

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

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
\$200,000	\$196,158.23	\$1,044,536.89	\$0	\$0	\$0	\$0

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Start Date: FY06

Expected Duration: FY11

Long-term Goal: Species research.

Conservation Measures: RASU5.

Location: Reach 2, Lake Mohave, Arizona/Nevada.

Purpose: Assess population for repatriated RASU, and develop a demographic model for predicting survival and replacement rates to maintain brood stock for the LCR MSCP.

Connections with Other Work Tasks (past and future): This activity uses data managed under G1 and collected under C23.

Project Description: This activity will support ongoing RASU conservation efforts at Lake Mohave to develop and maintain a population of adult RASU as a genetic refuge. More than 120,000 fish have been reared and repatriated to date, yet brood stock population estimates remain below 2,000 fish. The study will assess causes for poor survival of stocked RASU and make recommendations for corrective actions.

Previous Activities: Rearing, stocking, and recapture data for Lake Mohave were collated and reviewed. Field investigations were implemented during spawning and post-spawning seasons. Telemetry work was initiated to examine post-stocking dispersal, habitat selection, and short-term mortality, and to verify existing population models. A population model was refined to estimate abundance and to describe critical, dynamic life table features such as mortality rates. Data were acquired to assess fish predators as a mortality factor for stocked RASU.

Extensive sonic tracking of fish was used to assess distribution and survival. Demographic modeling was used to assess population structure. The study was designed as a multi-year, iterative process. Observations and conclusions from first-year activities provided direction for work in subsequent years. Initial findings showed that the 300-mm TL RASU that were released were being eaten by predators immediately after stocking, with less than 20% surviving the first 90 days. This prompted a need to evaluate stocking of adult size RASU (500 mm TL). Rearing

of these larger fish has taken longer than expected. Only a few hundred fish were available for research subjects during 2007.

Three additional six-month sonic telemetry studies were conducted from FY08 through FY10. The first two studies focused on comparative post-stocking survival of adult (500 mm TL or longer) and subadult RASU (350 mm TL to 415 mm TL). Adult survival was 36% (5 of 14 tracked throughout the study) and 80% (16 of 20) for the first and second study respectively, while subadult survival was 7% (1 of 15) and 67% (6 of 9), respectively. The final telemetry study compared the post-stocking survival of adult RASU raised at Bubbling Ponds and released into the lake with repatriate RASU captured in Lake Mohave. All study fish remained active for the entire six-month study period (100% survival).

The four sonic telemetry studies completed under this work task implicated predation as a major cause of post-stocking mortality, and provided additional evidence that RASU size at release is strongly associated with post-stocking mortality. However, the studies have shown high annual variation in post-stocking mortality, which may be linked to the abundance of large (greater than 800 mm) striped bass.

Annual monitoring for repatriated and wild RASU continued. Capture data continued to show a decline of the original wild population that had existed prior to the repatriation program. The repatriate population maintained a low abundance but was stable.

Based on monitoring data from 2009 and 2010, the wild RASU population in Lake Mohave was 30 fish. The repatriated RASU population was estimated to number 1,439 with a 1% estimated survival of all repatriates released as of March 2009.

In addition to routine monitoring data, remote sensing data from a study to evaluate the efficacy of the technique for monitoring RASU on Lake Mohave (C23 closed in FY09) was analyzed and compared to netting data. A total of 12,278 scanning contacts and 711 unique individuals were reported since remote sensing began in Lake Mohave in 2008; 1,733 from 2008, 3,083 from 2009 and 7,462 from 2010. In 2010 the number of unique remote scanning contacts with RASU exceeded the total RASU catch during the March roundup in 2010 (389 scans compared to 286 captured).

FY11 Accomplishments: Routine monitoring during March 2011 resulted in the capture of 13 RASU. Population estimates from March roundup data declined for wild fish; however, the repatriate population estimate increased by more than 100% between 2009 and 2010. Wild population estimates declined from 24 fish in 2009 to 13 fish in 2010, and repatriated RASU estimates increased from 1,439 to 2,966 fish. The current (2010) total population estimate for RASU in Lake Mohave is 2,979.

Stocking simulations based on size-survival relationships and growth and release data from the Lake Mohave Native Fish Work Group database reveal that post-stocking survival for RASU is between four and eight times higher when the target release size is 45 cm compared to a target size of 30 cm. Uncertainty in results is due to differences in stocking protocols between the 1990s and 2000s including stocking size and location.

Remote PIT-scanners were deployed twice a month in the riverine portion of Lake Mohave upstream of Willow Beach from February through September 2011, and in the basin from February through April 2011. These efforts contacted 1,044 unique RASU. Scanning data from 2010 and 2011, along with March roundup and electrofishing data, resulted in zone-specific population estimates of 1,086 and 1,654 RASU (134.2kHz PIT tags only) for the basin and river zones, respectively. Only seven individuals contacted were detected in both river and basin zones, suggesting relatively segregated populations, although those few fish moving between zones may be adequate to maintain gene flow.

FY12 Activities: Closed in FY11. Monitoring activities identified through this research will be implemented under Razorback Sucker and Bonytail Stock Assessment (D8).

Proposed FY13 Activities: Closed in FY11.

Pertinent Reports: A final report titled, *Demographics and Post-stocking Survival of Repatriated Razorback Sucker in Lake Mohave*, will be posted to the LCR MSCP website. The study plan is available upon request from the LCR MSCP.