

Work Task C10: Razorback Sucker Rearing Studies

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$125,000	\$127,882.41	\$589,689.23	\$125,000	\$125,000	\$125,000	\$125,000

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Start Date: FY06

Expected Duration: FY15

Long-term Goal: Seek measures to improve quantity, quality, and cost effectiveness of RASU reared for the Fish Augmentation Program.

Conservation Measures: RASU3, RASU4, and RASU6.

Location: Various locations including hatcheries, rearing ponds, universities, and private research facilities.

Purpose: Evaluate factors affecting rearing of subadult RASU to maximize quantity and quality of RASU produced for the LCR MSCP.

Connections with Other Work Tasks (past and future): This work is similar to actions in Bonytail Rearing Studies (C11) and shares some activities (concurrent studies at same locations). Also, a workshop for fish culturists was held in FY07 that focused on culture needs for both Razorback Sucker Rearing Studies (C10) and Bonytail Rearing Studies (C11).

Project Description: Provides funding for investigations into rearing and culture of RASU. The goal is to investigate ways to accelerate growth of RASU through manipulation of physical, chemical, and biological attributes of the rearing environment (e.g., manipulate feed, fish density, water temperature, water hardness, turbidity, lighting, presence/absence of cover). Current hatchery practices rear 250-300 mm TL fish in roughly three years. However, numerous observations during recent rearing and culture of RASU show a wide range in growth rates for this species, and it is possible to have 100-, 200-, and 300-mm TL fish from the same year class on station at the same time. In general, 25% of a RASU year class exhibit accelerated growth, 50% show moderate growth, and 25% demonstrate slow growth.

The species is a rare fish for which only limited life history data exist, and data that exist are mostly for adults, not young life stages such as those being reared in hatcheries. As more fish are reared, released, and followed, more life history data are being collected. Much of this information may be important to fish culturists. For example, the fact that

young RASU are nocturnal was determined in 1992 by observations of biologists from the Lake Mohave Native Fish Work Group. Even so, hatchery managers are only now testing night-time feeding regimes. Active culture of RASU is a young science; many of the techniques initially used for rearing this species originated in the culture of rainbow trout, a species actively cultured for more than 50 years. Only during the past decade was it conclusively determined that a high protein trout diet results in spinal deformities in fingerling RASU. For example, it was not recognized until the 1980s that adult RASU can feed successfully in open water areas on zooplankton. Much of the existing literature up to that time was for the riverine population, and assumed that the adult RASU were only bottom feeders. This information may be vital in determining where feed should be introduced within the water column during the culturing process (sinking, floating, or suspension). These types of observations need to be recognized, then hypotheses developed, and finally tests of the hypotheses designed and conducted.

This work task was originally expected to end in FY12. However, this project has consistently benefited RASU culture. Many of the studies require multiple years of observation to assess their effectiveness. As this work generally has added to the conservation of RASU, it is proposed that this project continue through FY15.

Previous Activities: Literature reviews were conducted to compile information on rearing these fish. These reviews also included site visits to facilities that are actively culturing RASU to document successes and failures. Inquiries were made to field biologists and technicians to document behavior of fish in the wild (i.e., daily activities such as feeding, resting, and use of cover in wild habitat). Ideas and hypotheses are being formulated into numerous small experiments, testing one variable at a time.

Survival of three native Colorado River fish species including razorback sucker were documented post-netting. Fish captured in trammel nets experienced higher mortality than fish captured using a seine net. Fish captured in water temperatures exceeding 20°C had elevated blood cortisol levels as compared to fish captured with the same methods below 15°C.

During calendar year 2009 several batches of PIT-tagged RASU were placed into the same pond. No significant differences in growth rate were observed among fish that had been in the pond only during the winter period compared to fish that had been in the pond the entire year, indicating that water temperatures at Bubbling Ponds are high enough to allow fish to feed and grow year-round.

RASU were reared in recirculating raceways units at Willow Beach NFH to determine how large they would grow in four years time. RASU grew on average 110 mm and doubled their weight during eight months of growth.

Polyculture of RASU and BONY took place at Achii Hanyo Rearing Station in four ponds. In December all four ponds were harvested and 54% of BONY grew to the stockable size of 300+ mm TL. RASU growth was variable in all four ponds with best growth from lower density ponds.

FY10 Accomplishments: The USFWS conducted the second year of polyculture for RASU and BONY stocked in the same ponds at Achii Hanyo Rearing Station. Polyculture of BONY and RASU is not detrimental to either species provided densities don't exceed carrying capacity.

The USFWS continued the RASU growth studies at Willow Beach NFH to determine density levels and feeding rates for rearing RASU from 300 mm up to 500 mm TL to accelerate broodstock development in Lake Mohave.

AGFD completed the fourth year of research to identify ways to improve growth rates and maximize the size of RASU at time of release. This year focused on 3 growth experiments. The first investigated growth in the absence of the parasite *Ichthyophthirius*, which were significantly greater than previously recorded rates at the hatchery over the last few years. Fish tagged at 300 mm or greater total length have reduced growth rates as expected. Sorting smaller fish from larger fish after the first year appears to improve growth rates of the smaller growing fish, with growth of the smaller fish equal to that of the larger fish. A research proposal was completed for Physiological Responses in Bonytail and Razorback Sucker to Transport Stress (C46) the scope of work is available upon request.

FY11 Activities: USFWS will continue the RASU growth studies focusing investigations on bottom surface area comparison to see if the spatial requirements of RASU are related to bottom surface area available rather than density of the entire water column. A second workshop is to be organized and held locally to review status of culturing native Colorado River Fishes.

Proposed FY12 Activities: Research investigations on RASU growth will continue to be implemented through research projects with cooperating hatcheries. Findings from the culturing native Colorado River Fishes workshop will be used to develop further research.

Pertinent Reports: Scopes of work and project reports are available upon request. *Effects of Disease Treatments on Growth of Razorback Sucker; Effects of Capture By Trammel Nets On Native Arizona Fishes; and Factors Affecting Growth of Razorback Sucker in Captivity: Literature Review and Knowledge Assessment* are available on the LCR MSCP website.