

## Work Task C61: Evaluation of Alternative Stocking Methods for Fish Augmentation

FY15 Estimate	FY15 Actual Obligations	Cumulative Expenditures Through FY15	FY16 Approved Estimate	FY17 Proposed Estimate	FY18 Proposed Estimate	FY19 Proposed Estimate
\$425,000	\$188,348.83	\$209,893.35	\$200,000	\$300,000	\$300,000	\$0

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**Start Date:** FY14

**Expected Duration:** FY18

**Long-Term Goal:** Maintain the effectiveness of the LCR MSCP Fish Augmentation Program

**Conservation Measures:** RASU3, RASU5, RASU6, BONY3, and BONY5

**Location:** The lower Colorado River within the LCR MSCP planning area, including reservoirs and connected channels from Lake Mead downstream to Imperial Dam

**Purpose:** To evaluate the effects alternative stocking methods have on survival of razorback suckers and bonytail stocked within the LCR MSCP planning area

**Connections with Other Work Tasks (Past and Future):** Related work tasks include B2, B3, B4, B5, B6, C10 (closed), C11 (closed), C26 (closed), C31, C33 (closed), C39 (closed), C46 (closed), C63, C64, D8, and G3. In FY15, Work Tasks C10 and C11 were incorporated into this work task due to similarities in purpose, scope, and out-year implementation. Specific activities will be detailed in this work task, and the proposed fiscal year budgets will reflect the work that is to be undertaken.

**Project Description:** Extensive monitoring of Colorado River native fishes is a commitment under the LCR MSCP, and in accordance with the Habitat Conservation Plan, several monitoring and research elements have been included as part of the LCR MSCP Fish Augmentation Program. Two of these research elements will be addressed, including: (1) understanding and minimizing adverse effects of stocking and (2) understanding post-stocking distribution and survival. Alternative stocking methods will be evaluated for razorback suckers and bonytail within the LCR MSCP Fish Augmentation Program boundaries and may include stocking during different seasons, stocking at night, stocking cohorts of various quantities, and stocking at specific locations. These alternative methods will

generally be evaluated through multiple iterations of paired stockings, with one group representing the more traditional stocking and one representing the alternative method being investigated.

In addition to these alternative stocking methods, fish reared by alternative means may also be evaluated through these efforts. These treatments will then be used to test whether different types of conditioning will translate to improved survival of stocked fish. To test the effectiveness of these alternate rearing treatments, stockings would be completed in paired groups and may include fish that have been either flow conditioned or trained to recognize predators. Information regarding post-stocking distribution and survival will be obtained through ongoing research and monitoring work tasks (C64 and D8). As information on these stockings becomes available, different combinations of these alternative stocking methods and treatments may also be evaluated.

**Previous Activities:** Previous research related to this work task was conducted under Work Task C26 in FY09–11. Feeding rates, efficiency of food conversion, growth, swimming performance, and physical condition of razorback suckers reared in flowing raceways at the Lake Mead Fish Hatchery were evaluated. The results from multiple iterations of this research showed that razorback suckers reared at the highest velocity flows evaluated, 38 and 39 centimeters per second, exhibited the most growth, highest food conversion efficiency, and best swimming performance. Additional rearing of native fish under flowing conditions will be conducted as part of the current work task, and future monitoring efforts will be used to evaluate how the benefits of this rearing strategy relate to post-stocking survival of native fishes.

A total of 23,251 razorback suckers were repatriated into Lake Mohave during FY13 and FY14 as 11 paired cohorts released in day and night stocking events. All efforts associated with these stocking events were captured under Work Task B2. Approximately 2% of FY13 releases had been captured or contacted through monitoring efforts at the end of FY14, with little difference observed between day or night releases. Additional capture and contact data for FY13 and FY14 cohorts will be obtained through future year monitoring efforts and evaluated under this work task to determine the effectiveness or benefit of night stockings as compared to traditional day stocking events.

A portion of FY14 funding was also obligated to upgrade the electrical capabilities at the Lake Mead Fish Hatchery in preparation of future flow conditioning efforts. This upgrade will support the operation of submersible propeller pumps, which will allow for controlled flow in ten 40-foot raceways. Monitoring data from flow-conditioned and static-reared cohorts will be analyzed under this work task to evaluate differential survival.

**FY15 Accomplishments:** Razorback sucker capture and contact data collected through ongoing monitoring efforts were analyzed during FY15 to evaluate the results from previous year day/night paired releases. Through FY15, approximately 2.2% of FY13 and < 1% of FY14 releases had been captured or contacted through monitoring efforts. These figures represent similar contact rates as those observed for traditional stockings; however, while little difference has been observed between fish contacted from FY13 day or night releases, approximately 67% of contacts from FY14 releases represent fish stocked at night. Lake Mohave monitoring data collected through Work Task D8 have demonstrated that stocked fish are often not contacted for up to 3 years post-release. For this reason, these cohorts will continue to be tracked in future years, as it may require multiple years of data to evaluate this alternative stocking method.

During FY15, the Willow Beach National Fish Hatchery repatriated 14,472 razorback suckers into Lake Mohave as 7 paired cohorts released in day and night stocking events. Cohort size, time of year, and locations of stockings were all similar to those of previous years. Capture and contact data for these cohorts will be obtained through ongoing monitoring efforts and evaluated under this work task in future years to determine the effectiveness or benefit of this alternative stocking method.

Six mesocosm research ponds were constructed and lined at the Valle Vista Country Club, Kingman, Arizona, for predator avoidance trials. Electrical service was run to the ponds for the installation of 12 (2 per pond) permanent submersible passive integrated transponder tag detection antennas. The Arizona Game and Fish Department has been rearing razorback suckers and bonytail to the desired size for these experiments.

**FY16 Activities:** FY16 will be the first of three study years in which survival of razorback suckers stocked into Lake Mohave will be compared using cohorts of different quantities. Approximately 7,000 razorback suckers will be stocked at four locations over a 3-week period, with each location receiving a different-sized cohort (250, 500, or 1,000 fish) each week. The total number of razorback suckers stocked at each location will be the same; however, cohort stockings will be staggered so that no more than two locations receive the same number of fish during any one week. Capture and contact data for these cohorts will be collected under this and other work tasks, and data will be analyzed as they become available.

Paired stockings of flow-conditioned and static-reared razorback suckers will occur in FY16 pending completion of the Lake Mead Fish Hatchery electrical upgrade. Cohort sizes may be small during the initial study year due to availability of suitably sized fish; however, they are expected to increase in

future years as additional fish are brought on station. Fish reared at the Lake Mead Fish Hatchery will be released in Reach 2 or 3, and data will be collected through ongoing monitoring.

Mesocosm-based post-conditioning survival trials for bonytail in the presence of largemouth bass and channel catfish simultaneously will be completed in FY16. Repeated conditioning may increase the likelihood of “learning” a behavior as compared to fish conditioned for only a single time.

**Proposed FY17 Activities:** The potential benefits of alternative stocking methods will be analyzed. An evaluation of cohort size and stocking of flow-conditioned and static-reared native fishes will continue. Mesocosm-based post-conditioning survival trials will also continue for bonytail and will be expanded to razorback suckers in FY17. Predator presence and conditioning frequency will be used as factors with both largemouth bass and channel catfish simultaneously. Separate groups of razorback suckers and bonytail will be exposed to three treatments: no conditioning events, a single predator conditioning event, or three predator conditioning events. Survivorship will be assessed over a 30-day trial period. Other alternatives to traditional stocking will be evaluated during the year, and potential opportunities to implement these alternatives will be assessed as fish become available. The increased budget projections for FY17 are to compensate for the expansion of these research efforts and for the preparation of treatment batches of these fish for paired-release stocking and long-term monitoring.

**Pertinent Reports:** N/A