

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
\$100,000	\$125,751.99	\$127,214.52	\$180,000	\$180,000	\$180,000	\$180,000

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

**Start Date:** FY10

**Expected Duration:** FY18

**Long-term Goal:** Effective fishery management of backwater habitats developed by the LCR MSCP.

**Conservation Measures:** RASU2, RASU6, BONY2, BONY5

**Location:** Reaches 2, 3, 4, and 5 backwater habitats.

**Purpose:** Quantify genetic and demographic parameters that are necessary for informed, long-term management of RASU and BONY in off-channel habitats.

**Connections with Other Work Tasks (past and future):** This work is related to Imperial Ponds Native Fish Research (C25), RASU Genetic Diversity Assessment (C31), and Lake-Side Rearing Ponds (B7).

**Project Description:** When observed on Lake Mohave and elsewhere, RASU and BONY demonstrate a group spawning behavior whereby a female will spawn with multiple partners many times over a period of a few weeks. These observations led biologists to believe that all possible genetic crosses were being made during the spawn. However, analyses of adult RASU placed into the Yuma Cove backwater in 1991 and 1992, along with analyses of the larval RASU produced each year, showed that not all of the adults contributed genetic material to the next generation. It is possible that individual adults do not spawn every year or that even if they do, they don't always contribute genetic material to the next generation. This information needs to be verified in order to model population structure within these isolated habitats over subsequent generations, and to predict at what frequency genetic material needs to be exchanged between habitats to maintain robustness of the overall RASU and BONY populations within the LCR MSCP program area.

This study will collect demographic and genetic information that will lead to recommendations to optimize long-term management of off-channel habitats for these two critically endangered fishes. Genetic data will be captured from larval, juvenile, and adult RASU and BONY from at

least two replicate groups from off-channel habitats. Characterization of microsatellite and mitochondrial DNA variation will be used to assign the parentage of individual larvae to specific adults.

Genetic tissues will be collected from groups of adult RASU and BONY. These fish will be tagged and released into backwater habitats. Remote sensing will be used to specifically track tagged adults and determine their presence in spawning areas at specific times. This combination of population and genetic information will allow us to determine the actual location of spawning and to evaluate reproductive success of specific individuals. These data can then be compared and contrasted to determine the actual number of individuals which participate in annual spawning activities, and census the populations, and to quantify patterns of survivorship.

There are three phases to the study: field observations, laboratory analyses of genetic materials, and modeling of population dynamics. The study will require multiple years of data collection and analyses; final recommendations are anticipated by 2018. Numbers of samples will be fewest during the first two years of the study, but estimated costs are initially high to cover purchase of specialized, analytical equipment.

This project requires stable populations for both RASU and BONY to allow for multiple years of censusing. These stable populations are currently available for RASU, and BONY will be incorporated into the study as habitats and populations of BONY become available.

**Previous Activities:** Tissues from reared RASU and BONY were collected under C31. RASU larvae and juveniles from lake-side ponds (B7) were also collected. Adults, larvae and juveniles have been genotyped and preliminary statistical analyses completed.

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

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

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

**Pertinent Reports:** Study plans are available upon request, and annual reports will be posted to the LCR MSCP website upon completion.