

Work Task C31: Razorback Sucker Genetic Diversity Assessment

FY16 Estimate	FY16 Actual Obligations	Cumulative Accomplishment Through FY16	FY17 Approved Estimate	FY18 Proposed Estimate	FY19 Proposed Estimate	FY20 Proposed Estimate
\$160,000	\$148,968.92	\$759,189.23	\$160,000	\$160,000	\$0	\$0

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

Start Date: FY09

Expected Duration: FY18

Long-Term Goal: Maintain the genetic quality of razorback suckers (*Xyrauchen texanus*) utilized by the LCR MSCP

Conservation Measures: RASU2, RASU3, RASU5, and RASU6

Location: Wayne State University, Detroit, Michigan

Purpose: To develop and maintain a genetic management program for razorback suckers

Connections with Other Work Tasks (Past and Future): This work task is related to larval razorback sucker collections (B1) and management of fish habitat restoration sites (e.g., C40, E14, and F5). Larval and adult tissue samples are collected from each reach of the LCR MSCP planning area wherever razorback suckers are captured, and this includes work accomplished under Work Tasks C13 (closed), C33 (closed), C45 (closed), C49 (closed), C64, and D8.

Project Description: The genetic structure of razorback sucker communities in reservoirs, river reaches, and off-channel habitats within the lower Colorado River will be monitored, and the various razorback sucker stocks relative to the founder population from Lake Mohave will be characterized. Under the LCR MSCP Fish Augmentation Program, the production of large numbers of fish annually will continue; these large pulses of fish have the potential to change the genetic diversity of a population in a short period of time. It is important to monitor the genetic structure of the various razorback sucker communities over many years in order to detect changes in genetic diversity as these populations mature.

Larval fish and adult fin clips will be collected and preserved from each stock during numerous annual surveys and the continuing Lake Mohave larvae

collections. These samples will be delivered to a genetics research laboratory for analyses. The results will be used to determine the genetic health of these communities, assess the effectiveness of the LCR MSCP Fish Augmentation Program, assess the effectiveness of the Lake Mohave repatriation effort, and inform management of the razorback sucker populations developing in newly constructed flood plain habitats within the LCR MSCP planning area.

Previous Activities: Samples of larvae and adult fin clips were obtained on an annual basis from multiple time periods and from various spawning areas, reservoirs, river reaches, and off-channel habitats within the LCR MSCP planning area. Deoxyribonucleic acid (DNA) was extracted and samples characterized for **mitochondrial** deoxyribonucleic acid (mtDNA) and microsatellite variation. Analyses of microsatellite data collected over the past 20 years are consistent with those from mtDNA, indicating that the razorback sucker conservation strategy employed in Lake Mohave is maintaining genetic diversity in the nuclear genome as well. Interpretation of the data in the context of effective numbers of breeders and size identifies the importance of increasing the population size in Lake Mohave.

FY16 Accomplishments: Within Lake Mohave, 128 fin clips and 503 larval samples were collected from the main basin and analyzed for levels of molecular variation. The findings were consistent with previous years and indicated that, in Lake Mohave, levels of molecular variation (as measured by mtDNA and microsatellites) continue to be maintained by the current management program. An additional 10 fin clips and 127 larvae were obtained from above the Willow Beach National Fish Hatchery. A comparison of larvae showed differences that may suggest little exchange between these two geographic areas of the lake; however, these differences were not statistically significant ($P = 0.051$).

From Lake Mead, 62 adult fin clips and 81 larvae were collected. Samples have been extracted, sequenced, genotyped, and analyzed using genetic software. There were no significant differences between Lakes Mohave and Mead in 2016.

From Reach 3, 116 adult fin clips and 283 larvae (9 spatial and/or temporally distinct samples) were collected. All larvae have been characterized for mtDNA variation but not microsatellites. The larval samples exhibited similar or higher levels of allelic and gene diversity than Lake Mohave, with only one sample exhibiting a significant reduction in the number of alleles expected when compared to the original Lake Mohave source population. Samples have been extracted from adults and are in the process of being characterized.

FY17 Activities: Razorback sucker genetics will continue to be assessed for the lower Colorado River through analyses of razorback sucker fin clips and larvae collected from spawning areas, reservoirs, river reaches, and off-channel habitats within the LCR MSCP planning area.

Reach 3 razorback sucker augmentation will include additional fish from the Lake Mohave gene pool. Due to this increase in the proportion of stocked razorback suckers reared from Lake Mohave origin larvae, spatial and temporal genetic monitoring efforts of larvae and adults for Reach 3 will continue and will allow for comparison with razorback sucker genetics of Lake Mohave.

Proposed FY18 Activities: The collection of larval razorback suckers and fin clips from spawning areas within the LCR MSCP planning area will continue. DNA will be extracted and samples characterized for mtDNA and microsatellite variation. Due to the small population sizes, future work will continue in order to evaluate potential problems related to the effective number of breeders. This work task will be close in FY18. Any future genetic monitoring will be conducted under system-wide monitoring (Section D).

Pertinent Reports: Annual reports for 2013–16 titled *Razorback Sucker Genetic Diversity Assessment* have been completed and will be posted on the LCR MSCP Web site upon completion.