

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

FY12 Estimate	FY12 Actual Obligations	Cumulative Expenditures Through FY12	FY13 Approved Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate	FY16 Proposed Estimate
\$180,000	\$180,401.56	\$270,718.43	\$180,000	\$180,000	\$180,000	\$180,000

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

Start Date: FY10

Expected Duration: FY18

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

Conservation Measures: RASU2, RASU6, BONY2, BONY5

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

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

Connections with Other Work Tasks (past and future): This work is related to Imperial Ponds Native Fish Research (C25), RASU Genetic Diversity Assessment (C31), Characterization of Lake Mohave Backwaters to Evaluate Factors Influencing Spawning Success (C56), 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. These data can then be compared and contrasted to determine the actual number of individuals that 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, and final recommendations are anticipated by 2018. Numbers of samples will be lower 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. Samples collected during FY10 were analyzed, identifying considerable variability in individual reproductive success within and especially among different lake-side ponds.

FY12 Accomplishments: RASU genetic samples were collected from AJ and Dandy backwaters as well as Imperial NWR pond 1. AJ backwater has reliably produced offspring that remained viable into the autumn, with little change in the proportion of individuals contributing to larval production across years. The proportion of individuals contributing to larval production at Dandy backwater and Imperial NWR Pond 1 was more variable, possibly resulting from processes influencing productivity.

A small proportion of individuals seem to be contributing a relatively large number of larvae in any given year. This variation in reproductive success is concerning, but variation across years may ameliorate this effect.

FY13 Activities: Sample collections and analysis similar to previous years will continue; Yuma cove backwater will be included in the analysis during FY13. This will provide replication that will allow us to assess stability of life history parameters across time.

Proposed FY14 Activities: Sample collections and analysis similar to previous years will continue. Ponds and funding will be dedicated to bonytail reproduction, this portion of the project will be new in FY14, this will allow for analysis of the variation in reproductive success for this species.

Pertinent Reports: The report, *Genetic and Demographic Studies to Guide Conservation Management of Bonytail and Razorback Sucker in Off-channel Habitats*, November 2012 is posted to the website. The report, *2012 Interim Report: Genetic and Demographic Studies to Guide Conservation Management of Bonytail and Razorback Sucker in Off-channel Habitats* is in review.