evaluate options for system-wide, site-specific law enforcement, and fire suppression. Develop a strategy which will form the basis for future law enforcement and fire suppression activities for the LCR MSCP. It is likely the development of the law enforcement and fire and suppression strategy will be delayed until FY07 with expenditures less than anticipated.

**FY07 Activities:** Activities are likely to include development of interagency agreements and funding of law and fire suppression efforts in support of the strategies developed in FY06.

## Work Task E19: Needles-Topock (AZ RM 240) Stabilization

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $80,000 | $0 | $0 | $0 | $0 | $0 | $0 |

**Contact:** Gail Iglitz, (702) 293-8138

**Start Date:** FY05 **Expected Duration:** Closed in FY05

**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 3, Havasu National Wildlife Refuge, River Miles 240-244, AZ

**Purpose:** Integrate Reclamation's river stabilization responsibilities with LCR MSCP habitat restoration goals to stabilize a section of river and provide quality habitat. The combining of resources is expected to benefit both programs.

**Connections with Other Work Tasks (past and future):** This Work Task was previously included in the Draft FY05 Work Tasks as Needles-Topock (Az Rm 240) Stabilization, Havasu National Wildlife Refuge (E2). Work Task E19 has been closed.

**Project Description:** Located on Havasu NWR, the Needles-Topock bankline has seen an increasing amount of erosion and shelving due to increased recreational use. The increased use of motor-driven boats and personal watercraft created a significant amount of wave action against the sandy bankline, which intensified the loss of land due to erosion and increased the sediment load in the river.

The opportunity existed to incorporate the development of various habitats, such as marsh, riparian, and backwater environments, with stabilization techniques of the bankline. Along with the stabilization techniques, a passive flood irrigation system would have been utilized. The intent of this type of system was to decrease the costs associated with maintenance and personnel to operate irrigation systems. The passive irrigation system would allow water to flood the site when river flows exceed 12,000 cubic feet per second. These flows are generated during the seasons (spring, summer and fall) of high water demand downstream. They also coincide with both the growing season for trees/vegetation, and the migration and breeding season of the SWFL.

The site would be contoured to create elevation changes which would allow low areas to be saturated or filled pockets of standing water. Areas of contouring would allow for the creation of marsh. Approximately 50 acres of a long linear mosaics of habitats would be created and serve

as a connection to other restoration sites along the LCR.

**FY05 Accomplishments:** Initial discussions determined that this joint project could meet the LCR MSCP objectives of minimum cottonwood-willow habitat patch size identified in the LCR MSCP HCP.

**FY06 Activities:** The project was significantly scaled back to use a different approach for stabilizing a small portion of the bankline. It was determined the modified design will not accommodate minimum LCR MSCP habitat objectives. Therefore, LCR MSCP involvement in the project was discontinued.

**FY07 Proposed Activities:** This Work Task is closed.

## Work Task E20: Pintail Slough

| FY05 Estimate | FY2005 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $10,000 | $0 | $95,000 | $0 | $0 | $0 | $0 |

**Contact:** Terry Murphy, (702) 293-8140

**Start Date:** FY04 **Expected Duration:** Closed in FY05

**Long-term Goal:** Habitat creation

**Conservation Measures:** WIFL1, WRBA2, WYBA3, YBCU1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, CLRA1, and LEBI1

**Location:** Reach 3, Havasu National Wildlife Refuge, 4 miles east of River Mile 244, AZ

**Purpose:** Upgrade the existing water delivery and management system to allow increased irrigation efficiency and evaluation of restoration techniques with native riparian vegetation, and potentially create and manage habitat for covered species.

**Connections with Other Work Tasks (past and future):** This Work Task was previously included in the FY04 and Draft FY05 Work Tasks as Pintail Slough, Havasu National Wildlife Refuge (D2) and (E3) respectively. Work Task E20 is closed.

**Previous Activities:** Concrete lining of the main irrigation canal and installation of water control (stop log) structures were completed using funds obligated in FY04. This concluded any obligations of the LCR MSCP and any additional earthwork, improvements, and site operation are the responsibility of the FWS.

**Project Description:** Work on this project consisted of improving the existing water conveyance and control system and expanding the acreage of riparian and seasonal wetland habitats. Improvements to the water system have focused on maximizing the use of the existing pump system by concrete lining the main canal, establishing an independent fill and drain system for each unit in the slough, and improving water distribution and drainage for each unit. These improvements have been completed to allow for future managed flooding and establishment of native plant species.

**FY05 Accomplishments:** Reclamation and FWS discussed a long-term commitment of refuge resources for the purposes of LCR MSCP. This Work Task was closed.

**FY06 Activities:** This Work Task is closed.

**FY07 Proposed Activities:** This Work Task is closed.

## Work Task E21: Planet Ranch, Bill Williams River

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $100,000 | $20,000 | $20,000 | $0 | $0 | $0 | $0 |

**Contact:** Nathan Lenon, (702) 293-8015

**Start Date:** FY05 **Expected Duration:** Closed in FY05

**Long-term Goal:** Habitat creation

**Conservation Measures:** AMM1, MRM1, CLRA1, WIFL1, WIFL2, WRBA2, WYBA3, CRCR2, LEBI1, YBCU1, YBCU2, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, MNSW2, CLNB2, and PTBB2

**Location:** Reach 3, Bill Williams River, 11 miles east of River Mile 190, AZ

**Purpose:** Evaluate the potential for creating habitat for covered species on Planet Ranch, to help determine whether acquiring the property would be in the best interest of the LCR MSCP.

**Connections with Other Work Tasks (past and future):** This Work Task was previously included in the Draft FY05 Work Tasks as Planet Ranch, Bill Williams River (E4). Work Task E21 is closed.

**Project Description:** Planet Ranch (currently owned by the City of Scottsdale), was evaluated for its potential to provide habitat for covered species. The property encompasses approximately 8,400 acres, approximately 2,400 acres of which had previously been farmed for alfalfa. If the LCR MSCP were to acquire Planet Ranch for habitat creation purposes, substantially less water would be pumped from the water table which would afford some degree of protection to the existing riparian habitat occurring at the eastern extent of Bill Williams River NWR.

Reclamation's evaluation of Planet Ranch was intended to estimate the acreage of habitat that could be established, while also protecting the habitat located on the Refuge from the lowering of the water table, which would threaten the downstream riparian habitat should agricultural production resumes at the ranch at the full capacity of the water entitlement.

**FY05 Accomplishment:** Reclamation evaluated Planet Ranch and developed a conceptual design, which estimated up to 1,003 acres of cottonwood-willow, 52 acres of marsh, and 300 acres of mesquite could be established. This would protect up to 874 acres of cottonwood-willow, 42 acres of marsh, and 331 acres of mesquite on Bill Williams River NWR.

**FY06 Activities:** This Work Task is closed.

**Pertinent Reports:** *Planet Ranch: Potential Restoration Site, Preliminary Site Analysis and Conceptual Design* is posted to the LCR MSCP website.

## Work Task E22: Pratt Agricultural Lease

| FY05 Estimate | FY2005 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $15,000 | $0 | $5,088 | $0 | $0 | $0 | $0 |

**Contact:** Barbara Raulston, (702) 293-8788

**Start Date:** FY04 **Expected Duration:** Closed in FY05

**Long-term Goal:** Restoration research

**Conservation Measures:** YHCR2, WIFL1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, and SUTA1

**Location:** Reach 6, Bureau of Land Management managed lands, River Mile 44, AZ

**Purpose:** Demonstrate restoration and management techniques with native riparian vegetation to create habitat for SWFL and other covered riparian bird species.

**Connections with Other Work Tasks (past and future):** This Work Task was previously included in the FY04 Work Tasks and Draft FY05 Work Tasks as Pratt Agricultural Lease (D6) and Imperial Ponds (E14) respectively.

**Project Description:** The 12-acre Pratt site was planted with cottonwood and willow in 1999. Five years of growth have produced a healthy stand of riparian habitat and migrating SWFL have been observed using the site. However, the willow and cottonwood trees are maturing into a gallery forest, making it largely unsuitable habitat for SWFL. The intent of this project is to monitor avian use of the site while implementing a selective harvesting program coupled with an irrigation schedule that create conditions for breeding SWFL. Selective harvesting involves periodic cutting within stands to create a mosaic of uneven aged, structurally diverse habitat. Bird surveys and banding are being conducted, in conjunction with management actions, to determine when and if SWFL use the site and if other LCR-MSCP species are present.

**Previous Activities:** In 1999, BLM removed 12 acres from a contiguous 58-acre agricultural lease. BLM and Reclamation restored the area with cottonwood and willow. Reclamation funded an irrigation contract and conducted monitoring activities.

**FY05 Accomplishments:** Selective harvesting was implemented by BLM in FY05. Irrigation was accomplished through a contract with a local farmer. However, irrigation delivery conflicts led to a decision to discontinue funding for this site. This Work Task was closed.

**Proposed FY06 Activities:** This Work Task is closed.

**Pertinent Reports:** Final report will be completed and posted on the LCR MSCP website.

## Work Task E23: Mittry Lake Fire Rehabilitation Project

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $50,000 | $0 | $0 | $0 | $0 | $0 | $0 |

**Contact:** Barbara Raulston, (702) 293-8788

**Start Date:** FY04 **Expected Duration:** Closed in FY05

**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 6, Bureau of Land Management managed lands adjacent to Mittry Lake, ½ mile east of River Mile 47, AZ

**Purpose:** Restore habitat burned by wildfire by providing irrigation to newly planted vegetation.

**Connections with Other Work Tasks (past and future):** This Work Task was previously included in the Draft FY05 Work Tasks as Mittry Lake Fire Rehabilitation Project (E15). Work Task E23 is closed.

**Project Description:** Following a wildfire that occurred in March 2003, BLM obtained partial funding through the Wildland Fire Emergency Stabilization and Rehabilitation Program but the use of this funding is limited. BLM determined that irrigation was not an allowed use of these funds; therefore, Reclamation funded temporary sprinkler-type irrigation installation at the site.

**Previous Activities:** In March 2004, an Interagency Agreement was used to transfer funds to BLM from Reclamation for assistance in restoring habitat destroyed by wildfire in March 2003.

**FY05 Accomplishments:** Reclamation and BLM collaborated to continue irrigation at the Mittry Lake Fire Restoration site for a second year.

**FY06 Activities:** Work Task is closed.

**Proposed FY07 Activities:** Work Task is closed.

# WORK TASKS
# SECTION F

# POST
# DEVELOPMENT
# MONITORING

## Work Task F1: Habitat Monitoring

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $250,000 | $237,214 | $237,214 | $250,000 | $275,000 | $310,000 | $350,000 |

**Contact:** John Swett, (702) 293-8574

**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; PVER, California; CVCA, Cibola Nature Trail, Cibola NWR, Cibola, Arizona; Imperial Ponds, Imperial NWR; Arizona, and Pratt Restoration, Yuma, Arizona.

**Purpose:** Habitat creation projects will be monitored for initial survivorship and 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.

As each demonstration or habitat creation site is established, Reclamation will monitor initial survivorship for two years. 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 Task (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 if necessary habitat components have been provided to qualify as habitat as described in the LCR MSCP. Monitoring the biotic components (vegetation) and abiotic components (soil moisture, etc.) will provide data to incorporate into future restoration efforts. Prior to the development of each proposed restoration 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 in order to evaluate change in site conditions.

Vegetation will be monitored using two protocols. Immediately after development, each habitat creation site will be monitored to determine survivorship at the newly restored sites and to

determine if all necessary habitat components have been provided. After two years, successional changes within stands will be monitored as each habitat creation site matures. Changes in habitat quality over time, in conjunction with covered species monitoring, will guide the management of each habitat creation site.

**FY05 Accomplishments:** 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.

**FY06 Activities:** Monitoring plans are being written for habitat creation projects listed in Section E, including CVCA and PVER. Conduct pre-development monitoring at planned habitat creation sites. Conduct post-development monitoring at existing restoration sites, including Beal Lake, Cibola Nature Trail, Imperial Ponds, CVCA, and PVER.

**Proposed FY07 Activities:** Conduct pre-development monitoring at habitat creation sites identified in Section E, including CVCA and the PVER. Conduct post-development monitoring at existing restoration sites, including Beal Lake, Cibola Nature Trail, Imperial Ponds, CVCA, and PVER.

**Pertinent Reports:** *Vegetation Monitoring at Three Riparian Restoration Sites along the LCR* will be posted on the LCR MSCP website. Restoration Plans will be written for each habitat creation project listed in Section E including a monitoring section.

## Work Task F2: Avian Use of Restoration Sites

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $50,000 | $77,571 | $77,571 | $125,000 | $150,000 | $175,000 | $200,000 |

**Contact:** John Swett, (702) 293-8574

**Start Date:** FY05 **Expected Duration:** FY55

**Long-term Goal:** Post-development monitoring

**Conservation Measures:** AMM1, AMM3, MRM1, MRM2, CLRA1, WIFL1, LEBI1, BLRA1, YBCU1, ELOW1, GIFL1, GIWO1, VEFL1, BEVI1, YWAR1, SUTA1, and CMM2

**Location:** Beal Lake, Havasu NWR; PVER, California; CVCA, Cibola Nature Trail, Hart Mine Marsh, Cibola NWR, Cibola, Arizona; Imperial Ponds, Imperial NWR; Arizona, and Pratt Restoration, Yuma, Arizona.

**Purpose:** Monitor avifauna use of habitat creation sites to provide data for the adaptive management process and to 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 Work Tasks 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. Protocols will be developed to monitor habitat creation sites as the LCR MSCP evolves. Data gathered will be used to guide the design of future riparian habitat creation projects to provide covered species habitat.

**FY05 Accomplishments:** Monitoring for avian covered species occurred at three restoration sites: Pratt, Beal Lake, and the Cibola Nature Trail. Mean relative abundance of individual birds was highest at the Cibola Nature Trail site. The Cibola Nature Trail site contained more habitat generalists than Pratt due to its small patch size, open habitat, and surrounding agricultural fields. Riparian associated species, such as song sparrow and common yellowthroat, benefit from adjacent water sources, as occurred at the Beal Lake site. Avian use was summarized and evaluated for each site and compared between sites. Conclusions can not be derived after one year of data collection as bird populations fluctuate too dramatically. Monitoring needs to be conducted for multiple years to provide the data necessary for worthwhile conclusions.

In addition, SWFL surveys were conducted at the Pratt and Cibola Nature Trail restoration demonstration sites by Reclamation biologists during the 2005 breeding season. No breeding SWFL were detected at these two sites.

**FY06 Activities:** Conduct pre-development monitoring at habitat creation sites identified in Section E, including CVCA, PVER, and Hart Mine Marsh. Conduct post-development monitoring at existing restoration sites, including Beal Lake, Cibola Nature Trail, Imperial Ponds, CVCA, and PVER. Starting in 2006, SWFL surveys will be conducted under D2 for the Cibola Nature Trail and the Beal Lake Riparian and Marsh.

**Proposed FY07 Activities:** Conduct pre-development monitoring at restoration sites identified in Section E, including CVCA, PVER, and Hart Mine Marsh. Conduct post-development monitoring at existing restoration sites, including Beal Lake, Cibola Nature Trail, Imperial Ponds, CVCA, and PVER.

**Pertinent Reports:**
*Avian Post-Development Monitoring at the Beal Lake Restoration Site, Breeding Season, 2005, Results of the 2005 Southwestern Willow Flycatcher* (*Empidonax traillii extimus*) *Surveys on the Pratt and Cibola Nature Trail Restoration Sites,*
*Avian Post-Development Monitoring of the Restoration Sites along the LCR, Breeding Season, 2005,*
*Avian Post-Development Monitoring at the Pratt Restoration Site, Breeding Season, 2005,*
*Avian Post-Development Monitoring at the Cibola Nature Trail Restoration Site, Breeding Season, 2005* will be posted on the LCR MSCP website.

Restoration Plans will be written for each habitat creation project listed in Section E including a monitoring section.

## Work Task F3: Small Mammal Colonization of Restoration Sites

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $45,000 | $27,377 | $27,377 | $45,000 | $50,000 | $55,000 | $60,000 |

**Contact:** John Swett, (702) 293-8574

**Start Date:** FY05 **Expected Duration:** FY55

**Long-term Goal:** Post-development monitoring

**Conservation Measures:** AMM1, AMM5, AMM6, MRM2, DPMO1, CRCR1, CRCR2, YHCR1, and YHCR2

**Location:** Beal Lake, Havasu NWR; PVER, California; CVCA, Cibola Nature Trail, Hart Mine Marsh, Cibola NWR, Cibola, Arizona; Imperial Ponds, Imperial NWR; Arizona, and Pratt Restoration, Yuma, Arizona.

**Purpose:** Develop protocols and 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 D10, 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. The data will be used to guide the design of habitat restoration for covered small mammal species.

**FY05 Accomplishment:** Small mammal surveys were conducted at two restoration demonstration sites, Pratt Restoration and Cibola Nature Trail. Four animals from the genus *Sigmodon* were captured at Cibola and three were captured at Pratt. Although it may be assumed by reviewing existing literature that the Pratt animals were Yuma hispid cotton rats and the Cibola animals were Colorado River cotton rats, potential range expansion of these species makes this assumption less certain. Both captured species were present in dense *Baccharus* and Johnson grass within mesquite and cottonwood-willow habitat.

**FY06 Activities:** Conduct pre-development monitoring at restoration sites identified in Section E, including CVCA, PVER, and Hart Mine Marsh. Conduct post-development monitoring at existing restoration sites, including Beal Lake, Cibola Nature Trail, Imperial Ponds, CVCA, and PVER.

**Proposed FY07 Activities:** Conduct pre-development monitoring at restoration sites identified in Section E, including CVCA, PVER, and Hart Mine Marsh. Conduct post-development monitoring at existing restoration sites, including Beal Lake, Cibola Nature Trail, Imperial Ponds, CVCA, and PVER. Surveys will be expanded to future restoration sites as identified in restoration and monitoring plans.

**Pertinent Reports:** *Summary of Preliminary Mammal Trapping Efforts at Cibola National Wildlife Refuge and the Pratt Restoration Site, 2004-05* will be posted on the LCR MSCP website. Restoration Plans will be written for each habitat creation project listed in Section E including a monitoring section.

## Work Task F4: Post-Development Monitoring of Covered Bat Species

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $0 | $60,000 | $60,000 | $60,000 |

**Contact:** Theresa Olson, (702) 293-8127

**Start Date:** FY07 **Expected Duration:** FY55

**Long-term Goal:** Post-development monitoring

**Conservation Measures:** AMM1, MRM1, MRM2, WRBA2, WYBA2, and WYBA3

**Location:** Beal Lake, Havasu NWR; PVER, California; CVCA, Cibola Nature Trail, Cibola NWR, Cibola, Arizona; Imperial Ponds, Imperial NWR; Arizona, and Pratt Restoration, Yuma, Arizona.

**Purpose:** Monitor bat use of habitat creation sites to provide data for the adaptive management process and to 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 to 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:** Indigenous bat species were surveyed annually along the LCR from 2001-2006 by Brown and Berry. Post-development monitoring will utilize a protocol developed in 2006. Acoustic monitoring will be conducted at restoration sites, including CVCA, PVER, Cibola NWR Trail site, and Beal Lake on Havasu NWR. 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.

**FY05 Accomplishments:** This is a new start in FY07.

**FY06 Activities:** This is a new start in FY07.

**Proposed FY07 Activities:** Conduct pre- and post-development bat surveys on habitat creation sites, including Beal Lake, Cibola Nature Trail, CVCA, and PVER. Anabat files will be analyzed to determine species richness and abundance at restoration sites.

**Pertinent Reports:** Restoration Plans will be written for each habitat creation project listed in Section E including a monitoring section. Study design and protocol will be available upon request.

## Work Task F5: Post-Development Monitoring of Fish Restoration Sites

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $0 | $65,000 | $70,000 | $95,000 |

**Contact:** Tom Burke, (702) 293-8711

**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 to develop management guidelines for created backwater habitats.

**Connections to 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. Regardless of which role played, 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.

**FY06 Activities:** This is a new start in FY07. An interagency meeting is planned for September 2006, to scope monitoring parameters.

**Proposed FY07 Activities:** Reclamation and FWS will conduct post-development fish and fish habitat monitoring at Beal Lake. The FWS has developed a fisheries management plan for Beal Lake which was stocked with BONY and RASU in FY06. This plan calls for monthly sampling of physical and chemical conditions in the lake and surveys of the fish populations. Netting and electro-fishing will be used to conduct fish surveys during spring and fall when water temperatures are less stressful to fish. Visual inspections and sonic-graphing with electronic equipment (fish-finders) will be employed during summer months to locate and assess fish

numbers and distributions within the lake.  Larval light trapping will be conducted monthly from February to May to assess reproduction and recruitment.

# WORK TASKS
# SECTION G

# ADAPTIVE MANAGEMENT PROGRAM

# Work Task G1: Data Management

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $160,000 | $0 | $235,000 | $225,000 | $650,000 | $960,000 | $950,000 |

**Contact:** Theresa Olson, (702) 293-8127

**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 robust database management system needs to be developed to manage data collected through the species research, system monitoring, habitat creation, post-development monitoring, adaptive management, and habitat maintenance programs. Conservation measure completion and financial data also need to be managed to effectively and efficiently implement the LCR MSCP. Database design, initial implementation, and maintenance are funded through this Work Task. It is anticipated that implementation will be completed by FY09.

**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. ASU received a federal grant in FY04 to continue this work for four years. Reclamation accounted for these funds in its request for financial credit. The grant provides funds to support this work through FY07.

**FY05 Accomplishments:** RASU and BONY tagging and stocking information for fish released to the lower Colorado River were provided to ASU and entered into the Lower Colorado River Native Fishes database. This database was redesigned so that the stocking history of recaptured fish could be accessed via the internet.

**FY06 Activities:** Reclamation prepared an LCR MSCP Database Management Framework Requirements Analysis document outlining 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.

All tagging and stocking data for RASU and BONY continue to be provided to ASU for inclusion into the Lower Colorado River Native Fishes database.

**Proposed FY07 Activities:** Database design and implementation will begin in FY07. The proposed funding level will enable Reclamation to design the system, conduct a pilot project on high priority modules, and complete initial set-up for the database management system. Estimated costs include Reclamation staff, associated hardware, software, and storage requirements.

**Pertinent Reports:** *Draft LCR MSCP Database Management Framework Requirements Analysis* is available upon request.

## Work Task G2: Annual Report Writing and Production

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $35,000 | $35,000 | $35,000 | $35,000 | $75,000 | $75,000 | $75,000 |

**Contact:** Jed Blake, (702) 293-8614

**Start Date:** FY05 **Expected Duration:** FY55

**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 yearly *Implementation Report, Work Plan, Budget and Contribution Schedule* as required by the LCR MSCP FMA.

**FY05 Accomplishments:** The FY05 Draft Work Task document was prepared.

**FY06 Activities:** Preparation of the Implementation Report FY07 Work Plans and FY05 Accomplishments will be completed.

**Proposed FY07 Activities:** Implementation Report FY08 Work Plans and FY06 Accomplishments will be published.

**Pertinent Reports:**
*Work Tasks and Obligations Fiscal Year 2004, Draft Lower Colorado River Multi-Species Conservation Program Work Tasks and Obligations for Federal Fiscal Year 2005, Lower River Multi-Species Conservation Program Final Implementation Report, Fiscal Year 2006 Work Plan, and Budget* posted on LCR-MSCP website.

# Work Task G3: Adaptive Management Research Projects

| FY05 Estimate | FY05 Actual | Cumulative Accomplishment Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $230,000 | $275,000 | $325,000 | $325,000 |

**Contact:** John Swett, (702) 293-8574

**Start Date:** FY06 **Expected Duration:** FY55

**Long-term Goal:** Species Research

**Conservation Measures:** MRM1, MRM2, MRM4, WIFL1, CMM1, 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 implement successful habitat creation and the Fish Augmentation Program, an Adaptive Management Program must be developed. Data gaps will be identified during Work Task 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.

**FY05 Accomplishments:** This is a new start in FY06.

**FY06 Activities:** Research needs have been identified in the fish augmentation program. Data gaps are being identified under Work Task C3. A program was initiated to develop remote sensing techniques to monitor relative abundance of RASU. This project spawned from observations that trammel netting, the current standard for sampling RASU, does not appear to be as successful in flowing river reaches as it is in lakes and still-water areas. In addition,

trammel nets catch non-target organisms such as beavers, muskrats, and waterfowl. The project is looking at surveying techniques which might be more successful in flowing water and are less intrusive ways of surveying these fish in any water type. Two principle techniques being investigated are use of camera equipment (high resolution still photos and digital video) and the use of ocular surveys (surface counts with two observers in drift boats). These techniques are being used at known razorback sucker spawning sites on Lake Mohave and in the LCR upstream of Needles, California.

The work is being led by Reclamation staff from the Denver Technical Services Center in cooperation with researchers from USGS Denver, CDFG, and Reclamation's staff in Boulder City. (The Reclamation helicopter based out of Boulder City is also being used to conduct this work.)

A draft progress report is currently in review. Preliminary results are encouraging for the ocular surveys, but discouraging for the aerial surveys.

**Proposed FY07 Activities:** Species profiles, being completed under Work Task C3, should be finalized in FY06. If immediate research needs are identified in FY07, proposals and study designs will be written and research may be funded under this Work Task.

Testing and evaluation of remote sensing techniques for counting fish will continue. Study techniques will incorporate findings from FY06. For example, airspeed for the helicopter needs to be slowed to increase counting accuracy, and night-time ocular surveys using halogen lamps will be tested.

**Pertinent Reports:** Progress report for remote sensing study results from FY06 will be made available upon request. Study plan for FY07 is available upon request.

# Work Task G4: Science/Adaptive Management Strategy

| FY05 Estimate | FY05 Actual Expenditure | Cumulative Expenditures Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Projected Estimate | FY09 Projected Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $173,000 | $100,000 | $100,000 | $100,000 |

**Contacts:** John Swett (702) 293-8574

**Start Date:** FY06 **Expected Duration:** FY09

**Long-Term Goal:** Ensure successful and efficient implementation of LCR MSCP conservation measures for the benefit of the natural resources on the LCR.

**Conservation Measures:** All conservation measures dealing with construction and restoration of habitat, and conservation measures dealing with rearing, releasing and maintaining native fish.

**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 Task (past and future):** All science-based work tasks.

**Project Description:** During FY06, draft a peer-reviewed science strategy that defines processes for ensuring project accomplishments using sound science. This strategy will include processes for analysis, recommendations for improved habitat construction, peer review of reports generated for research and monitoring, and other activities associated with adaptive management needs.

**Previous Activities**: None

**FY05 Accomplishments:** This is a new start for FY06.

**FY06 Activities:** A draft science strategy is being developed to accomplish LCR MSCP implementation. This science strategy will be used in a draft form for approximately one year, after which it will be revised and finalized.

**FY07 Proposed Activities**: Begin implementing the draft Science Strategy.

**Pertinent Reports**: The *Draft Final Science Strategy* will be posted on the LCR MSCP website.

## Work Task G5: Public Outreach

| FY05 Estimate | FY05 Actual | Cumulative Expenditures Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $35,000 | $35,000 | $35,000 | $35,000 |

**Contact:** Laura Vecerina, (702) 293-8540

**Start Date:** FY05 **Expected Duration:** FY55

**Long-Term Goal:** To increase education and support for the LCR MSCP Program

**Conservation Measures:** n/a

**Location:** n/a

**Purpose: 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

**FY05 Accomplishments:** This was a new start in FY06.

**FY06 Activities:** In FY06, Reclamation formed a core outreach group, consisting of representatives from Reclamation and the Steering Committee. This group has met frequently to develop and implement short and long-term outreach goals. For short term goals, the group has updated the look of the LCR MSCP logo, and is developing a standardized banner that will be used in various outreach materials. In the short term, the group is also developing a standard LCR MSCP report cover for publication that reflects the partnership aspect of the Program. In addition, the group is developing a general display and outreach materials for the Program that can be displayed and distributed at conferences.

For long term goals, the core group helped develop a questionnaire to identify LCR MSCP outreach goals. This questionnaire was used to guide two focus group meetings: one which was held with Reclamation staff in March 2006, and another for the Steering Committee Work Group in April 2006. Information from those focus group meetings will be used to develop an outreach strategy for the Program, which will be presented to the Steering Committee.

**Proposed FY07 Activities:** One of the recommendations from the focus group meetings held in FY06 was that the content of the Reclamation Website needed to be expanded to offer information for interested stakeholders and the general public. In FY07, Reclamation and the core group will redesign the Website to include the new partnership look and add more layperson friendly information to the site. Reclamation will also continue to develop fact sheets and conference materials for specific aspects of the program. In addition, information and pictures of

the covered species will be obtained for various uses. Reclamation will also draft a long-term outreach strategy for the Program. This strategy would then be used as a guide for continuing efforts.

# WORK TASKS
# SECTION H

# EXISTING
# HABITAT
# MAINTENANCE

## Work Task H1: Existing Habitat Maintenance

| FY05 Estimate | FY05 Actual | Total Expenditures Through FY05 | FY06 Approved Estimate | FY07 Proposed Estimate | FY08 Proposed Estimate | FY09 Proposed Estimate |
|---|---|---|---|---|---|---|
| $0 | $0 | $0 | $541,500 | $561,000 | $561,000* | $561,000* |

*Existing Habitat maintenance contributions are determined prior to each fiscal year. FY08, and FY09 will be posted as the information becomes available.

**Contact:** Jed Blake, (702) 293-8614

**Start Date:** FY06 **Expected Duration:** FY15

**Long-Term Goal:** Reduce or stop ecosystem degradation resulting from past river operations and maintenance activities.

**Conservation Measure:** N/A

**Location:** Lower Colorado River (Reaches 1-7)

**Purpose:** Maintain the baseline level of habitat that may be affected in the future by past operations and maintenance activities.

**Project Description:** As outlined in section 8.4.2 of the Funding and Management Agreement, during the first ten years of program implementation, a share of each state's contribution will be set aside in an interest bearing account. Interest earned on the Existing Habitat Maintenance Account will be added to the account for the purpose of implementation of the LCR MSCP. At this time, no funds have been withdrawn from any of the accounts.

**FY05 Accomplishments:** This is a new start in FY06.

**FY06 Activities:** A total of $541,500 was deposited into interest bearing accounts among the Arizona, California, and Nevada partners.

**Proposed FY07 Activities:** A total of $561,000 is expected to be deposited into the three non-federal interest bearing accounts.

# APPENDIX A

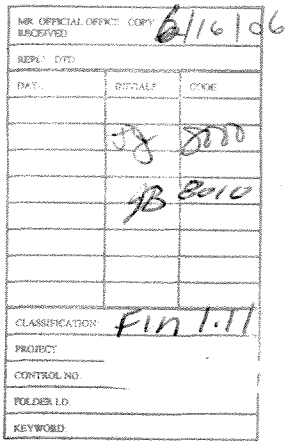
# LETTER FROM CENTRAL ARIZONA WATER CONSERVATION DISTRICT

CAP
CENTRAL ARIZONA PROJECT

P.O. Box 43020 • Phoenix, AZ 85080-3020
23636 N. 7th Street • Phoenix, AZ 85024

623-869-2333 • www.cap-az.com

June 7, 2006




Joseph A. Vanderhorst
Deputy General Counsel
Metropolitan Water District of Southern California
P.O. Box 54153
Los Angles, CA 90054-0153

Phillip S. Lehr
Environmental Program Manager
Colorado River Commission of Nevada
555 E. Washington Ave., Suite 3100
Las Vegas, NV 89101

Gentlemen:

For the Federal Fiscal Year 2007, the Non-Federal share, both annually and quarterly by state are detailed in this letter. The inflation index used is 1.122. These are the same preliminary total annual figures that were discussed at the May 22, 2006 MSCP Workgroup meeting.

| | |
|---|---|
| FY 2007 Non-Federal Share (2003 $) | $5,607,000 |
| FY 2007 Inflation Index | 1.122 |
| FY 2007 Non-Federal Share (Escalated $) | $6,291,054 |

| FY 2007 Non-Federal Payments | Existing Habitat Maintenance | Balance | Total |
|---|---|---|---|
| Arizona (10% of Non-Federal Share) | $140,250.00 | $ 488,855.40 | $ 629,105.40 |
| Nevada (32.5% of Non-Federal Share) | 140,250.00 | 1,904,342.55 | 2,044,592.55 |
| California (57.5% of Non-Federal Share) | 280,500.00 | 3,336,856.05 | 3,617,356.05 |
| Total | $561,000.00 | $5,730,054.00 | $6,291,054.00 |

| FY 2007 Quarterly Payments | | Existing Habitat Maintenance | Balance | Total |
|---|---|---|---|---|
| Arizona | Q1 | $ 35,062.50 | $ 122,213.85 | $ 157,276.35 |
| | Q2 | 35,062.50 | 122,213.85 | 157,276.35 |
| | Q3 | 35,062.50 | 122,213.85 | 157,276.35 |
| | Q4 | 35,062.50 | 122,213.85 | 157,276.35 |
| Nevada | Q1 | $ 35,062.50 | $ 476,085.64 | $ 511,148.14 |
| | Q2 | 35,062.50 | 476,085.64 | 511,148.14 |
| | Q3 | 35,062.50 | 476,085.64 | 511,148.14 |
| | Q4 | 35,062.50 | 476,085.63 | 511,148.13 |
| California | Q1 | $ 70,125.00 | $ 834,214.02 | $ 904,339.01 |
| | Q2 | 70,125.00 | 834,214.01 | 904,339.01 |
| | Q3 | 70,125.00 | 834,214.01 | 904,339.01 |
| | Q4 | 70,125.00 | 834,214.01 | 904,339.02 |

Please note that some of the quarterly amounts for Nevada and California 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,

T Cooke

Theodore Cooke
Central Arizona Project
Assistant General Manager
Finance and Information Technologies

Attachments

Cc Lorri Gray, MSCP Program Manager, Bureau of Reclamation
Jackie Brown, Financial Analysis and Planning Manager, CAP
Dana Medlock, Senior Financial Analyst, CAP

## Section 8.1.1 - Fiscal Year 2007 Inflation Calculation for Lower Colorado River Multi-Species Conservation Program (Actual Indices through September 2005)

| Item | | Description / Formula | | Values | | Result |
|---|---|---|---|---|---|---|
| FY | = | Federal Fiscal Year Being Adjusted for Inflation | | 2007 | | 2007 |
| FY-2 | = | Federal Fiscal Year for 2 years prior to Federal Fiscal Year Being Adjusted for Inflation | | 2005 | | 2005 |
| PPI Inflation Index for FY | = | Producer Price Index for Materials and Components for Const Sept FY-2 Producer Price Index for Materials and Components for Const Sept 2002 | = | 177/ 152.1 | = | 1.1640 |
| | | | | | | |
| | | | | | | |
| GDPIP Inflation Index for FY | = | Gross Domestic Product Implicit Price Deflator September 30, FY-2 Gross Domestic Product Implicit Price Deflator September 30, 2002 | | 112.527 / 104.243 | = | 1.0790 |
| | | | | | | |
| Inflation Index for FY | = | (PPI Inflation Index for FY + GDPIP inflation Index for FY)/2 | | (1.164 + 1.079)/2 | = | 1.122 |
| | | | | | | |
| | | | | | | |
| 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 1.122 | = | $6,291.054 |
| Federal Indexed Funding Obligation for | = | (Federal Funding Obligation for FY) X (Inflation Index for FY) | | $5,607 X 1.122 | = | $6,291.054 |

All $ are in thousands

| Individual State's share in $ | | | |
|---|---|---|---|
| California Share | | 50.00% | $3,145,527.00 |
| Azrizona Share | | 25.00% | $1,572,763.50 |
| Nevada Share | | 25.00% | $1,572,763.50 |
| Total Non-Federal Share | | | $6,291,054.00 |

## Fiscal Year 2007 Lower Colorado River Multi-Species Program Funding, Indexing and Inflation Adjusted Changes in Funding (Actual Indices through September 2005)

| | | | | | | | | | Program in 9/2002 $ (Table 7-1 of HCP) | | | Program in Indexed $ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sept/FY | Estimated Annual Inflation GDP | Estimated Annual Inflation PPI | Gross Domestic Product Index | GDP Inflation Index | Producer Price Index | PPI Inflation Index | Composite Inflation Index | Total | Federal | Non-Federal | Indexed Total | Indexed Federal | Indexed Non-Federal |
| row | col (a) | col (b) | col (c) | col (d) | col (e) | col (f) | col (g) | col (h) | col (i) | col (j) | col (k) | col (l) | col (m) | col (n) |
| 1 | | | | | d3/d2 =e3 | | f3/f2 =g3 | (e3+g3)/2 =h3 | | | | | j6*h4 =m6 | k6*h4 =n6 |
| 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 | Preliminary | Preliminary | 112.527 | 1.079 | 177.000 | 1.164 | 1.122 | | | | | | |
| 6 | 2006 | 3.0% | 3.5% | 115.903 | 1.112 | 183.195 | 1.204 | 1.158 | 11,214 | 5,607 | 5,607 | 12,145 | 6,072 | 6,072 |
| 7 | 2007 | 3.0% | 3.5% | 119.380 | 1.145 | 189.607 | 1.247 | 1.196 | 11,214 | 5,607 | 5,607 | 12,582 | 6,291 | 6,291 |
| 8 | 2008 | 3.0% | 3.5% | 122.961 | 1.180 | 196.243 | 1.290 | 1.235 | 11,214 | 5,607 | 5,607 | 12,986 | 6,493 | 6,493 |
| 9 | 2009 | 3.0% | 3.5% | 126.650 | 1.215 | 203.112 | 1.335 | 1.275 | 11,214 | 5,607 | 5,607 | 13,412 | 6,706 | 6,706 |
| 10 | 2010 | 3.0% | 3.5% | 130.450 | 1.251 | 210.220 | 1.382 | 1.317 | 11,214 | 5,607 | 5,607 | 13,849 | 6,925 | 6,925 |
| 11 | 2011 | 3.0% | 3.5% | 134.363 | 1.289 | 217.578 | 1.430 | 1.360 | 27,540 | 13,770 | 13,770 | 35,114 | 17,557 | 17,557 |
| 12 | 2012 | 3.0% | 3.5% | 138.394 | 1.328 | 225.193 | 1.481 | 1.405 | 27,540 | 13,770 | 13,770 | 36,270 | 18,135 | 18,135 |
| 13 | 2013 | 3.0% | 3.5% | 142.546 | 1.367 | 233.075 | 1.532 | 1.450 | 27,540 | 13,770 | 13,770 | 37,454 | 18,727 | 18,727 |
| 14 | 2014 | 3.0% | 3.5% | 146.822 | 1.408 | 241.233 | 1.586 | 1.497 | 27,540 | 13,770 | 13,770 | 38,694 | 19,347 | 19,347 |
| 15 | 2015 | 3.0% | 3.5% | 151.227 | 1.451 | 249.676 | 1.642 | 1.547 | 27,540 | 13,770 | 13,770 | 39,933 | 19,967 | 19,967 |
| 16 | 2016 | 3.0% | 3.5% | 155.764 | 1.494 | 258.415 | 1.699 | 1.597 | 22,164 | 11,082 | 11,082 | 33,180 | 16,590 | 16,590 |
| 17 | 2017 | 3.0% | 3.5% | 160.437 | 1.539 | 267.459 | 1.758 | 1.649 | 22,164 | 11,082 | 11,082 | 34,288 | 17,144 | 17,144 |
| 18 | 2018 | 3.0% | 3.5% | 165.250 | 1.585 | 276.820 | 1.820 | 1.703 | 22,164 | 11,082 | 11,082 | 35,396 | 17,698 | 17,698 |
| 19 | 2019 | 3.0% | 3.5% | 170.207 | 1.633 | 286.509 | 1.884 | 1.759 | 22,164 | 11,082 | 11,082 | 36,548 | 18,274 | 18,274 |
| 20 | 2020 | 3.0% | 3.5% | 175.313 | 1.682 | 296.537 | 1.950 | 1.816 | 22,164 | 11,082 | 11,082 | 37,745 | 18,873 | 18,873 |
| 21 | 2021 | 3.0% | 3.5% | 180.573 | 1.732 | 306.916 | 2.018 | 1.875 | 19,982 | 9,991 | 9,991 | 35,148 | 17,574 | 17,574 |
| 22 | 2022 | 3.0% | 3.5% | 185.990 | 1.784 | 317.658 | 2.088 | 1.936 | 19,982 | 9,991 | 9,991 | 36,287 | 18,144 | 18,144 |
| 23 | 2023 | 3.0% | 3.5% | 191.570 | 1.838 | 328.776 | 2.162 | 2.000 | 19,982 | 9,991 | 9,991 | 37,466 | 18,733 | 18,733 |
| 24 | 2024 | 3.0% | 3.5% | 197.317 | 1.893 | 340.283 | 2.237 | 2.065 | 19,982 | 9,991 | 9,991 | 38,685 | 19,343 | 19,343 |
| 25 | 2025 | 3.0% | 3.5% | 203.236 | 1.950 | 352.193 | 2.316 | 2.133 | 19,982 | 9,991 | 9,991 | 39,964 | 19,982 | 19,982 |
| 26 | 2026 | 3.0% | 3.5% | 209.333 | 2.008 | 364.519 | 2.397 | 2.203 | 8,144 | 4,072 | 4,072 | 16,817 | 8,409 | 8,409 |
| 27 | 2027 | 3.0% | 3.5% | 215.613 | 2.068 | 377.278 | 2.480 | 2.274 | 8,144 | 4,072 | 4,072 | 17,371 | 8,686 | 8,686 |
| 28 | 2028 | 3.0% | 3.5% | 222.082 | 2.130 | 390.482 | 2.567 | 2.349 | 8,144 | 4,072 | 4,072 | 17,941 | 8,971 | 8,971 |
| 29 | 2029 | 3.0% | 3.5% | 228.744 | 2.194 | 404.149 | 2.657 | 2.426 | 8,144 | 4,072 | 4,072 | 18,519 | 9,260 | 9,260 |
| 30 | 2030 | 3.0% | 3.5% | 235.607 | 2.260 | 418.294 | 2.750 | 2.505 | 8,144 | 4,072 | 4,072 | 19,130 | 9,565 | 9,565 |
| 31 | 2031 | 3.0% | 3.5% | 242.675 | 2.328 | 432.935 | 2.846 | 2.587 | 7,500 | 3,750 | 3,750 | 18,195 | 9,098 | 9,098 |

## Fiscal Year 2007 Lower Colorado River Multi-Species Program Funding, Indexing and Inflation Adjusted Changes in Funding (Actual Indices through September 2005)

| | | | | | | | | | Program in 9/2002 $ (Table 7-1 of HCP) | | | Program in Indexed $ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sept/FY | Estimated Annual Inflation GDP | Estimated Annual Inflation PPI | Gross Domestic Product Index | GDP Inflation Index | Producer Price Index | PPI Inflation Index | Composite Inflation Index | Total | Federal | Non-Federal | Indexed Total | Indexed Federal | Indexed Non-Federal |
| row | col (a) | col (b) | col (c) | col (d) | col (e) | col (f) | col (g) | col (h) | col (i) | col (j) | col (k) | col (l) | col (m) | col (n) |
| 32 | 2032 | 3.0% | 3.5% | 249.955 | 2.398 | 448.087 | 2.946 | 2.672 | 7,500 | 3,750 | 3,750 | 18,788 | 9,394 | 9,394 |
| 33 | 2033 | 3.0% | 3.5% | 257.454 | 2.470 | 463.770 | 3.049 | 2.760 | 7,500 | 3,750 | 3,750 | 19,403 | 9,701 | 9,701 |
| 34 | 2034 | 3.0% | 3.5% | 265.177 | 2.544 | 480.002 | 3.156 | 2.850 | 7,500 | 3,750 | 3,750 | 20,040 | 10,020 | 10,020 |
| 35 | 2035 | 3.0% | 3.5% | 273.133 | 2.620 | 496.802 | 3.266 | 2.943 | 7,500 | 3,750 | 3,750 | 20,700 | 10,350 | 10,350 |
| 36 | 2036 | 3.0% | 3.5% | 281.327 | 2.699 | 514.191 | 3.381 | 3.040 | 7,173 | 3,587 | 3,587 | 20,443 | 10,222 | 10,222 |
| 37 | 2037 | 3.0% | 3.5% | 289.766 | 2.780 | 532.187 | 3.499 | 3.140 | 7,173 | 3,587 | 3,587 | 21,110 | 10,555 | 10,555 |
| 38 | 2038 | 3.0% | 3.5% | 298.459 | 2.863 | 550.814 | 3.621 | 3.242 | 7,173 | 3,587 | 3,587 | 21,806 | 10,903 | 10,903 |
| 39 | 2039 | 3.0% | 3.5% | 307.413 | 2.949 | 570.092 | 3.748 | 3.349 | 7,173 | 3,587 | 3,587 | 22,523 | 11,262 | 11,262 |
| 40 | 2040 | 3.0% | 3.5% | 316.636 | 3.037 | 590.046 | 3.879 | 3.458 | 7,173 | 3,587 | 3,587 | 23,255 | 11,627 | 11,627 |
| 41 | 2041 | 3.0% | 3.5% | 326.135 | 3.129 | 610.697 | 4.015 | 3.572 | 7,173 | 3,587 | 3,587 | 24,022 | 12,011 | 12,011 |
| 42 | 2042 | 3.0% | 3.5% | 335.919 | 3.222 | 632.072 | 4.156 | 3.689 | 7,173 | 3,587 | 3,587 | 24,804 | 12,402 | 12,402 |
| 43 | 2043 | 3.0% | 3.5% | 345.996 | 3.319 | 654.194 | 4.301 | 3.810 | 7,173 | 3,587 | 3,587 | 25,622 | 12,811 | 12,811 |
| 44 | 2044 | 3.0% | 3.5% | 356.376 | 3.419 | 677.091 | 4.452 | 3.936 | 7,173 | 3,587 | 3,587 | 26,461 | 13,231 | 13,231 |
| 45 | 2045 | 3.0% | 3.5% | 367.067 | 3.521 | 700.789 | 4.607 | 4.064 | 7,173 | 3,587 | 3,587 | 27,329 | 13,665 | 13,665 |
| 46 | 2046 | 3.0% | 3.5% | 378.079 | 3.627 | 725.317 | 4.769 | 4.198 | 7,173 | 3,587 | 3,587 | 28,233 | 14,116 | 14,116 |
| 47 | 2047 | 3.0% | 3.5% | 389.422 | 3.736 | 750.703 | 4.936 | 4.336 | 7,173 | 3,587 | 3,587 | 29,151 | 14,576 | 14,576 |
| 48 | 2048 | 3.0% | 3.5% | 401.104 | 3.848 | 776.977 | 5.108 | 4.478 | 7,173 | 3,587 | 3,587 | 30,112 | 15,056 | 15,056 |
| 49 | 2049 | 3.0% | 3.5% | 413.138 | 3.963 | 804.171 | 5.287 | 4.625 | 7,173 | 3,587 | 3,587 | 31,102 | 15,551 | 15,551 |
| 50 | 2050 | 3.0% | 3.5% | 425.532 | 4.082 | 832.317 | 5.472 | 4.777 | 7,173 | 3,587 | 3,587 | 32,121 | 16,060 | 16,060 |
| 51 | 2051 | 3.0% | 3.5% | 438.298 | 4.205 | 861.449 | 5.664 | 4.935 | 7,173 | 3,587 | 3,587 | 33,175 | 16,588 | 16,588 |
| 52 | 2052 | 3.0% | 3.5% | 451.447 | 4.331 | 891.599 | 5.862 | 5.097 | 7,173 | 3,587 | 3,587 | 34,265 | 17,133 | 17,133 |
| 53 | 2053 | 3.0% | 3.5% | 464.990 | 4.461 | 922.805 | 6.067 | 5.264 | 7,173 | 3,587 | 3,587 | 35,399 | 17,699 | 17,699 |
| 54 | 2054 | 3.0% | 3.5% | 478.940 | 4.594 | 955.103 | 6.279 | 5.437 | 7,173 | 3,587 | 3,587 | 36,561 | 18,280 | 18,280 |
| 55 | 2055 | 3.0% | 3.5% | 493.308 | 4.732 | 988.532 | 6.499 | 5.616 | 7,173 | 3,587 | 3,587 | 37,759 | 18,879 | 18,879 |
| | Total | | | | | | | | **626,180** | **313,090** | **313,090** | **1,369,305** | **684,652** | **684,652** |

# 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 |
|---|---|---|
| Total Annual Funding Commitment | $ 12,144,762.00 | $ 12,582,108.00 |
| X Exiting Habitat Percentage Above | 4.458712323880860% | 4.458712323880860% |
| Existing Habitat Maintenance Cost | $ 541,500.00 | $ 561,000.00 |
| Arizona - 25% Share | $ 135,375.00 | $ 140,250.00 |
| Nevada - 25% Share | 135,375.00 | 140,250.00 |
| California - 50% Share | 270,750.00 | 280,500.00 |
| Total Existing Habitat Maintenance Cost | $ 541,500.00 | $ 561,000.00 |

# APPENDIX B

# DESCRIPTION OF TAKE

**APPENDIX B TABLE B-1**
**Lower Colorado River Multi-Species Conservation Program**
**Federal Flow-Related Covered Actions and Accomplishments**
**Calendar Year 2005**

| Federal Covered Actions<br>*Biological Assessment*<br>Chapter 2 | Nondiscretionary Actions | Discretionary Actions | Nondiscretionary Actions<br>Related to Non-Federal Actions[1] | 2005 Accomplishments[2, 3] |
|---|---|---|---|---|
| **2.2 BUREAU OF RECLAMATION** | | | | |
| **2.2.1 Ongoing Flow-Related Actions** | | | | |
| **2.2.1.1 Flood Control**<br>(page 2-3; Table 2-1, page 2-5) | • Prescribed flood control releases per Field Working Agreement and *Water Control Manual for Lake Mead/Hoover Dam* | • Timing of required releases may be varied within the month<br><br>• Anticipatory flood control releases<br><br>• 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<br><br>• Management of target elevations for Lake Mohave (Davis Dam) and Lake Havasu (Parker Dam) | • None | No flood control releases were made from Lake Mead.<br><br>The elevation of Lake Mead provided for flood control space that was well above that required. The elevation was between 1130.11 and 1147.75 feet mean sea level.<br><br>Elevations at Lake Mohave and Lake Havasu were managed to target elevations. |
| **2.2.1.2 State Apportionment and Water Contracts**<br>(page 2-5; Table 2-2, page 2-6) | • Delivery of water to water users in the United States pursuant to applicable Federal law, including the Boulder Canyon Project Act (BCPA); the Supreme Court Decree of March 9, 1964, 376 U.S. 340, as amended (Decree)<br><br>• Delivery of a State's unused entitlement to a junior entitlement holder within that State on an annual basis | • Determinations and delivery of post-2016 unused apportionment water from one State to another within the Lower Basin on an annual basis | • Delivery of water to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree | Water deliveries were made to water users in Arizona, California, and Nevada to satisfy the basic entitlements to delivery of Colorado River water.<br><br>Unused entitlement water within a State's apportionment was delivered to junior priority holders in that State. |
| **2.2.1.3 Annual Operations Normal, Surplus, Shortage, and Unused Apportionment**<br>(page 2-6; Table 2-3, page 2-9) | • Issuance of an annual operating plan<br><br>• 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)<br><br>• Delivery of water to Mexico pursuant to the 1944 Water Treaty | • Determination of shortage conditions absent specific guidelines<br><br>• Determination of surplus conditions absent specific guidelines<br><br>• Revision of annual operations through the *Annual Operating Plan* (AOP), pursuant to the long-range operating criteria within the year to reflect current hydrologic conditions<br><br>• Determinations and delivery of post-2016 unused apportionment water from one Sstate to another within the Lower Basin on an annual basis<br><br>• Execution of agreements and the delivery of surplus waer pursuant to the Reclamation Reform Act and the Reclamation States Emergency Drought Relief Act<br><br>• Periodic review of the Long Range Operation of the Colorado (LROC) | • Delivery of water to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree | The *Annual Operating Plan* for 2005 was issued which governed releases.<br><br>Annual operations were revised through the *Annual Operating Plan* , pursuant to the long-range operating criteria to reflect current hydrologic conditions.<br><br>A Partial Domestic Surplus condition was declared, however no surplus water was taken.<br><br>Water was delivered to water users in the United States pursuant to applicable Federal law, including the BCPA and the Decree.<br><br>Water was delivered to Mexico pursuant to the 1944 Water Treaty. Delivery to Mexico in excess of schedule was 116,339 acre-feet.<br><br>There was a review of the Long-Range Operating Criteria of Colorado River reservoirs. |

**APPENDIX B TABLE B-1**
**Lower Colorado River Multi-Species Conservation Program**
**Federal Flow-Related Covered Actions and Accomplishments**
**Calendar Year 2005**

| Federal Covered Actions<br>*Biological Assessment*<br>Chapter 2 | Nondiscretionary Actions | Discretionary Actions | Nondiscretionary Actions<br>Related to Non-Federal Actions[1] | 2005 Accomplishments[2, 3] |
|---|---|---|---|---|
| **2.2.1.4 Daily Hoover Dam Operations**<br>(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.<br><br>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**<br>(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.<br><br>The timing of releases was varied based on available downstream storage, Lakes Mohave and Havasu operational constraints, downstream water requirements, and hydropower needs. |
| **2.2.1.4 Daily Parker Dam Operations**<br>(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.<br><br>The timing of releases was varied based on available downstream water requirements, hydropower needs, and other operational constraints immediately downsteam of Parker Dam. |
| **2.2.1.4 Daily Senator Wash, Imperial Dam, and Laguna Dam Reservoir Operations**<br>(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 overdeliveries, 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 generate hydropower with water releases from Senator Wash.<br><br>Water releases from Senator Wash, Imperial, and Laguna Dams were made to prevent overdeliveries, to release water to entitlement holders, for sluicing operations, to deliver a portion of the 1944 Water Treaty deliveries to Mexico, and for fllood control purposes. |
| **2.2.1.5 Electric Power Generation**<br>(page 2-11)<br><br>**43 CFR PART 431**<br>(page 2-14) | • Operational requirements to satisfy 43 C.F.R. Part 431 requirements | --- | --- | Hydroelectric power generated (net)[4]:<br>• Hoover Dam: 3,254,593,045 kWh<br>• Davis Dam: 968615,600 kWh<br>• Parker Dam: 395,638,153 kWh<br><br>Operations met the requirements to satisfy the 43 C.F.R. Part 431 requirements. |
| **2.2.1.6 Lower Colorado Water Supply Project - California**<br>(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 | Water was delivered to California domestic water users under existing contracts for delivery of Lower Colorado Water Supply Project water.<br><br>No new contracts were issued. |

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**Lower Colorado River Multi-Species Conservation Program**
**Federal Flow-Related Covered Actions and Accomplishments**
**Calendar Year 2005**

| Federal Covered Actions<br>*Biological Assessment*<br>Chapter 2 | Nondiscretionary Actions | Discretionary Actions | Nondiscretionary Actions<br>Related to Non-Federal Actions[1] | 2005 Accomplishments[2, 3] |
|---|---|---|---|---|
| **2.2.1.7 1944 Water Treaty Deliveries**<br>(page 2-17; Table 2-9, page 2-20) | • Delivery of Mexico allotment (1.5 million acre-feet [maf]) pursuant to the 1944 Water Treaty and related Minutes<br><br>• 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<br><br>• Deliver of Mexico allotment pursuant to the 1944 Water Treaty and related Minutes under extraordinary drought conditions<br><br>• Compliance with the salinity requirements of Minute No. 242 of the 1944 Water Treaty<br><br>• Delivery of emergency waer to Tijuana pursuant ot Minute No. 310 of the 1944 Water Treaty and contract | • Routing of water through the Yuma Division for delivery to Northerly International Boundary (NIB)<br><br>• Determination of quantity of water delivered at Southerly International Boundary (SIB) up to 140,000 afy<br><br>• Drainage pumping and delivery of drainage return flows at NIB and SIB<br><br>• Operation of variable-speed pumps and diversion canal at SIB to reduce salinity<br><br>• Execution of contracts to deliver a portion of Mexico's allotment to Tijuana pursuant to Minute No. 310 of the 1944 Water Treaty<br><br>• Routing of water through the Yuma Division during flood control conditions | • Delivery of emergency water to Tijuana pursuant to Minute No. 310 of the 1944 Water Treaty and contract<br><br>• Retention of a portion of Metropolitan's entitlement in Lake Mead to accommodate delivery of water pursuant to Minute No. 310 of the 1944 Water Treaty | Water delivery met the Mexico allotment (1.5 maf) pursuant to the 1944 Water Treaty and related Minutes.<br><br>A total of 1,616,339 acre-feet of water was delivered to Mexico.<br><br>Compliance was met with the salinity requirements of Minute No. 242 of the 1944 Water Treaty.<br><br>Delivery of emergency water to Tijuana pursuant to Minute No. 310 of the 1944 Water Treaty totaled 176 acre-feet.<br><br>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.<br><br>Delivery of water at SIB totaled 121,551 acre-feet.<br><br>Drainage pumping and delivery of drainage return flows were made at NIB and SIB.<br><br>Variable-speed pumps and the diversion canal at SIB were used to reduce salinity. A total of 991 acre-feet was diverted through the diversion canal. |
| **2.2.1.8 Decree Accounting**<br>(page 2-21; Table 2-10, page 2-22) | • Annual preparation of official records of the diversion, return flow, and consumptive use of Colorado River water pursuant to Article V of the Supreme Court Decree in *Arizona v. California* | • None | • Report data for Decree Accounting records | *Colorado River Accounting and Water Use Report; Arizona, California, Nevada* for calendar year 2005 is currently being prepared. Publication will take place during Fiscal Year 2006. Provisional data is available (see Appendix B, Attachment 1).<br><br>Provisional Data - Diversions from Mainstream Summary[5]:<br>• Arizona:<br><br>Diversions = 2,573,405 acre-feet<br>Measured Returns = 553,390 acre-feet<br>Unmeasured Returns = 53,112 acre-feet<br>Consumptive Use = 1,966,903 acre-feet<br>• California:<br><br>Diversions = 4,259,232 acre-feet<br>Measured Returns = 470,825 acre-feet<br>Unmeasured Returns = 50,731 acre-feet<br>Consumptive Use = 3,737,676 acre-feet<br>• Nevada:<br><br>Diversions = 407,221 acre-feet<br>Measured Returns = 154,035 acre-feet<br>Unmeasured Returns = 0 acre-feet<br>Consumptive Use = 253,186 acre-feet |

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| Federal Covered Actions<br>*Biological Assessment*<br>Chapter 2 | Nondiscretionary Actions | Discretionary Actions | Nondiscretionary Actions Related to Non-Federal Actions[1] | 2005 Accomplishments[2, 3] |
|---|---|---|---|---|
| **2.2.2 Future Flow-Related Covered Actions** | | | | |
| **2.2.2.1 Specific Surplus and Shortage Guidelines**<br>(page 2-22; Table 2-11, page 2-24) | • 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)<br><br>• Delivery of water pursuant to the Article II(B)(3) of the Decree (shortage) | • Adoption of specific post-2016 surplus guidelines<br><br>• Adoption of specific shortage guidelines | • Consult with States on development of specific post-2016 surplus guidelines or development of specific shortage guidelines<br><br>• Delivery of water to water users in the United States pursuant to applicable Federal law, including the Boulder Canyon Project Act and the Decree | No surplus water was delivered pursuant to Article II(B)(2) of the Decree.<br><br>No water was delivered pursuant to the Article II(B)(3) of the Decree.<br><br>No adoption of specific post-2016 surplus guidelines was made. There was no adoption of specific shortage guidelines. |
| **2.2.2.2 Flood Release Contracts**<br>(page 2-24; Table 2-12, page 2-25) | • Delivery of water under executed flood release contracts | • Execution of contracts for water released during flood control operations | • Participate in the development of and consult in the execution of flood release contracts | No water deliveries were made under flood release contracts. |
| **2.2.2.3 Changes in the Storage and Delivery of State Entitlement Waters through Various Administrative Actions**<br>(page 2-25) | --- | --- | --- | No administrative actions were taken to reduce the water deliveries as listed in Table 2-13. |
| **Flow Changes Below Hoover Dam to Davis Dam**<br>(Table 2-14, after page 2-26) | --- | --- | --- | Releases were not reduced as listed in Table 2-14. Banking of 10,000 acre-feet of water on behalf of Southern Nevada Water Authority by The Metropolitan Water District of Southern California increased the release of water below Hoover Dam to Davis Dam. Banking is not accounted as a transfer (see Changes in Delivery Related to Off-Stream Storage below). |
| **Flow Changes Below Davis Dam to Parker Dam**<br>(Table 2-15, after page 2-26) | --- | --- | --- | Releases were not reduced as listed in Table 2-15. Banking of 10,000 acre-feet of water on behalf of Southern Nevada Water Authority by The Metropolitan Water District of Southern California increased the release of water below Davis Dam to Parker Dam. Banking is not accounted as a transfer (see Changes in Delivery Related to Off-Stream Storage below). |
| **Flow Changes Below Parker Dam to Imperial Dam**<br>(Table 2-16, after page 2-26 | --- | --- | --- | Releases were not reduced as listed in Table 2-16. Banking of 10,000 acre-feet of water on behalf of Southern Nevada Water Authority by The Metropolitan Water District of Southern California did not affect the amount of water released below Parker Dam. Banking is not accounted as a transfer (see Changes in Delivery Related to Off-Stream Storage below). |
| **Water Conservation Field Services Program**<br>(page 2-27; Table 2-17, page 2-28) | • Develop water conservation program pursuant to Reclamation Reform Act section 210(a) | • Implementation of the Field Services Program | • Consult in the development of conservation plans pursuant to RRA section 210(a) | Updated five water conservation plans per scheduled update. All water conservation plans for the Lower Colorado Region's contractors are complete. |
| **Unauthorized Use**<br>(page 2-28; Table 2-18, page 2-30) | • Enforcement of provisions of the Boulder Canyon Project Act in *Arizona v. California* to limit the release and delivery of Colorado River water to authorized users | • Implementation of appropriate policy or rule to address four types of unauthorized use<br><br>• Execution of water delivery contracts with entities identified as non-contract users | • Consult with states in the development of policies or rules to address four types of unauthorized use<br><br>• Consult with the states on the execution of water delivery contracts with entities identified as noncontract users | The unauthorized use team continued to review data, perform modeling studies, and consult with the Lower Division States, in preparation for initiating a rulemaking action to address unauthorized use. The focus will be on non-contract use, which represents most of the unauthorized use in the Lower Basin. |
| **Unallocated or Noncontract Water in Arizona, Exclusive of CAP**<br>(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. |

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|---|---|---|---|---|
| **Central Arizona Project Contract Actions**<br>(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 delivery to use by CAP subcontractors and Indian tribes in satisfaction of water delivery contracts. A *Federal Register* notice was developed and circulated for internal review to announce the allocation that was implemented by the Arizona Water Settlements Act. The notice has not been published and contracts to implement the act have not been developed. |
| **Changes in Delivery Related to Water Transfers**<br>(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 | Delivery of 126,500 acre-feet of water was made under the Colorado River Water Delivery Agreement that reflects changes in points of diversion and used to implement the Quantification Settlement Agreement water transfers.<br><br>Other prospective water transfers are in the discussion stages. |
| **Changes in Delivery Related to Off-Stream Storage**<br>(page 2-32; Table 2-22, page 2-33) | • Delivery of water under executed off-stream storage agreements, pursuant to 43 C.F.R. Part 414 | • Execution of Storage and Interstate Release Agreements, pursuant to 43 C.F.R. Part 414 | • Delivery of water under executed off-stream storage agreements, pursuant to 43 C.F.R. Part 414 | Banking of 10,000 acre-feet of water on behalf of Southern Nevada Water Authority by The Metropolitan Water District of Southern California. Water deliveries made in Arizona allowed water to be placed in storage under executed off-stream storage agreements. Arizona did not bank any of California or Nevada's unused apportionments.<br><br>Initial banking is not accounted as a transfer. The water stored by Metropolitan was Nevada's unused approtionment and Nevada reduced its consumptive use by an equal amount. When water is released from storage in the future, California will reduce its consumptive use in an amount equal to Nevada's requested release and Nevada will receive the water through the intentially created unused apportionment made available by California. The change in point of diversion for delivery to Nevada will be accounted at that time. |
| **Changes in Amount of Delivery**<br>(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 were no contracts or contract amendments executed that resulted in changes in amounts of delivery or changes in points of diversion. |
| **Changes in Type of Water Use**<br>(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 | There was one contract action executed that resulted in a minor change in type of water use in the Yuma area, where 72 acre-feet of a 480 acre-foot irrigation use entitlement was transferred from an existing irrigation water user to another entity (North Baja Pipeline) for domestic use. |
| **Inclusions and Exclusions to Service Areas**<br>(page 2-34; Table 2-25, page 2-35) | • Delivery of water pursuant to executed contract amendments or new contracts that includes or excludes lands in service areas | • Execution of contract amendments or new contracts that includes or excludes lands in service areas | • Review of contracts and consultation on new or amended contracts | There was one contract where a right to an entitlement was acquired by another entitlement holder. Southern Nevada Water Authority (SNWA) acquired lands owned by the Boy Scouts, but SNWA already had a right to water unused by the Boy Scouts under the water priority system for Nevada. |
| **Contract Terminations**<br>(page 2-35; Table 2-26, page 2-36) | • None | • Termination of water contract due to abandonment<br><br>• Execution of contract amendments when entitlement holder has relinquished water | • Consultation on the disposition of any water allocated for use but not consumptively used within a state | No contract terminations. |

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**Calendar Year 2005**

| Federal Covered Actions<br>*Biological Assessment*<br>Chapter 2 | Nondiscretionary Actions | Discretionary Actions | Nondiscretionary Actions<br>Related to Non-Federal Actions[1] | 2005 Accomplishments[2, 3] |
|---|---|---|---|---|
| **2.3 WESTERN AREA POWER ADMINISTRATION[6]** | --- | --- | --- | See section 2.2.1.5 Accomplishments above. |
| **2.4 NATIONAL PARK SERVICE** | --- | --- | • Water entitlement holder | See section 2.2.1.8 Accomplishments above. |
| **2.5 BUREAU OF INDIAN AFFAIRS** | | | | |
| **2.5.2.2 Ongoing Water Conservation Practices**<br>(page 2-77) | --- | • Conduct conservation measures for efficient water use | --- | Continued existing practices. |
| **2.5.2.6 Flow-Related Actions**<br>(page 2-82) | --- | --- | • Water entitlement holder | See section 2.2.1.8 Accomplishments above. |
| **2.5.3.2 Future Water Conservation Practices**<br>(page 2-77) | --- | • Institute new conservation measures for efficient water use | --- | No implementation in 2005. |
| **2.5.3.5 Headgate Rock Dam Operation and Maintenance**<br>(page 2-88) | --- | • Water releases and generate hydropower with these water releases | --- | Continued existing practices. |
| **2.6 FISH AND WILDLIFE SERVICE** | --- | --- | • Water entitlement holder | See section 2.2.1.8 Accomplishments above. |
| **2.7 BUREAU OF LAND MANAGEMENT** | --- | --- | • Water entitlement holder | See section 2.2.1.8 Accomplishments above. |

**NOTES:**
1. See *LCR MSCP Habitat Conservation Plan* , section 2.1.1, Relationship of Non-Federal Covered Activities to Federal Nondiscretionary Actions. Can be accessed at http://www.usbr.gov/lc/lcrmscp/documents.html .
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 Non-Federal Covered Activities) are reported for Calendar Year 2005, except hydropower generation (see Note 4 below).
4. Bureau of Reclamation. *Hydroelectric Powerplants Fiscal Year 2005 Generation* . Can be accessed at http://www.usbr.gov/power/data/fy05gen.html
5. Bureau of Reclamation. Provisional data from *Draft Colorado River Accounting and Water Use Report; Arizona, California, Nevada; Calendar Year 2005* (see Appendix B, Attachment 1). Can be accessed at http://www.usbr.gov/lc/region/g4000/hourly/use05.pdf .
6. 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. Can be accessed at http://www.usbr.gov/lc/lcrmscp/documents.html .

**APPENDIX B TABLE B-2**
**Lower Colorado River Multi-Species Conservation Program**
**Federal Non-Flow-Related Covered Actions and Incidental Take Summary**
**Fiscal Year 2005**

| Federal Covered Actions *Biological Assessment* Chapter 2 | Covered Actions Summary | | | Covered Actions Implemented | | | | | | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| | Nondiscretionary Actions | Discretionary Actions | Nondiscretionary Actions Related to Non-Federal Actions | Reach | Location | River Miles | Habitat Type Impacted | Number of Acres Impacted | Complied with Avoidance and Minimization Measures | |
| **2.2 BUREAU OF RECLAMATION** | | | | | | | | | | |
| **2.2.3 Ongoing Non-Flow-Related (Facilities and Channel Activities)** (page 2-36; Table 2-27, page 2-37) | • Operate, maintain, and control river in Arizona, California, and Nevada<br><br>• Construct, maintain, and improve drainage works for water projects<br><br>• Maintain floodway to accommodate flood flows for 100-year event or 40,000 cubic feet per second, whichever is greater<br><br>• Measure diversions and return flows to and from the mainstem of the Colorado River | --- | • Administration of contracts for water district operation and maintenance of Federally owned facilities | | | | | | | See line items below. |
| **2.2.3.1 Channel Maintenance** (page 2-38) | --- | --- | --- | | | | | | | No implementation in FY05. |
| **Wash Fans** (page 2-40; Table 2-30, page 2-42) | --- | • Wash fan removal | --- | | | | | | | No implementation in FY05. |
| **Protected Bankline Maintenance and Care of Unprotected Banklines** (page 2-43) | --- | • Protected bankline location and maintenance | --- | | | | | | | No implementation in FY05. |
| **Levee Maintenance** (page 2-44) | --- | • Levee location and maintenance | --- | | | | | | | No implementation in FY05. |
| **Desilting Basins** (page 2-46; Table 2-32, page 2-46) | --- | • Sediment dredging upstream of principal canal diversions and disposal sites<br><br>• Maintenance of settling basins to remove sediment and maintain flows; four principal basins | --- | | | | | | | No implementation in FY05. |
| **Jetties and Training Structures** (page 2-47; Tables 2-33 – 2-34, page 2-48) | --- | • Jetty and training structure location and maintenance | --- | | | | | | | No implementation in FY05. |
| **Stockpiles** (page 2-49; Table 2-37, page 2-49) | --- | • Location of three future stock piles | --- | | | | | | | No implementation in FY05. |
| **Riprap Placement and Haul Roads** (page 2-50) | --- | • Haul roads and riprap storage location and maintenance | --- | | | | | | | No implementation in FY05. |
| **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 acess roads<br><br>• Maintenance of open channel drains and outfall channels<br><br>• Maintenance and replacement of gauging stations, survey line markers, and boat ramps | --- | | | | | | | |
| **Maintenance Activities at the SIB** (page 2-52) | --- | • Maintenance of facilities to provide flood flow capacity | --- | | | | | | | No implementation in FY05. |

**APPENDIX B TABLE B-2**
**Lower Colorado River Multi-Species Conservation Program**
**Federal Non-Flow-Related Covered Actions and Incidental Take Summary**
**Fiscal Year 2005**

| Federal Covered Actions *Biological Assessment* Chapter 2 | Covered Actions Summary | | | Covered Actions Implemented | | | | | | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| | Nondiscretionary Actions | Discretionary Actions | Nondiscretionary Actions Related to Non-Federal Actions | Reach | Location | River Miles | Habitat Type Impacted | Number of Acres Impacted | Complied with Avoidance and Minimization Measures | |
| **2.2.3.3 Backwater Maintenance** (page 2-53; Table 2-37, page 2-54) | --- | • Backwater maintenance | --- | | | | | | | No implementation in FY05. |
| **Mohave Division** (page 2-55; Table 2-38, page 2-56) | --- | • Backwater maintenance | --- | 3 | Needles Gage | C243.5 | screwbean mesquite-arrowweed | 0.1 | AMM1, AMM3, AMM6 | Replaced gage. |
| **Parker Division** (page 2-57; Table 2-39, page 2-57) | --- | • Backwater maintenance | --- | | | | | | | No implementation in FY05. |
| **Palo Verde Division** (page 2-58; Table 2-40, page 2-58) | --- | • Backwater maintenance | --- | | | | | | | No implementation in FY05. |
| **Cibola Division** (page 2-58; Table 2-41, page 2-59) | --- | • Backwater maintenance | --- | 4 | Cibola Gage | A87.3 | none | 0 | AMM1, AMM3, AMM6 | Replaced gage. |
| **Imperial Division** (page 2-59; Table 2-42, page 2-59) | --- | • Backwater maintenance | --- | | | | | | | No implementation in FY05. |
| **Laguna Division** (page 2-60; Table 2-43, page 2-60) | --- | • Backwater maintenance | --- | | | | | | | No implementation in FY05. |
| **Yuma Division** (page 2-60; Table 2-44, page 2-61) | --- | • Backwater maintenance | --- | | | | | | | No implementation in FY05. |
| **Limitrophe Division Mitigation Obligations** (page 2-61; Table 2-45, page 2-62) | --- | --- | --- | | | | | | | No implementation in FY05. |
| **2.2.3.4 Limitrophe Division Maintenance** (page 2-62) | --- | --- | --- | | | | | | | No implementation in FY05. |
| **2.2.4 Future Non-Flow-Related Actions** (page 2-63) | --- | --- | --- | | | | | | | |
| **2.2.4.1 Topock Marsh** (page 2-63) | --- | --- | --- | | | | | | | No implementation in FY05. |
| **2.2.4.2 Laguna Reservoir** (page 2-63) | --- | --- | --- | | | | | | | No implementation in FY05. |
| **2.2.4.3 Bankline Maintenance - Unprotected Banklines** (page 2-65; Table 2-46, page 2-66) | --- | --- | --- | | | | | | | No implementation in FY05. |
| **2.2.4.4 Proposed Jetties** (page 2-67; Table 2-48, page 2-67) | --- | --- | --- | | | | | | | No implementation in FY05. |

**APPENDIX B TABLE B-2**
**Lower Colorado River Multi-Species Conservation Program**
**Federal Non-Flow-Related Covered Actions and Incidental Take Summary**
**Fiscal Year 2005**

| Federal Covered Actions *Biological Assessment* Chapter 2 | Covered Actions Summary | | | Covered Actions Implemented | | | | | | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| | Nondiscretionary Actions | Discretionary Actions | Nondiscretionary Actions Related to Non-Federal Actions | Reach | Location | River Miles | Habitat Type Impacted | Number of Acres Impacted | Complied with Avoidance and Minimization Measures | |
| **2.3 WESTERN AREA POWER ADMINISTRATION** | | | • Operation and maintenance of switchyards, substations, and transmission lines | 4 | 17 sites | n/a | saltcedar, developed | < 0.5 acre | AMM3, AMM5 | Replaced 17 transmission poles. |
| **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 FY05. |
| **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 | | | | | | | | No implementation in FY05. |
| **2.4.4 Boating Access** (page 2-72) | | • Maintenance and enhancement of boating access on Lake Mead and Lake Mohave | | | | | | | | No implementation in FY05. |
| **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 | n/a | none | 0 | AMM1, AMM3 | Continued existing practices. |
| | | | | 3 | Chemehuevi | n/a | none | 0 | AMM1, AMM3 | Continued existing practices. |
| | | | | 4 | CRIT | n/a | none | 0 | AMM1, AMM3 | Continued existing practices. |
| | | | | 6 | Fort Yuma | n/a | none | 0 | AMM1, AMM3 | Continued existing practices. |
| | | | | 7 | Cocopah | n/a | none | 0 | AMM1, AMM3 | 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 FY05. |
| **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 FY05. |
| **2.5.3.2 Future Water Conservation Practices** (page 2-85) | | • Installation, operation, and maintenance of new equipment | | | | | | | | No implementation in FY05. |
| **2.5.3.3 Future Farmland Development** (page 2-85) | | • Develop additional agricultural acreage, including construction of irrigation systems | | | | | | | | No implementation in FY05. |
| **2.5.3.6 Future Wildland Fire Management** (page 2-88) | | • Implementation of new fuels management projects | | | | | | | | No implementation in FY05. |
| **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 2005**

| Non-Federal Covered Activities *Habitat Conservation Plan* Chapter 2 | Covered Activities Summary | Covered Activities Implemented | | | | | | Notes |
|---|---|---|---|---|---|---|---|---|
| | | Reach | Location | River Miles | Habitat Type Impacted | Number of Acres Impacted | Complied with Avoidance and Minimization Measures | |
| **2.2 ARIZONA** | | | | | | | | |
| **2.2.1 Ongoing Flow-Related Covered Activities**[1] (page 2-4) | • Diversion of up to 2.8 maf of Arizona's full annual entitlement, plus surplus, plus Arizona's share of any unused apportionment, plus the volume of return flow, as applicable<br><br>• Generation and transmission of hydroelectric power<br><br>• Power contracting | | | | | | | Non-Federal Flow-Related Covered Activities are included in the Federal Flow-Related Covered Actions and Accomplishments (see Appendix B, Table B-1). |
| **2.2.2 Future Flow-Related Covered Activities**[1] (page 2-6) | Future Arizona water contract holder activities may include:<br>• Diversions, discharges, and return flows through existing facilities<br>• Changes to points of diversion<br>• New points of diversion<br>• Interstate water banking<br>• Water marketing<br>• Water transfers<br>• 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)<br><br>Future Arizona hydroelectric power contract holder activities may include:<br>• 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 FY05. |
| **2.2.3 Ongoing Non-Flow-Related Covered Activities** (page 2-7) | Operation, maintenance, and replacement of:<br>• The facilities and equipment through which water is diverted and conveyed<br><br>• The facilities through which return flows are returned to the river<br><br>• Drainage wells in the Yuma area<br><br>• The facilities and equipment through which electric power is generated and transmitted<br><br>• 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 | | | | AMM1, AMM3 | 41.6 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 FY05. |
| **Fish Surveys** (page 2-8) | • Surveys for Federally listed and nonnative fish species | | | | | | | Six nights of electro-fishing surveys. |
| **Fish Stocking** (page 2-9) | • Stocking of trout | | | | | | | No implementation in FY05. |
| **Maintenance of Aids to Navigation and Boating Access** (page 2-9) | • Place and maintain aids to navigation | | | | | | | 132 buoys inspected and maintained. |
| **Law Enforcement Patrol Activities** (page 2-9) | • Administer law enforcement and boating safety program using watercraft patrols | | | | | | | 478 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 2005**

| Non-Federal Covered Activities *Habitat Conservation Plan* Chapter 2 | Covered Activities Summary | Covered Activities Implemented | | | | | | Notes |
|---|---|---|---|---|---|---|---|---|
| | | Reach | Location | River Miles | Habitat Type Impacted | Number of Acres Impacted | Complied with Avoidance and Minimization Measures | |
| **2.3 CALIFORNIA** | | | | | | | | |
| **2.3.1 Ongoing Flow-Related Covered Activities[1]** (page 2-11) | • Diversion of up to 4.4 maf of California's full annual entitlement (consistent with the Quantification Settlement Agreement), plus California's share of any unused apportionment and designated surpluses, plus volume of return flows, as applicable<br><br>• Generation and transmission of hydroelectric power<br><br>• Power contracting | | | | | | | Non-Federal Flow-Related Covered Activities are included in the Federal Flow-Related Covered Actions and Accomplishments (see Appendix B, Table B-1). |
| **2.3.2 Future Flow-Related Covered Activities[1]** (page 2-13) | Future California water contract holder activities may include:<br>• Diversions, discharges, and return flows through existing facilities<br>• Changes to points of diversion<br>• New points of diversion<br>• Interstate water banking<br>• Water marketing<br>• Water transfers<br>• Any other actions as made possible from any future agreements and/or measures taken by the Colorado River Board of California or contract holder(s)<br><br>Future California hydroelectric power contract holder activities may include:<br>• Execution, administration, and operation of extended, renewed, new, or additional contracts for hydroelectric power from hydroelectric facilities at Hoover Dam, Davis Dam, Parker Dam, Headgate Rock Dam, Siphon Drop Power Plant, and Pilot Knob Power Plant | | | | | | | Non-Federal Flow-Related Covered Activities are included in the Federal Flow-Related Covered Actions and Accomplishments (see Appendix B, Table B-1). |
| **2.3.3 Ongoing Non-Flow-Related Activities** | Operation, maintenance, and replacement of:<br>• The facilities and equipment through which water is diverted and conveyed<br><br>• The facilities through which return flows are returned to the river<br><br>• The facilities and equipment through which electric power is generated and transmitted<br><br>• The appurtenant works that support these facilities, including access and service roads, electric power and communication transmission lines and substations, docks, boat ramps, and bankline protection | 4<br><br>6 | Palo Verde Irrigation District<br><br>Bard Water District | | | | AMM1, AMM3<br><br>AMM1, AMM3 | 19.1 miles of drain maintenance.<br><br>3.9 miles of drain maintenance. |

**APPENDIX B TABLE B-3**
**Lower Colorado River Multi-Species Conservation Program**
**Non-Federal Covered Activities and Incidental Take Summary**
**Fiscal Year 2005**

| Non-Federal Covered Activities *Habitat Conservation Plan* Chapter 2 | Covered Activities Summary | Covered Activities Implemented | | | | | | Notes |
|---|---|---|---|---|---|---|---|---|
| | | Reach | Location | River Miles | Habitat Type Impacted | Number of Acres Impacted | Complied with Avoidance and Minimization Measures | |
| **2.4 NEVADA** | | | | | | | | |
| **2.4.1 Ongoing Flow-Related Covered Activities**[1] (page 2-15) | • Diversion of up to 0.3 maf of Nevada's full annual entitlement, plus surplus flows, plus Nevada's share of any unused apportionment, plus volume of return flows, as applicable<br><br>• Generation and transmission of hydroelectric power<br><br>• Power contracting | | | | | | | Non-Federal Flow-Related Covered Activities are included in the Federal Flow-Related Covered Actions and Accomplishments (see Appendix B, Table B-1). |
| **2.4.2 Future Flow-Related Covered Activities**[1] (page 2-17) | Future Nevada water contract holder activities may include:<br>• Diversions, discharges, and return flows through existing facilities<br>• Changes to points of diversion<br>• New points of diversion<br>• Interstate water banking<br>• Water marketing<br>• Water transfers<br>• 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)<br><br>Future Nevada hydroelectric power contract holder activities may include:<br>• Execution, administration, and operation of extended, renewed, new, or additional contracts for hydroelectric power from hydroelectric facilities at Hoover Dam, Davis Dam, Parker Dam, and Headgate Rock Dam | | | | | | | Non-Federal Flow-Related Covered Activities are included in the Federal Flow-Related Covered Actions and Accomplishments (see Appendix B, Table B-1). |
| **2.4.3 Ongoing Non-Flow-Related Activities** (page 2-18) | Operation, maintenance, and replacement of:<br>• The facilities and equipment through which water is diverted and conveyed<br><br>• The facilities through which return flows are returned to the river<br><br>• The facilities and equipment through which electric power is generated and transmitted<br><br>• 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 FY05. |
| **2.4.3.1 Nevada Game and Fish Department Programs and Activities** (page 2-18) | Implementation of select Federally funded:<br>• Aquatic, wetland, and riparian habitat maintenance and restoration activities<br><br>• Aquatic, wetland, and riparian revegetation enhancement activities<br><br>• Place and maintain aids to navigation and boating access<br><br>• Administer law enforcement and boating safety program using watercraft patrols | | | | | | | No implementation in FY05. |

**NOTE:**
1. See *LCR MSCP Habitat Conservation Plan* , section 2.1.1, Relationship of Non-Federal Covered Activities to Federal Nondiscretionary Actions. Can be accessed at http://www.usbr.gov/lc/lcrmscp/documents.html .

AZ PROVISIONAL DATA -- PROVISIONAL DATA -- PROVISIONAL DATA -- PROVISIONAL DATA -- PROVISIONAL DATA -- PROVISIONAL DATA -- PROVISIONAL DATA -- PROVISIONAL DATA

AZ DIVERSIONS FROM MAINSTREAM-AVAILABLE RETURN FLOW
AZ AND CONSUMPTIVE USE OF SUCH WATER
AZ CALENDAR YEAR 2005
AZ STATE OF ARIZONA
AZ 03/08/06 2:17PM (ACRE-FEET)

| AZ | WATER USER | | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL 1/ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AZ | LAKE MEAD NAT'L RECREATION, AZ. | | | | | | | | | | | | | | |
| AZ | DIVERSIONS FROM LAKE MEAD | DIVERSION | 1 | 1 | 2 | 3 | 7 | 7 | 11 | 10 | 11 | 8 | 6 | 3 | 70 |
| AZ | (TEMPLE BAR) | 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 | 1 | 1 | 2 | 3 | 7 | 7 | 11 | 10 | 11 | 8 | 6 | 3 | 70 |
| AZ | LAKE MEAD NAT'L RECREATION, AZ. | | | | | | | | | | | | | | |
| AZ | DIVERSIONS FROM LAKE MOHAVE | DIVERSION | 8 | 8 | 8 | 13 | 16 | 20 | 29 | 29 | 21 | 18 | 12 | 9 | 191 |
| AZ | (KATHERINE, WILLOW BEACH) | 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 | 8 | 8 | 8 | 13 | 16 | 20 | 29 | 29 | 21 | 18 | 12 | 9 | 191 |
| AZ | LOWER COLORADO RIVER DAMS PROJECT | | | | | | | | | | | | | | |
| AZ | DIVERSION AT DAVIS DAM | 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 | BULLHEAD CITY | | | | | | | | | | | | | | |
| AZ | PUMPED FROM WELLS | DIVERSION | 619 | 525 | 684 | 785 | 1097 | 1022 | 1142 | 1100 | 984 | 1041 | 818 | 1001 | 10818 |
| AZ | DIV. AT DAVIS DAM, MOHAVE CO. PARKS | DIVERSION | 4 | 2 | 5 | 6 | 9 | 15 | 12 | 10 | 12 | 9 | 7 | 6 | 97 |
| AZ | | MEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AZ | | UNMEAS. RETURNS | 206 | 174 | 227 | 261 | 365 | 342 | 381 | 366 | 329 | 347 | 272 | 332 | 3602 |
| AZ | | CONSUMPTIVE USE | 417 | 353 | 462 | 530 | 741 | 695 | 773 | 744 | 667 | 703 | 553 | 675 | 7313 |
| AZ | MOHAVE WATER CONSERVATION DIST. | | | | | | | | | | | | | | |
| AZ | PUMPED FROM WELLS | 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 | BROOKE WATER, (WAS CONSOLIDATED W U) | | | | | | | | | | | | | | |
| AZ | PUMPED FROM RIVER | 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 | MOHAVE VALLEY I.D.D. | | | | | | | | | | | | | | |
| AZ | PUMPED FROM WELLS | DIVERSION | 416 | 210 | 1757 | 3829 | 3944 | 5626 | 3497 | 2876 | 4263 | 1906 | 1546 | 2354 | 32224 |
| AZ | | MEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AZ | | UNMEAS. RETURNS | 191 | 97 | 808 | 1761 | 1814 | 2588 | 1609 | 1323 | 1961 | 877 | 711 | 1083 | 14823 |
| AZ | | CONSUMPTIVE USE | 225 | 113 | 949 | 2068 | 2130 | 3038 | 1888 | 1553 | 2302 | 1029 | 835 | 1271 | 17401 |
| AZ | FORT MOJAVE INDIAN RESERVATION | | | | | | | | | | | | | | |
| AZ | 14 PUMPS AND WELLS IN FLOOD PLAIN | DIVERSION 2/3/4 | | | | | | | | | | | | | 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 | GOLDEN SHORES WATER CONSERVATION DIST | | | | | | | | | | | | | | |
| AZ | PUMPED FROM WELLS | 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 | HAVASU NATIONAL WILDLIFE REFUGE | | | | | | | | | | | | | |
| AZ | INLET-NW NE NW SEC 33 T9N RSSW G&SRM | DIVERSION 8/ | 20 | 387 | 499 | 5864 | 5396 | 4869 | 4629 | 2205 | 2872 | 2102 | 1075 | 75 | 29993 |
| AZ | WELL 8N/23E-15Aa | DIVERSION 2/ | | | | | | | | | | | | | 0 |
| AZ | | MEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 12 | 14 | 14 | 16 | 86 |
| AZ | | UNMEAS. RETURNS | 18 | 341 | 439 | 5160 | 4748 | 4285 | 4074 | 1914 | 2517 | 1837 | 934 | 52 | 26319 |
| AZ | | CONSUMPTIVE USE | 2 | 46 | 60 | 704 | 648 | 584 | 555 | 261 | 343 | 251 | 127 | 7 | 3588 |
| AZ | LAKE HAVASU I.D.D. (CITY) | | | | | | | | | | | | | | |
| AZ | DISTRICT PUMPED FROM WELLS | DIVERSION | 981 | 925 | 1097 | 1122 | 1220 | 1293 | 1342 | 1148 | 947 | 813 | 930 | 969 | 12787 |
| AZ | | MEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AZ | | UNMEAS. RETURNS | 373 | 352 | 417 | 426 | 464 | 491 | 510 | 436 | 360 | 309 | 353 | 368 | 4859 |
| AZ | | CONSUMPTIVE USE | 608 | 573 | 680 | 696 | 756 | 802 | 832 | 712 | 587 | 504 | 577 | 601 | 7928 |
| AZ | CENTRAL ARIZONA PROJECT | | | | | | | | | | | | | | |
| AZ | PUMPED FROM LAKE HAVASU | DIVERSION | 175165 | 67750 | 21387 | 163589 | 163300 | 101697 | 90764 | 66284 | 106492 | 140135 | 147061 | 76247 | 1319871 |
| 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 | 175165 | 67750 | 21387 | 163589 | 163300 | 101697 | 90764 | 66284 | 106492 | 140135 | 147061 | 76247 | 1319871 |
| 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/ | 42 | 38 | 50 | 70 | 87 | 101 | 114 | 84 | 82 | 73 | 60 | 49 | 850 |
| AZ | | MEAS. RETURNS | 26 | 23 | 22 | 22 | 22 | 21 | 23 | 23 | 22 | 21 | 21 | 21 | 267 |
| AZ | | UNMEAS. RETURNS | 12 | 11 | 14 | 20 | 25 | 29 | 32 | 24 | 23 | 21 | 17 | 14 | 242 |
| AZ | | CONSUMPTIVE USE | 4 | 4 | 14 | 28 | 40 | 51 | 59 | 37 | 37 | 31 | 22 | 14 | 341 |
| AZ | COLORADO RIVER INDIAN RESERVATION | | | | | | | | | | | | | | |
| AZ | DIVERSION AT HEADGATE ROCK DAM | DIVERSION | 5650 | 6890 | 40410 | 72930 | 73790 | 76270 | 77370 | 69760 | 59930 | 40160 | 26700 | 26120 | 575980 |
| AZ | 1 PUMP (B-04-22,S14 bbd) & TOWN OF PARK | DIVERSION 4/10/ | 7 | 5 | 6 | 8 | 8 | 9 | 10 | 10 | 9 | 7 | 7 | 7 | 93 |
| AZ | | MEAS. RETURNS | 13988 | 11970 | 15427 | 22735 | 24724 | 24926 | 26066 | 25822 | 25515 | 26207 | 21951 | 20623 | 259954 |
| AZ | | UNMEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AZ | | CONSUMPTIVE USE | -8331 | -5075 | 24989 | 50203 | 49074 | 51353 | 51314 | 43948 | 34424 | 13960 | 4756 | 5504 | 316119 |
| AZ | EHRENBURG IMPROVEMENT ASSN. | | | | | | | | | | | | | | |
| AZ | 1 PUMP SW SEC 3 T3N R22W G&SRM | 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 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 1 | 0 | 5 |
| AZ | WELLS W, X, Y, Z | DIVERSION 2/ | 11 | 11 | 9 | 34 | 69 | 77 | 81 | 88 | 136 | 23 | 36 | 20 | 595 |
| 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 | 11 | 11 | 9 | 34 | 69 | 77 | 81 | 88 | 140 | 23 | 37 | 20 | 600 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AZ | GILA MONSTER FARMS | | | | | | | | | | | | | |
| AZ | DIVERSION AT IMPERIAL DAM | DIVERSION | 159 | 446 | 509 | 690 | 885 | 1296 | 1175 | 809 | 886 | 615 | 513 | 552 | 8535 |
| AZ | (WARREN ACT) | MEAS. RETURNS | 25 | 66 | -2 | -28 | 41 | 42 | 43 | 57 | 77 | 20 | 22 | 117 | 480 |
| AZ | | UNMEAS. RETURNS | 60 | 169 | 193 | 262 | 336 | 492 | 447 | 307 | 337 | 234 | 195 | 210 | 3242 |
| AZ | | CONSUMPTIVE USE | 74 | 211 | 318 | 456 | 508 | 762 | 685 | 445 | 472 | 361 | 296 | 225 | 4813 |
| AZ | WELLTON MOHAWK I. & D. D. | | | | | | | | | | | | | | |
| AZ | DIVERSION AT IMPERIAL DAM | DIVERSION | 8662 | 10026 | 32501 | 39625 | 45487 | 46825 | 44577 | 30781 | 39743 | 30508 | 25625 | 17839 | 372199 |
| AZ | | GGMC RETURN | 1521 | 1641 | -152 | -1829 | 2340 | 1710 | 1806 | 2433 | 3856 | 1113 | 1244 | 4140 | 19823 |
| AZ | | DOME RETURN | 1000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 771 | 873 | 814 | 2080 | 5538 |
| AZ | | MOD RETURN 9/ | 9510 | 8450 | 10090 | 9770 | 9780 | 9950 | 10050 | 9070 | 9170 | 9850 | 8780 | 6300 | 110770 |
| AZ | | RETURNS, TOTAL | 12031 | 10091 | 9938 | 7941 | 12120 | 11660 | 11856 | 11503 | 13797 | 11836 | 10838 | 12520 | 136131 |
| AZ | | UNMEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AZ | | CONSUMPTIVE USE | -3369 | -65 | 22563 | 31684 | 33367 | 35165 | 32721 | 19278 | 25946 | 18672 | 14787 | 5319 | 236068 |
| AZ | CITY OF YUMA | | | | | | | | | | | | est | | |
| AZ | DIVERSION AT IMPERIAL DAM (AAC) | DIVERSION | 2000 | 1804 | 1848 | 2151 | 2520 | 2513 | 3286 | 2723 | 2623 | 2274 | 1976 | 2070 | 27788 |
| AZ | DIVERSION AT IMPERIAL DAM (GILA) | DIVERSION | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 17 |
| AZ | PUMP DIVERSION FOR YUMA EAST WETLANDS | DIVERSION | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 3 | 0 | 0 | 0 | 8 |
| AZ | | MEAS. RETURNS | 957 | 1062 | 833 | 754 | 863 | 592 | 1165 | 762 | 667 | 844 | 763 | 930 | 10192 |
| AZ | | UNMEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 3 |
| AZ | | CONSUMPTIVE USE | 1043 | 742 | 1015 | 1397 | 1657 | 1921 | 2122 | 1963 | 1958 | 1430 | 1213 | 1157 | 17618 |
| AZ | MARINE CORPS AIR STATION (YUMA) | | | | | | | | | | | | | | |
| AZ | DIVERSION AT IMPERIAL DAM | DIVERSION | 68 | 58 | 86 | 116 | 178 | 226 | 203 | 225 | 177 | 195 | 123 | 134 | 1789 |
| 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 | 68 | 58 | 86 | 116 | 178 | 226 | 203 | 225 | 177 | 195 | 123 | 134 | 1789 |
| AZ | SOUTHERN PACIFIC COMPANY | | | | | | | | | | | | | | |
| AZ | DIVERSION AT IMPERIAL DAM | DIVERSION | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 48 |
| AZ | | MEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AZ | | UNMEAS. RETURNS | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 24 |
| AZ | | CONSUMPTIVE USE | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 24 |
| AZ | YUMA MESA FRUIT GROWERS ASSN. | | | | | | | | | | | | | | |
| AZ | DIVERSION AT IMPERIAL DAM | DIVERSION | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 11 |
| 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 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 11 |
| AZ | UNIVERSITY OF ARIZONA | | | | | | | | | | | | | | |
| AZ | DIVERSION AT IMPERIAL DAM | DIVERSION | 43 | 52 | 48 | 45 | 72 | 75 | 76 | 66 | 60 | 0 | 0 | 0 | 537 |
| AZ | (WARREN ACT) | 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 | 43 | 52 | 48 | 45 | 72 | 75 | 76 | 66 | 60 | 0 | 0 | 0 | 537 |
| AZ | YUMA UNION HIGH SCHOOL | | | | | | | | | | | | | | |
| AZ | DIVERSION AT IMPERIAL DAM | DIVERSION | 15 | 15 | 13 | 15 | 22 | 35 | 16 | 22 | 21 | 9 | 14 | 15 | 212 |
| AZ | | MEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AZ | | UNMEAS. RETURNS | 4 | 4 | 3 | 4 | 6 | 9 | 4 | 6 | 5 | 2 | 4 | 4 | 55 |
| AZ | | CONSUMPTIVE USE | 11 | 11 | 10 | 11 | 16 | 26 | 12 | 16 | 16 | 7 | 10 | 11 | 157 |
| AZ | CAMILLE, ALEC. JR. | | | | | | | | | | | | | | |
| AZ | DIVERSION AT IMPERIAL DAM | DIVERSION | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| AZ | (WARREN ACT) | 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 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| AZ | DESERT LAWN MEMORIAL | | | | | | | | | | | | | | |
| AZ | DIVERSION AT IMPERIAL DAM | DIVERSION | 0 | 0 | 0 | 8 | 21 | 20 | 20 | 18 | 23 | 13 | 5 | 1 | 129 |
| AZ | | MEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AZ | | UNMEAS. RETURNS | 0 | 0 | 0 | 2 | 6 | 6 | 6 | 5 | 7 | 4 | 2 | 0 | 38 |
| AZ | | CONSUMPTIVE USE | 0 | 0 | 0 | 6 | 15 | 14 | 14 | 13 | 16 | 9 | 3 | 1 | 91 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AZ | NORTH GILA VALLEY IRRIGATION DISTRICT | | | | | | | | | | | | | |
| AZ | DIVERSION AT IMPERIAL DAM 7/ | DIVERSION | 1782 | 1654 | 4138 | 3920 | 5249 | 4243 | 5047 | 3057 | 3997 | 5052 | 3415 | 3253 | 44807 |
| AZ | | MEAS. RETURNS | 1305 | 1212 | 2109 | 1909 | 2742 | 2322 | 2678 | 2092 | 2489 | 2798 | 2121 | 2362 | 26139 |
| AZ | | UNMEAS. RETURNS | 244 | 227 | 567 | 537 | 719 | 581 | 691 | 419 | 548 | 692 | 468 | 446 | 6139 |
| AZ | | CONSUMPTIVE USE | 233 | 215 | 1462 | 1474 | 1788 | 1340 | 1678 | 546 | 960 | 1562 | 826 | 445 | 12529 |
| AZ | YUMA IRRIGATION DISTRICT | | | | | | | | | | | | | | |
| AZ | DIVERSION AT IMPERIAL DAM 7/ | DIVERSION | 2676 | 2941 | 6271 | 7038 | 6877 | 5377 | 5700 | 4046 | 5802 | 6323 | 4998 | 5477 | 63526 |
| AZ | PUMPED FROM PRIVATE WELLS | DIVERSION | 40 | 37 | 283 | 224 | 147 | 39 | 48 | 163 | 118 | 48 | 10 | 16 | 1173 |
| AZ | | MEAS. RETURNS | 1206 | 1354 | 1110 | 823 | 1647 | 1168 | 1215 | 1146 | 1664 | 1427 | 1288 | 2529 | 16577 |
| AZ | | UNMEAS. RETURNS | 579 | 634 | 1396 | 1547 | 1496 | 1154 | 1224 | 897 | 1261 | 1357 | 1067 | 1170 | 13782 |
| AZ | | CONSUMPTIVE USE | 931 | 990 | 4048 | 4892 | 3881 | 3094 | 3309 | 2166 | 2995 | 3587 | 2653 | 1794 | 34340 |
| AZ | YUMA MESA I. D. D. | | | | | | | | | | | | | | |
| AZ | DIVERSION AT IMPERIAL DAM 7/ | DIVERSION | 7359 | 6190 | 13478 | 15300 | 22563 | 25265 | 24873 | 24210 | 23829 | 13739 | 11576 | 9789 | 198171 |
| AZ | | MEAS. RETURNS | 5770 | 5286 | 778 | 276 | 2164 | 6673 | 8308 | 7248 | 9056 | 5373 | 3549 | 6115 | 60596 |
| AZ | | UNMEAS. RETURNS | 1177 | 990 | 2156 | 2448 | 3610 | 4042 | 3980 | 3874 | 3813 | 2198 | 1852 | 1566 | 31706 |
| AZ | | CONSUMPTIVE USE | 412 | -86 | 10544 | 12576 | 16789 | 14550 | 12585 | 13088 | 10960 | 6168 | 6175 | 2108 | 105869 |
| AZ | UNIT "B" I. D. D. | | | | | | | | | | | | | | |
| AZ | DIVERSION AT IMPERIAL DAM 7/7E/ | DIVERSION | 929 | 557 | 1736 | 2249 | 2105 | 2210 | 2907 | 3133 | 2914 | 1970 | 1893 | 1536 | 24139 |
| AZ | | MEAS. RETURNS | 934 | 819 | 141 | 78 | 252 | 1066 | 1385 | 1159 | 1432 | 926 | 617 | 1023 | 9832 |
| AZ | | UNMEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AZ | | CONSUMPTIVE USE | -5 | -262 | 1595 | 2171 | 1853 | 1144 | 1522 | 1974 | 1482 | 1044 | 1276 | 513 | 14307 |
| AZ | YUMA COUNTY WATER USERS ASSOCIATION | | | | | | | | | | | | | | |
| AZ | DIVERSION AT IMPERIAL DAM | DIVERSION | 14456 | 14557 | 38001 | 42436 | 36212 | 27128 | 26483 | 20402 | 25138 | 43368 | 30667 | 22479 | 341327 |
| AZ | PUMPED FROM WELLS 7E/ | DIVERSION | 570 | 255 | 151 | 678 | 117 | 88 | 154 | 1363 | 63 | 57 | 298 | 83 | 3877 |
| AZ | | MEAS. RETURNS | 7514 | 6636 | 9293 | 10293 | 11726 | 7679 | 7312 | 5826 | 7472 | 13001 | 11920 | 10843 | 109515 |
| AZ | | UNMEAS. RETURNS | 316 | 311 | 801 | 905 | 763 | 572 | 559 | 457 | 529 | 912 | 650 | 474 | 7249 |
| AZ | | CONSUMPTIVE USE | 7196 | 7865 | 28058 | 31916 | 23840 | 18965 | 18766 | 15482 | 17200 | 29512 | 18395 | 11245 | 228440 |
| AZ | COCOPAH INDIAN RESERVATION | | | | | | | | | | | | | | |
| AZ | DIVERSION AT IMPERIAL DAM | DIVERSION | 26 | 177 | 479 | 155 | 219 | 490 | 749 | 579 | 189 | 447 | 339 | 375 | 4224 |
| AZ | PUMPED FROM WELLS 7E/ | DIVERSION | 1 | 3 | 2 | 2 | 1 | 2 | 4 | 0 | 0 | 1 | 3 | 1 | 20 |
| AZ | PUMPED FROM WELLS, WEST COCOPAH | DIVERSION | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AZ | | MEAS. RETURNS | 2 | 2 | 1 | 2 | 7 | 10 | 20 | 1 | 5 | 18 | 13 | 11 | 92 |
| AZ | | UNMEAS. RETURNS | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 6 |
| AZ | | CONSUMPTIVE USE | 25 | 177 | 479 | 154 | 213 | 481 | 732 | 578 | 184 | 430 | 328 | 365 | 4146 |
| 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 | | | | | | | | | | | | | | | |
| AZ | PUMPED FROM SOUTH GILA WELLS (DPOC'S) | MEAS. RETURNS 5/ | 5084 | 5621 | 6454 | 4656 | 6054 | 5183 | 4496 | 4747 | 5690 | 5450 | 5980 | 3202 | 62617 |
| AZ | | UNMEAS. ABOVE | -5084 | -5621 | -6454 | -4656 | -6054 | -5183 | -4496 | -4747 | -5690 | -5450 | -5980 | -3202 | -62617 |
| AZ | | RETURNS CREDIT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| AZ | | | | | | | | | | | | | | | |
| 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 | 221715 | 115529 | 165463 | 362911 | 371623 | 306843 | 294326 | 235209 | 281354 | 290919 | 259719 | 170501 | 3076112 |
| AZ | | MEAS. RETURNS | 48842 | 44142 | 46104 | 49461 | 62362 | 61342 | 64567 | 60416 | 67898 | 67935 | 59097 | 60312 | 692478 |
| AZ | | UNMEAS. RETURNS | -1902 | -2308 | 570 | 8680 | 8300 | 9411 | 9025 | 5284 | 6003 | 3342 | 548 | 2519 | 49472 |
| AZ | | CONSUMPTIVE USE | 174775 | 73695 | 118789 | 304770 | 300961 | 236090 | 220734 | 169509 | 207453 | 219642 | 200074 | 107670 | 2334162 |

AZ

AZ NOTE: The term 'CONSUMPTIVE USE' in this tabulation means diversions including underground pumping, less measured return flow and less current

AZ

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

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

AZ

AZ Irrigation & Drainage District is as follows:

AZ

AZ

| Item | Annual Totals (Acre-Feet) | | |
|---|---|---|---|
| Diversion at Imperial Dam A/ | 306504 | | |
| Pumped from wells | 1173 | | |
| Surface returns from South Gila Valley (S.Gila Cal Wasteway) | 2627 | * | |
| Return flow North Gila Valley (6 drains & wasteways) B/ | 7426 | * | |
| Return flow South Gila Valley wells (DPOC's) less Unmeasured Return C/ | 51627 | | |
| Return flow Yuma Mesa Outlet Drain D/ | 19237.2 | * | |
| Return flow protective and regulatory pumping unit E/ | 25341.9 | * | |
| Estimated unmeasured groundwater return flow F/ | 25920.3 | | |
| Return flow share of Gila Main Canal loss | 22760 | * | |
| Natural Vegetation flow | 154939 | 154939 | check from above |
| Consumptive Use (see notes above) | 152738 | 152738 | check from above |

AZ Totals for the North Gila Valley, The Yuma Irrigation and the Yuma Mesa Irrigation and Drainage Districts, and 'Unit B'.

AZ Estimated at 85 percent of the Yuma Mesa Outlet Drain with balance credited to 'Unit B'.

AZ (A) Estimated at 85 percent of Protective and Regulatory Pumping Unit with balance credited to 'Unit B'.

AZ (B) Estimated at 38 percent of the North Gila Valley Diversion at Imperial Dam plus 14 percent of Yuma Irrigation District diversion at

AZ (C) (Based on analysis of the USGS Report 83-4220 entitled 'A Method for Estimating Ground-Water Return Flow to the

AZ (D)

AZ Diversion*mileage weighted share of Gila Main Canal loss less canal surface evaporation (1397 af/yr) and phreatophytes (2154 af/yr).

AZ Additional unmeasured amounts of return flows from the Yuma Mesa Irrigation and Drainage District, 'Unit B', the Cocopah Indian

AZ (E) Reservation, and the Yuma County Water Users Association (YCWUA) are utilized to meet consumptive uses in the United States and in

AZ (F) Lower Colorado River in the Yuma Area') Some of these underground flows are recovered by pumping from wells on the

AZ Efforts will be made to at least

AZ

AZ 8/ Diversion adjusted for delivery to Mohave Valley I. D. D. (Chesney) and Farm Ditch (FMIR).

AZ 9/ Main Outlet Drain return flow credit is measured flow at Station 0+00 and includes both Colorado River and Gila River water. Reclamation

AZ partial satisfaction of the Mexican Treaty obligation.

AZ Cocopah Indian Reservation and in the YCWUA area, and by some of the surface drains in the YCWUA area.

AZ 10/ Includes river pump CRIT tribal usage delivered by the Town of Parker has been deducted.

AZ Quantify these return flows within broad limits by respective water user entities in future years.

AZ

DIVERSIONS FROM MAINSTREAM-AVAILABLE RETURN FLOW
AND CONSUMPTIVE USE OF SUCH WATER
CALENDAR YEAR 2005
STATE OF CALIFORNIA

03/08/06 (ACRE-FEET)

| WATER USER | | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL 1/ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FORT MOJAVE INDIAN RESERVATION | | | | | | | | | | | | | | |
| DELIVERED BY CITY OF NEEDLES | DIVERSION | | | | | | | | | | | | | 0 |
| PUMPED FROM RIVER AND WELLS | DIVERSION 4/ | | | | | | | | | | | | | 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 |
| CITY OF NEEDLES | | | | | | | | | | | | | | |
| 4 WELLS NW SW SEC 29 T9N R23E SBM | DIVERSION | | | | | | | | | | | | | 0 |
| | MEAS. RETURNS 9/ | | | | | | | | | | | | | 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 |
| CHEMEHUEVI INDIAN RESERVATION | | | | | | | | | | | | | | |
| 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 |
| METROPOLITAN WATER DISTRICT | | | | | | | | | | | | | | |
| DIVERSION FROM LAKE HAVASU | DIVERSION | 3267 | 45160 | 34661 | 79892 | 86638 | 104621 | 103579 | 96084 | 94958 | 100651 | 102467 | 49375 | 901353 |
| | MEAS. RETURNS 2/ | 289 | 239 | 1570 | 262 | 266 | 253 | 262 | 257 | 250 | 267 | 262 | 275 | 4452 |
| | UNMEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | CONSUMPTIVE USE | 2978 | 44921 | 33091 | 79630 | 86372 | 104368 | 103317 | 95827 | 94708 | 100384 | 102205 | 49100 | 896901 |
| PARKER DAM AND GOVERNMENT CAMP | | | | | | | | | | | | | | |
| 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 |
| COLORADO RIVER INDIAN RESERVATION | | | | | | | | | | | | | | |
| PUMPED FROM 11 PUMPS AND WELLS | DIVERSION 4/ | | | | | | | | | | | | | 0 |
| 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 |
| CITY OF WINTERHAVEN | | | | | | | | | | | | | | |
| 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 |
| PALO VERDE IRRIGATION DISTRICT | | | | | | | | | | | | | | |
| DIVERSION FROM PALO VERDE DAM | DIVERSION | 19420 | 22970 | 61400 | 82610 | 94260 | 101700 | 105400 | 81410 | 88620 | 56190 | 46310 | 42490 | 802780 |
| | MEAS. RETURNS | 28785 | 28024 | 31511 | 36571 | 36411 | 37845 | 41188 | 40843 | 40634 | 38983 | 35571 | 34330 | 430696 |
| | UNMEAS. RETURNS | 1088 | 1286 | 3438 | 4626 | 5279 | 5695 | 5902 | 4559 | 4963 | 3147 | 2593 | 2379 | 44955 |
| | CONSUMPTIVE USE | -10453 | -6340 | 26451 | 41413 | 52570 | 58160 | 58310 | 36008 | 43023 | 14060 | 8146 | 5781 | 327129 |
| YUMA PROJECT, RES. DIV. INDIAN UNIT | | | | | | | | | | | | | | |
| DIVERSION AT IMPERIAL DAM | DIVERSION | 1785 | 1183 | 4669 | 5552 | 5588 | 2151 | 2134 | 2491 | 3179 | 5630 | 4392 | 3062 | 41816 |
| | MEAS. RETURNS | 85 | 9 | 11 | 75 | 159 | 42 | 47 | 64 | 66 | 185 | 138 | 73 | 954 |
| | UNMEAS. RETURNS | 298 | 198 | 780 | 927 | 933 | 359 | 356 | 416 | 531 | 940 | 733 | 511 | 6982 |
| | CONSUMPTIVE USE | 1402 | 976 | 3878 | 4550 | 4496 | 1750 | 1731 | 2011 | 2582 | 4505 | 3521 | 2478 | 33880 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CA | YUMA PROJECT, RES. DIV. BARD UNIT | | | | | | | | | | | | | | |
| CA | DIVERSION AT IMPERIAL DAM | DIVERSION | 1306 | 924 | 3683 | 5180 | 6495 | 5117 | 4529 | 2416 | 2863 | 3486 | 3119 | 2017 | 41135 |
| CA | | MEAS. RETURNS | 40 | 5 | 5 | 40 | 107 | 49 | 59 | 35 | 43 | 72 | 62 | 29 | 546 |
| CA | | UNMEAS. RETURNS | 218 | 154 | 615 | 865 | 1085 | 855 | 756 | 403 | 478 | 582 | 521 | 337 | 6869 |
| CA | | CONSUMPTIVE USE | 1048 | 765 | 3063 | 4275 | 5303 | 4213 | 3714 | 1978 | 2342 | 2832 | 2536 | 1651 | 33720 |
| CA | RETURNS FROM YUMA PROJECT | | | | | | | | | | | | | | |
| CA | RESERVATION DIVISION RETURNS | MEAS. RETURNS 3/ | 1916 | 2616 | 2340 | 2270 | 3072 | 2163 | 2472 | 2487 | 1995 | 2015 | 2644 | 2047 | 28037 |
| CA | SUM YUMA PROJECTS, RES. DIV. USE | CONSUMPTIVE USE | 534 | -875 | 4601 | 6555 | 6727 | 3800 | 2973 | 1502 | 2929 | 5322 | 3413 | 2082 | 39563 |
| CA | | | | | | | | | | | | | | | |
| CA | IMPERIAL IRRIGATION DISTRICT | | | | | | | | | | | | | | |
| CA | DIVERSION AT IMPERIAL DAM | DIVERSION | 107626 | 100750 | 277837 | 319404 | 340457 | 318711 | 339173 | 264213 | 265738 | 216677 | 187354 | 144226 | 2882166 |
| CA | | MEAS. RETURNS | 8713 | 1328 | 1063 | 6990 | 15329 | 9245 | 12566 | 10898 | 10017 | 11952 | 10017 | 5726 | 103844 |
| CA | (Unmeas.Return=USBR Salton Sea for now) | UNMEAS. RETURNS | 0 | 8529 | 12947 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21476 |
| CA | | CONSUMPTIVE USE | 98913 | 90893 | 263827 | 312414 | 325128 | 309466 | 326607 | 253315 | 255721 | 204725 | 177337 | 138500 | 2756846 |
| CA | COACHELLA VALLEY WATER DISTRICT | | | | | | | | | | | | | | |
| CA | DIVERSION AT IMPERIAL DAM | DIVERSION | 8216 | 8543 | 23097 | 31227 | 38540 | 36885 | 39172 | 34017 | 29734 | 24063 | 25303 | 17682 | 316479 |
| CA | | MEAS. RETURNS | 665 | 113 | 88 | 683 | 1735 | 1070 | 1451 | 1403 | 1121 | 1327 | 1353 | 702 | 11711 |
| CA | | UNMEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CA | | CONSUMPTIVE USE | 7551 | 8430 | 23009 | 30544 | 36805 | 35815 | 37721 | 32614 | 28613 | 22736 | 23950 | 16980 | 304768 |
| 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 | 141620 | 179530 | 405347 | 523865 | 571978 | 569185 | 593987 | 480631 | 485092 | 406697 | 368945 | 258852 | 4985729 |
| CA | | MEAS. RETURNS | 40493 | 32334 | 36588 | 46891 | 57079 | 50667 | 58045 | 55987 | 54126 | 54801 | 50047 | 43182 | 580240 |
| CA | | UNMEAS. RETURNS | 1604 | 10167 | 17780 | 6418 | 7297 | 6909 | 7014 | 5378 | 5972 | 4669 | 3847 | 3227 | 80282 |
| CA | | CONSUMPTIVE USE | 99523 | 137029 | 350979 | 470556 | 507602 | 511609 | 528928 | 419266 | 424994 | 347227 | 315051 | 212443 | 4325207 |
| CA | | WATER MANAGEMENT | | | | | | | | | | | | | |
| CA | | ACCT. CREDITS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CA | | TOTAL USE | 99523 | 137029 | 350979 | 470556 | 507602 | 511609 | 528928 | 419266 | 424994 | 347227 | 315051 | 212443 | 4325207 |
| CA | | | | | | | | | | | | | | | |
| CA | | | | | | | | | | | | | | | |
| CA | WATER CONSERVATION PROGRAM | | | | | | | | | | | | | | |
| CA | IMPERIAL I. D./METROPOLITAN W. D. CONSERVED WATER 8/ | | 8495 | 8495 | 8495 | 8495 | 8495 | 8495 | 8495 | 8495 | 8495 | 8495 | 8495 | 8495 | 101940 |
| CA | | | | | | | | | | | | | | | |
| CA | | | | | | | | | | | | | | | |

CA 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.

CA 1/ No surface returns unless shown.

CA 2/ Estimate based on measured seepage returning 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 seepage from the All American Canal.

CA 4/ Calculated using monthly 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/ IID/MWD Water Conservation Program Phase 1 conserved water made available by Imperial I.D. for diversion in current year. Of the amount conserved, Metropolitan W.D. utilized 55,502 ac-ft and Coachella Valley W.D. utilized 40,538 acre-feet,

CA 9/ Negates both return estimated as 10% of diversion plus Measured Returns (Unpublished report, Colorado River Board of California).

CA

CA

DIVERSIONS FROM MAINSTREAM-AVAILABLE RETURN FLOW
AND CONSUMPTIVE USE OF SUCH WATER
CALENDAR YEAR 2005

STATE OF NEVADA

03/08/06 (ACRE-FEET)

| WATER USER | | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL 1/ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BOULDER CANYON PROJECT | | | | | | | | | | | | | | |
| DIVERSION AT HOOVER 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 |
| ROBERT B. GRIFFITH WATER PROJECT | | | | | | | | | | | | | | |
| DIVERSION AT SADDLE ISLAND, LAKE MEAD | DIVERSION | 27171 | 24083 | 31642 | 36824 | 47850 | 45581 | 50720 | 45425 | 42320 | 42985 | 34313 | 28373 | 457287 |
| BOULDER CITY 4/ | | 377 | 365 | 577 | 853 | 1133 | 1378 | 1493 | 1122 | 1214 | 892 | 586 | 489 | 10479 |
| BY USER: 4/ | | 21291 | 18726 | 23885 | 26940 | 35127 | 31356 | 35205 | 31261 | 29153 | 32075 | 26254 | 20988 | 332261 |
| 4/ | | 2905 | 2552 | 4168 | 5058 | 6978 | 8375 | 8712 | 7480 | 6735 | 5410 | 3804 | 3509 | 65686 |
| 4/ | | 2515 | 2369 | 2902 | 3819 | 4333 | 4169 | 4941 | 5249 | 4950 | 4404 | 3546 | 3315 | 46512 |
| 4/ | | 83 | 70 | 110 | 154 | 279 | 303 | 369 | 313 | 268 | 204 | 123 | 72 | 2348 |
| | 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 |
| LAS VEGAS VALLEY W.D.<br>HENDERSON<br>NORTH LAS VEGAS | CONSUMPTIVE USE | 27171 | 24083 | 31642 | 36824 | 47850 | 45581 | 50720 | 45425 | 42320 | 42985 | 34313 | 28373 | 457287 |
| LAKE MEAD NATIONAL RECREATION AREA<br>DIVERSIONS FROM LAKE MEAD<br>NELLIS AIR FORCE BASE | DIVERSION | 62 | 23 | 32 | 39 | 50 | 51 | 64 | 55 | 59 | 38 | 36 | 35 | 544 |
| | 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 | 62 | 23 | 32 | 39 | 50 | 51 | 64 | 55 | 59 | 38 | 36 | 35 | 544 |
| LAKE MEAD NATIONAL RECREATION AREA | | | | | | | | | | | | | | |
| DIVERSION FROM LAKE MOHAVE | DIVERSION | 12 | 11 | 13 | 15 | 18 | 21 | 23 | 22 | 21 | 21 | 15 | 15 | 207 |
| (COTTONWOOD) | 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 | 12 | 11 | 13 | 15 | 18 | 21 | 23 | 22 | 21 | 21 | 15 | 15 | 207 |
| BASIC MANAGEMENT INC. | | | | | | | | | | | | | | |
| DIVERSION AT SADDLE ISLAND, LAKE MEAD | DIVERSION | 466 | 414 | 427 | 504 | 454 | 471 | 533 | 556 | 554 | 487 | 407 | 547 | 5820 |
| | 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 | 466 | 414 | 427 | 504 | 454 | 471 | 533 | 556 | 554 | 487 | 407 | 547 | 5820 |
| CITY OF HENDERSON | | | | | | | | | | | | | | |
| DIVERSION AT SADDLE ISLAND, LAKE MEAD | DIVERSION | 420 | 539 | 585 | 1015 | 1052 | 833 | 1564 | 1399 | 1541 | 1591 | 1188 | 846 | 12573 |
| | 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 | 420 | 539 | 585 | 1015 | 1052 | 833 | 1564 | 1399 | 1541 | 1591 | 1188 | 846 | 12573 |
| NEVADA DEPARTMENT OF FISH & GAME | | | | | | | | | | | | | | |
| DIVERSION AT SADDLE ISLAND, LAKE MEAD | DIVERSION | 1 | 0 | 1 | 8 | 29 | 95 | 222 | 362 | 473 | 466 | 460 | 445 | 2562 |
| | MEAS. RETURNS | 0 | 0 | 1 | 7 | 28 | 94 | 221 | 361 | 472 | 465 | 459 | 444 | 2552 |
| | UNMEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | CONSUMPTIVE USE | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 10 |
| CITY OF BOULDER CITY | | | | | | | | | | | | | | |
| DIVERSION AT HOOVER DAM | DIVERSION | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 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 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NV | PACIFIC COAST BUILDING PRODUCTS INC. | | | | | | | | | | | | | |
| NV | DIVERSION AT GYPSUM WASH, LAKE MEAD | DIVERSION | 82 | 80 | 87 | 83 | 76 | 70 | 79 | 78 | 73 | 87 | 67 | 58 | 920 |
| NV | | MEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NV | | UNMEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NV | | CONSUMPTIVE USE | 82 | 80 | 87 | 83 | 76 | 70 | 79 | 78 | 73 | 87 | 67 | 58 | 920 |
| NV | SOUTHERN NEVADA WATER AUTHORITY (SCE) | | | | | | | | | | | | | | |
| NV | PUMPED FROM SEC 24 T32S R66E MDB&M | DIVERSION | 999 | 650 | 1046 | 652 | 1174 | 1212 | 1204 | 1251 | 1103 | 1139 | 895 | 1076 | 12401 |
| NV | | MEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NV | | UNMEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NV | | CONSUMPTIVE USE | 999 | 650 | 1046 | 652 | 1174 | 1212 | 1204 | 1251 | 1103 | 1139 | 895 | 1076 | 12401 |
| NV | BIG BEND WATER DISTRICT | | | | | | | | | | | | | | |
| NV | DIVERSION SEC 12 T32S R66E MDB&M | DIVERSION | 299 | 252 | 336 | 392 | 404 | 426 | 472 | 455 | 464 | 438 | 368 | 334 | 4640 |
| NV | | MEAS. RETURNS | 191 | 188 | 213 | 211 | 226 | 234 | 262 | 260 | 227 | 228 | 211 | 192 | 2643 |
| NV | | UNMEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NV | | CONSUMPTIVE USE | 108 | 64 | 123 | 181 | 178 | 192 | 210 | 195 | 237 | 210 | 157 | 142 | 1997 |
| NV | FORT MOJAVE INDIAN RESERVATION (Avi) | | | | | | | | | | | | | | |
| NV | 2 WELLS, SECTIONS 27 & 5 | DIVERSION | | | | | | | | | | | | | 0 |
| NV | | MEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NV | | UNMEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NV | | CONSUMPTIVE USE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NV | | | | | | | | | | | | | | | |
| NV | LAS VEGAS WASH RETURN FLOWS | RETURNS 2/ | 19468 | 16733 | 18018 | 16703 | 15503 | 15820 | 17206 | 17394 | 15526 | 17892 | 16872 | 16517 | 203652 |
| NV | | | | | | | | | | | | | | | |
| NV | OTHER USERS PUMPING FROM COLORADO | | | | | | | | | | | | | | |
| NV | RIVER AND WELLS IN FLOOD PLAIN | DIVERSION 3/ | | | 1 | | | | | | | | | | 0 |
| NV | DAVIS DAM TO CALIFORNIA BOUNDARY | MEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NV | | UNMEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NV | | CONSUMPTIVE USE | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NV | NEVADA TOTALS | | | | | | | | | | | | | | |
| NV | | DIVERSION | 29512 | 26052 | 34170 | 39532 | 51107 | 48760 | 54881 | 49603 | 46608 | 47252 | 37749 | 31729 | 496955 |
| NV | | MEAS. RETURNS | 19659 | 16921 | 18232 | 16921 | 15757 | 16148 | 17689 | 18015 | 16225 | 18585 | 17542 | 17153 | 208847 |
| NV | | UNMEAS. RETURNS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NV | | CONSUMPTIVE USE | 9853 | 9131 | 15938 | 22611 | 35350 | 32612 | 37192 | 31588 | 30383 | 28667 | 20207 | 14576 | 288108 |
| NV | | | | | | | | | | | | | | | |
| NV | | | | | | | | | | | | | | | |
| NV | GROUNDWATER INJECTED STORAGE 6/ | | | | | | | | | | | | | | |
| NV | | | | | | | | | | | | | | | |
| NV | LAS VEGAS VALLEY WATER DIST. | INJECTED | 4031 | 3242 | 1573 | 25 | 0 | 0 | 0 | 0 | 0 | 2676 | 3693 | 628 | 15868 |
| NV | | WITHDRAWN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 141 | 207 | 136 | 88 | 572 |
| NV | CITY OF NORTH LAS VEGAS | INJECTED | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NV | | WITHDRAWN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

NV

NV 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.

NV

NV

NV 1/ No surface returns unless shown.

NV 2/ Estimated return based on historic use method adopted by the task force on unmeasured return flows on August 28, 1984 and as revised.

NV 3/ Details on Nevada Supplemental Sheets.

NV 4/ User deliveries adjusted by weighted use to equal total diversion at Lake Mead.

NV

| | | | |
|---|---|---|---|
| NV 6/ Nevada Injected Storage Balance: | Beginning of Year Cumulative Injected Storage | 295733 | |
| NV | Plus Current Year Additions | 15868 | |
| NV | Minus Current Year Withdrawals | 572 | |
| NV | End of Year Cumulative Injected Storage | 311029 | |

DELIVERIES TO MEXICO IN SATISFACTION OF PART III OF 1944 TREATY
AND
WATER PASSING TO MEXICO IN EXCESS OF TREATY REQUIREMENTS

CALENDAR YEAR 2005

03/08/06 (ACRE-FEET)

| WATER USER | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DELIVERY AT NORTH INTERNATIONAL BOUNDARY 1/ | 132146 | 178573 | 206762 | 188374 | 102612 | 98980 | 112462 | 109305 | 81562 | 78053 | 89651 | 116310 | 1494790 |
| DELIVERY AT SOUTH INT. LAND BOUNDARY | 8552 | 7683 | 8861 | 10808 | 10885 | 10758 | 11533 | 8964 | 10609 | 12667 | 10091 | 10140 | 121551 |
| TOTAL DELIVERY IN SATISFACTION OF TREATY | 140698 | 186256 | 215623 | 199182 | 113497 | 109738 | 123995 | 118269 | 92171 | 90720 | 99742 | 126450 | 1616341 |
| TO MEXICO AS SCHEDULED | 128113 | 152980 | 204113 | 197528 | 104228 | 109271 | 121599 | 97713 | 89307 | 74788 | 98763 | 121599 | 1500002 |
| TO MEXICO IN EXCESS OF SCHEDULE 2/ | 12585 | 33276 | 11510 | 1654 | 9269 | 467 | 2396 | 20556 | 2864 | 15932 | 979 | 4851 | 116339 |
| WATER BYPASSED PURSUANT TO MINUTE 242 | 9314 | 8089 | 9293 | 9555 | 9990 | 9523 | 9289 | 8375 | 8919 | 9369 | 9514 | 6300 | 107530 |

1/ Includes wasteway deliveries to the River limitrophe in satisfaction of treaty.
2/ Water that is lost to the United States through releases into the Colorado River above Morelos Dam in excess of Lower Basin delivery orders
These excess waters exceed water orders in Mexico and are generally not diverted for beneficial use in
and Mexican Treaty requirements.
Mexico.

RELEASES OF WATER THROUGH REGULATORY STRUCTURES
CONTROLLED BY THE UNITED STATES

CALENDAR YEAR 2005

03/08/06 (THOUSAND ACRE-FEET)

| STRUCTURE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GLEN CANYON DAM | 787 | 730 | 817 | 535 | 601 | 795 | 869 | 894 | 515 | 532 | 529 | 827 | 8431 |
| HOOVER DAM | 337 | 342 | 427 | 1023 | 1008 | 899 | 975 | 795 | 623 | 640 | 675 | 530 | 8274 |
| DAVIS DAM | 292 | 273 | 473 | 1039 | 1031 | 980 | 1051 | 796 | 846 | 775 | 739 | 496 | 8789 |
| PARKER DAM | 256 | 272 | 596 | 676 | 703 | 741 | 851 | 634 | 538 | 428 | 377 | 298 | 6370 |
| HEADGATE ROCK DAM 1/ | 250 | 265 | 556 | 603 | 629 | 664 | 774 | 565 | 478 | 388 | 350 | 272 | 5794 |
| PALO VERDE DAM | 231 | 238 | 476 | 509 | 490 | 480 | 543 | 420 | 416 | 362 | 321 | 249 | 4734 |
| 2/ | 39 | 41 | 30 | 28 | 27 | 25 | 30 | 43 | 28 | 35 | 19 | 24 | 368 |
| IMPERIAL DAM | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 9 |
| SUM IMPERIAL DAM + DIVERSION TO MITTRY LAKE | 40 | 41 | 31 | 28 | 28 | 25 | 31 | 44 | 28 | 36 | 20 | 25 | 377 |
| DIVERSION TO MITTRY LAKE FROM GILA MAIN CAL | | | | | | | | | | | | | |
| LAGUNA DAM | 40 | 48 | 35 | 33 | 31 | 27 | 34 | 37 | 25 | 29 | 27 | 32 | 398 |

1/ Computed as Parker Dam release less diversion at Headgate Rock Dam.
2/ Flow below Imperial Dam, does not include diversions through AAC and GGMC

SU S U M M A R Y
SU USE BY STATE, UNMEASURED RETURNS ESTIMATE, AND RESERVOIR CONTENTS
SU
SU 03/08/06 CALENDAR YEAR 2005 (THOUSAND ACRE-FEET)

| | | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WATER USE SUMMARY | | | | | | | | | | | | | | |
| ARIZONA | | 174.775 | 73.695 | 118.789 | 304.77 | 300.961 | 236.09 | 220.734 | 169.509 | 207.453 | 219.642 | 200.074 | 107.67 | 2334 |
| CALIFORNIA | | 99.523 | 137.029 | 350.979 | 470.556 | 507.602 | 511.609 | 528.928 | 419.266 | 424.994 | 347.227 | 315.051 | 212.443 | 4325 |
| NEVADA | | 9.853 | 9.131 | 15.938 | 22.611 | 35.35 | 32.612 | 37.192 | 31.588 | 30.383 | 28.667 | 20.207 | 14.576 | 288 |
| TOTAL USE, LOWER BASIN STATES | | 284.151 | 219.855 | 485.706 | 797.937 | 843.913 | 780.311 | 786.854 | 620.363 | 662.83 | 595.536 | 535.332 | 334.689 | 6947 |
| MEXICO IN SATISFACTION OF TREATY | | 140.698 | 186.256 | 215.623 | 199.182 | 113.497 | 109.738 | 123.995 | 118.269 | 92.171 | 90.72 | 99.742 | 126.45 | 1616 |
| WATER BYPASSED PURSUANT TO MINUTE 242 | | 9.314 | 8.089 | 9.293 | 9.555 | 9.99 | 9.523 | 9.289 | 8.375 | 8.919 | 9.369 | 9.514 | 6.3 | 108 |
| TOTAL USE, LOWER BASIN STATES & MEXICO | 2/ | 434.163 | 414.2 | 710.622 | 1006.67 | 967.4 | 899.572 | 920.138 | 747.007 | 763.92 | 695.625 | 644.588 | 467.439 | 8671 |
| END OF MONTH ACTIVE CONTENTS: | | | | | | | | | | | | | | |
| LAKE POWELL | | 8481 | 8265 | 8015 | 8538 | 10509 | 12360 | 12418 | 12022 | 11939 | 12016 | 11977 | 11576 | 128116 |
| LAKE MEAD | | 15119 | 15739 | 16220 | 15869 | 15593 | 15441 | 15288 | 15351 | 15219 | 15078 | 14896 | 15131 | 184944 |
| LAKE MOHAVE | | 1658.71 | 1722.9 | 1688.87 | 1706.95 | 1721.25 | 1684.3 | 1671.95 | 1729.52 | 1572.71 | 1527.16 | 1538.43 | 1634.18 | 19857 |
| LAKE HAVASU | | 558.524 | 613.4 | 550.98 | 586.014 | 586.208 | 581.746 | 576.409 | 569.605 | 554.292 | 569.794 | 582.328 | 579.433 | 6909 |
| LOWER BASIN TOTAL STORAGE | | 17336.2 | 18075.3 | 18459.9 | 18162 | 17900.5 | 17707 | 17536.4 | 17650.1 | 17346 | 17175 | 17016.8 | 17344.6 | 211710 |
| USE ABOVE HOOVER DAM: | | | | | | | | | | | | | | |
| ARIZONA | | 0.001 | 0.001 | 0.002 | 0.003 | 0.007 | 0.007 | 0.011 | 0.01 | 0.011 | 0.008 | 0.006 | 0.00343 | 0 |
| NEVADA | | 8.746 | 8.417 | 14.768 | 21.778 | 33.998 | 31.208 | 35.778 | 30.142 | 29.043 | 27.318 | 19.155 | 13.358 | 274 |
| TOTAL USE | | 8.747 | 8.418 | 14.77 | 21.781 | 34.005 | 31.215 | 35.789 | 30.152 | 29.054 | 27.326 | 19.161 | 13.3614 | 274 |
| USE BELOW PARKER DAM: | | | | | | | | | | | | | | |
| ARIZONA | | -6.729 | -0.764 | 88.792 | 132.519 | 127.323 | 124.081 | 121.398 | 95.182 | 91.354 | 71.552 | 44.931 | 25.661 | 915 |
| CALIFORNIA | | 96.545 | 92.108 | 317.888 | 390.926 | 421.23 | 407.241 | 425.611 | 323.439 | 330.286 | 246.843 | 212.846 | 163.343 | 3428 |
| MEXICO | 3/ | 150.012 | 194.345 | 224.916 | 208.737 | 123.487 | 119.261 | 133.284 | 126.644 | 101.09 | 100.089 | 109.256 | 132.75 | 1724 |
| TOTAL USE | | 239.828 | 285.689 | 631.596 | 732.182 | 672.04 | 650.583 | 680.293 | 545.265 | 522.73 | 418.484 | 367.033 | 321.754 | 6067 |

SU
SU
SU
SU 2/ Sum of Total States, deliveries to Mexico in Satisfaction of Treaty and Bypass Pursuant to Min. 242.
SU 3/ Includes water delivered in satisfaction of the treaty with Mexico and water bypassed pursuant to Minute 242.

# APPENDIX C

# RECOMMENDATIONS FROM U.S. FISH AND WILDLIFE SERVICE

7-15. B (9-89)
Bureau of Reclamation

| OFFICIAL FILE COPY | | |
|---|---|---|
| DATE | SURNAME | CODE |
| 5/8 | [signature] | 8070 |
| 5/9 | [signature] | 8200 |
| 5/9 | [signature] | 8001 |
| 5/8 | [signature] | 8400 |
| 5/12 | [signature] | 8000 |
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| | | |
| Classification | | |
| Project | | |
| Control No. 6001276 | | |
| Folder I.D. 41732 | | |

LC-8000
ADM 1.10

MAY 12 2006

MEMORANDUM

To: Field Supervisor
U.S. Fish and Wildlife Service
Ecological Services Field Office
2321 W. Royal Palm Road Suite 103
Phoenix, AZ 85021-4951

From: Lorri Gray, Program Manager
Lower Colorado River Multi Species Conservation Program

Subject: Status Report for Conservation Measures under the Biological Opinion (BO) for Interim Surplus Criteria (ISC), Secretarial Implementation Agreements (SIA), and Conservation Measures on the Lower Colorado River, Lake Mead to the Southerly International Boundary Arizona, California and Nevada

The attached report gives the current status of the Conservation Measures 1 through 4 for the subject BO. As a result of the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) implementation, the reporting and implementation of the Conservation Measures for the ISC has been subsumed by the LCR MSCP. The annual status of those measures from this point on will be found in the LCR MSCP annual reports.

In general, these conservation measures are being successfully implemented. Since the stocking of razorback suckers began, field studies looking at survival of the razorback sucker augmentation stockings completed under the 1997 Biological Opinion have shown that first year survival for razorback sucker in the lower river is poor and is directly correlated to size at time of release. The BO conservation measure requires fish of 250 mm or 10 inch total length, and this can be accomplished by December 2006. However, we would like to rear the fish to 300 mm or greater (12 inch) and continue to study the survival to determine if there are adaptive management implications of using the larger sized fish. This would require an additional six to twelve months rearing to complete the conservation measure. Please advise us as to your preference on this approach.

Should you have further questions please contact Mr. Tom Burke of the Fisheries Group at (702) 293-8711, Mr. John Swett of the Wildlife Group at (702) 293-8574, or Mr. Terry Murphy of the Restoration Group at (702) 293-8140.

Attachment

cc: Mr. Larry Purcell, San Diego County Water Authority
Ms. Laura Simoneck, The Metropolitan Water District of Southern California

**Status Report Biological Opinion (BO) 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**

March, 2006

**Conservation Measure 1.** Stock 20,000 razorback suckers, 25 cm or greater in length, into the Colorado River between Parker and Imperial dams. This will be completed by 2006.

Status: Reclamation entered into a cooperative agreement with Arizona Game and Fish Department on August 27, 2003 to rear razorback sucker for stocking into the Colorado River between Parker and Imperial Dams at their Bubbling Ponds Hatchery near Sedona, Arizona. The agreement is currently in effect and the completion date for this project is December 31, 2006.

Initial work accomplished under the agreement was the preparation of rearing ponds to receive fingerling fish and to order feed and supplies in advance of actually getting fish on station. First fish received on station for this task came from the U.S. Fish and Wildlife Service's (Service) Willow Beach National Fish Hatchery, with the delivery of 19,000 1.5 inch fingerling razorback sucker in late spring of 2004. In spring 2005 an additional 22,180 fingerling razorback sucker were delivered to Bubbling Ponds Hatchery from Willow Beach Hatchery. (All of the fingerling razorback suckers delivered to Bubbling Ponds Hatchery for this project have been wild caught larvae captured from Lake Mohave.)

To date 6,394 razorback sucker have been reared, tagged and released into the Colorado River under this agreement. These fish have all been released into the river at connected backwaters near Blythe, California. In addition there currently are 10,010 fish average length of five inches; 9, 670 fish average length of seven inches; 5,177 fish average length nine inches; and 2,177 fish average length of twelve inches on station at Bubbling Ponds hatchery and being reared to accomplish this conservation measure. At the current growth rates and mortality rates for these fish, and using the target size at release of ten inches, this conservation measure will be completed by December 2006. If the target size for the remaining fish is increased to 12 inches to determine adaptive management implications of using larger fish, the conservation measure would be completed in 2007.

**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: Reclamation in coordination with Imperial National Wildlife Refuge is scheduled to begin the expansion of the Imperial Ponds from 25 acres to approximately 80 acres in June of 2006. The project is the direct result of an interdisciplinary group of 13 subject matter experts from 4 agencies, who collaboratively prepared a conceptual design for the re-construction and expansion of the ponds. The final report, entitled "Imperial National Wildlife Refuge, Imperial

Native Fish Habitat Reconstruction, Design Workshop, Final Report", has been posted to the LCR MSCP website.

**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/or to support rearing efforts at Achii Hanyo. These efforts will be funded for 5 years (2001-2006).

Status: Reclamation and the Service 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 in these efforts by the two agencies in fiscal years. Reclamation entered into an Inter-Agency Agreement with the Service in July, 2004 to improve rearing capabilities for bonytail at Achii Hanyo Native Fish Facility. The agreement provides $50,000 per year for four years ($200,000 obligated) for facility improvements.

Significant improvements have been accomplished at the Achii Hanyo Native Fish Facility with these funds, including pond lining; berm and embankment repairs, installing collection kettles, installing circular rearing tanks, construction of metal workshop, and replacing well motor and hardware.

**Conservation Measure 4, Tier 1.** Identify and monitor 372 acres of currently occupied 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 five years to determine appropriate level of effort to monitor effects of water transfer actions. Monitoring will continue for up to five 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 willow flycatcher habitat along the lower Colorado River.

Status: In FY05, Reclamation modified an existing contract to include the monitoring of 372 acres of occupied willow flycatcher habitat. This acreage is split into 11 different sites between Palo Verde Diversion Dam and Imperial Dam (map attached).

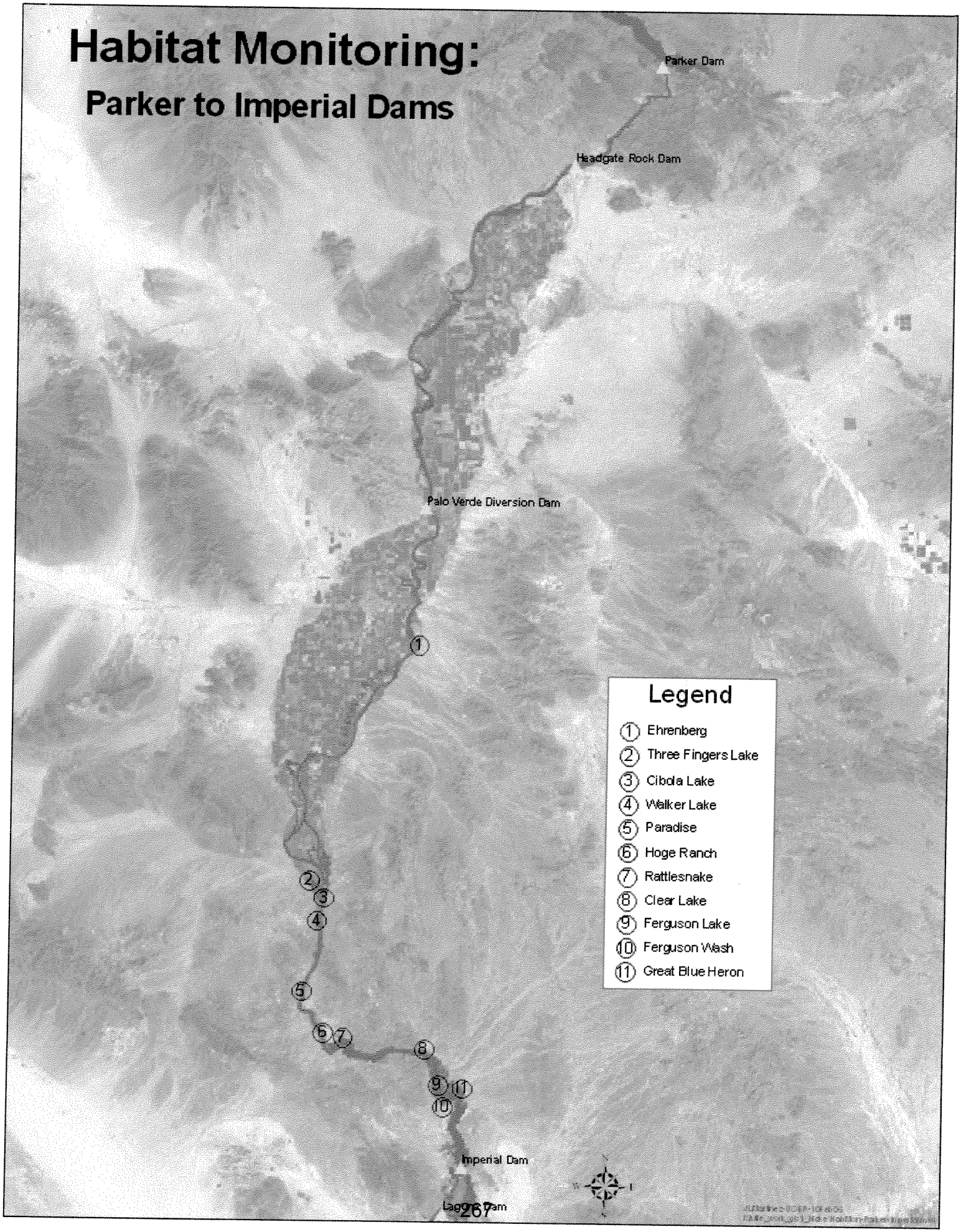
In FY06, Reclamation is implementing Phase I of the Cibola Valley Conservation Area which consists of a 22 acre native plant nursery and 64 acres of Southwestern Flycatcher habitat. A mass planting contract for the creation of the 64 acres of habitat, which included over 190,000 trees, was awarded in FY06. The contract includes the collection, propagation, and planting of the trees.

Additional lands within the Cibola Valley Conservation Area and the Palo Verde Ecological Reserve have been identified to complete the 372 acres of habitat.

**Conservation Measure 4, Tier 2.** Establish baseline soil moisture conditions within one year of acceptance of the BO. Depending upon the status of willow flycatcher population trends along the lower Colorado River, replace additional willow 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" soil moisture conditions.

Status: Completed through the Agreement referenced in Conservation Measure 4, Tier 1. SWCA has established baseline soil moisture conditions on the 372 acres we are currently monitoring for SIA and monitor these conditions yearly to determine if a change in soil moisture conditions has occurred due to ISC implementation.


Habitat Monitoring:
Parker to Imperial Dams
Parker Dam
Headgate Rock Dam
Palo Verde Diversion Dam
Imperial Dam
Laguna Dam
Legend
1 Ehrenberg
2 Three Fingers Lake
3 Cibola Lake
4 Walker Lake
5 Paradise
6 Hoge Ranch
7 Rattlesnake
8 Clear Lake
9 Ferguson Lake
10 Ferguson Wash
11 Great Blue Heron

# United States Department of the Interior

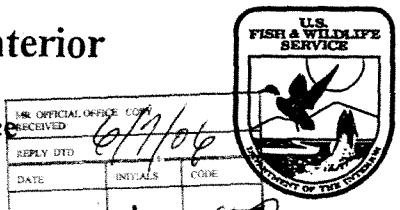
**U.S. Fish and Wildlife Service**

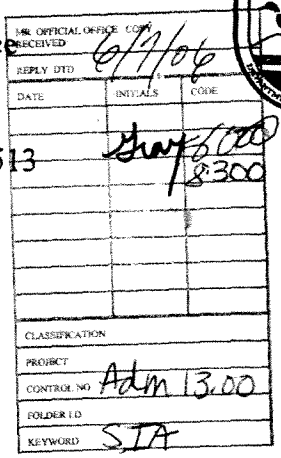
**Arizona Ecological Services Field Office**

2321 West Royal Palm Road, Suite 103

Phoenix, Arizona 85021-4951

Telephone: (602) 242-0210 Fax: (602) 242-2513


In Reply Refer to:
AESO/SE
02-21-00-F-273
02-21-04-F-0161

June 2, 2006

Memorandum

To: Program Manager, Lower Colorado River Multi-Species Conservation Program, Bureau of Reclamation, Lower Colorado Regional Office, Boulder City, Nevada (LC-8000)

From: Field Supervisor

Subject: Status Report for Interim Surplus Criteria, Secretarial Implementation Agreements, and Conservation Measures, on the Lower Colorado River, Lake Mead to the Southerly International Boundary, Arizona, Nevada, and California

This responds to your May 12, 2006, provision of the annual status report for conservation measures included with the subject project, as required by the terms of the January 12, 2001, biological opinion issued to the Bureau of Reclamation (Reclamation) by the Fish and Wildlife Service (FWS). We understand that the annual report for activities related to this biological opinion will, in future years, be combined with the annual report for the Lower Colorado River Multi-Species Conservation Program (LCR MSCP).

Concerning the provision for the stocking of razorback sucker (*Xyrauchen texanus*) included in the 2001 biological opinion, we have reviewed the information on survival provided in your letter. We believe it would be preferable to raise the fish to 300 millimeters or greater prior to stocking in order to gain additional information on the relationship between size at stocking and survival. The additional time needed to complete this provision is acceptable given the opportunity for research into survival rates.

Thank you for your efforts to conserve listed species. If there are questions regarding this communication, please contact me at (602) 242-0210 x244 or Lesley Fitzpatrick at x236.

Sincerely,

Steven L. Spangle

W:\Lesley Fitzpatrick\04-0161 SIA Fish Stocking.doc:bml