

## Work Task C26: Evaluation of Raceway Rearing of Razorback Sucker at Lake Mead Fish Hatchery

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$70,000	\$82,395.92	\$157,726.77	\$70,000	\$0	\$0	\$0

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**Start Date:** FY08

**Expected Duration:** FY11

**Long-term Goal:** Rear RASU of sufficient quantity and quality to accomplish the LCR MSCP Fish Augmentation and Species Research programs.

**Conservation Measures:** RASU3, RASU4, and RASU8.

**Location:** Reach 1, Lake Mead, Boulder City, Nevada.

**Purpose:** Evaluate raceway rearing of RASU to improve physical conditioning prior to stocking.

**Connections with Other Work Tasks (past and future):** This research is complementary to work conducted under Razorback Sucker Rearing Studies (C10). If successful (i.e., shows benefit to fish and is cost effective), this action may be included in the Fish Augmentation Program (Section B) in the future. Other rearing of RASU is being conducted at this facility, Lake Mead Fish Hatchery (B6).

**Project Description:** This project will investigate and evaluate rearing of RASU in flowing raceways at Lake Mead SFH. The study will investigate ways to deliver food, efficiency of food conversion, feeding rate, growth of RASU, and physical condition of fish. End-of-year results will be compared with similar parameters for RASU being reared for the LCR MSCP in non-flow facilities (Willow Beach NFH and Bubbling Ponds SFH).

This research is designed to take advantage of a unique opportunity at Lake Mead SFH. Research underway at Achii Hanyo by the USGS and USFWS is showing that RASU acclimated to flow have improved swimming performance. This may improve post-stocking survival for fish released by the LCR MSCP. Currently, there are no facilities rearing fish for the LCR MSCP using flowing raceways. Due to current water elevations of Lake Mead, intake water temperatures at Lake Mead SFH are too warm for rearing rainbow trout (summer water temperatures in 2006 exceeded 75°F). The NDOW is waiting to acquire water from deeper, cooler areas of Lake Mead. In the meantime, all or

parts of the Lake Mead SFH will be idle. This work proposes to use RASU from lakes Mead and Mohave to examine and evaluate the practicality and cost effectiveness of feeding and growing RASU in flowing raceways at Lake Mead SFH.

**Previous Activities:** Reclamation, SNWA, and NDOW have been cooperatively rearing Lake Mead RASU at the Lake Mead Fish Hatchery (B6) to support ongoing studies in Lake Mead. During FY09 the design for the flowing raceway test apparatus was finalized, and four large fiberglass raceways along with parts and equipment for construction of the inflow manifold were purchased. A portion of the subadult RASU reared under Lake Mead Fish Hatchery (B6) were PIT tagged and kept on station for use as research subjects.

**FY10 Accomplishments:** Construction of the inflow manifold was completed and the flowing raceway apparatus was tested and approved in early 2010. Rearing trials began in late May and concluded in the end of July while hatchery water temperatures were still favorable. Approximately 1,200 subadult RASU were weighed, measured for total length, individually marked with PIT tags, divided and released into the three test raceways, and exposed to flow velocities of 0, 23, or 36 centimeters per second (cm/s). A subset of the 1,200 unexercised RASU were also evaluated individually in a swim chamber to establish their pre-trial mean failure velocity (velocity at which fish could not maintain their position in the water column) for post-trial comparison.

Post-trial analysis showed that growth, food conversion efficiency, and swimming performance were highest among fish that had been exposed to flowing water conditions. Furthermore, fish exposed to the highest average flow velocity (36 cm/s) performed better in each category tested while unexercised control fish (0 cm/s treatment) exhibited the worst growth, food conversion efficiency, and conditioning. Additional trials planned for the next study year will help to validate these findings and direct future research in this area.

**FY11 Activities:** Rearing trials are expected to begin in May when hatchery water temperatures become favorable. Minor modifications to the study design, including flow acclimation periods and increased trial durations, are anticipated based on observations made during the FY10 study year. Relative cost, fish growth, and food conversion data from other facilities rearing RASU under non-flowing conditions will be obtained and compared to study results.

**Proposed FY12 Activities:** Closed in FY11.

**Pertinent Reports:** The final report for the FY10 study year titled, *Evaluation of Rearing Razorback Sucker (*Xyrauchen texanus*) in Flowing Raceways at Lake Mead Fish Hatchery*, will be posted on the LCR MSCP website.