

Work Task C10: Razorback Sucker Rearing Studies

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
\$125,000	\$132,922.93	\$693,462.54	\$125,000	\$125,000	\$125,000	\$125,000

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Start Date: FY06

Expected Duration: FY15

Long-term Goal: Provide RASU of sufficient quantity and quality for the Fish Augmentation Program, and ensure that these fish are reared in a cost-effective manner.

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 task is a companion study to Bonytail Rearing Studies (C11) and may share some of the same locations, source data, and testing staff during implementation. Also, investigations carried out may be conducted at hatcheries identified in Section B.

Project Description: These projects provide funding for investigating rearing and culture practices 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.

During 2009 RASU were reared in recirculating raceways at Willow Beach NFH to determine maximum growth. RASU grew on average 110 mm and doubled their weight in 2009. RASU growth studies continued in 2010 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.

Polyculture of RASU and BONY was investigated at Achii Hanyo Rearing Station in 2009 and 2010. In December of each year 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. Polyculture of BONY and RASU were not detrimental to either species provided that densities did not exceed carrying capacity.

FY11 Accomplishments: ADFG is in the fifth year of research investigating factors to improve growth in rearing ponds. Data suggest that the current growth rates (6-9 mm/ month) at Bubbling Ponds SFH cannot be exceeded due to current production goals and the presence of *Ichthyophthirius multifiliis* in the receiving waters. The final report, *Growth of Razorback Sucker (Xyrauchen texanus) at Bubbling Ponds Fish Hatchery* is in review and will be posted to the LCR MSCP website once finalized.

The USFWS completed the first year of a two-year investigation of RASU growth to 500 mm reared in raceways. 1,494 RASU were PIT tagged, weighed, and measured. Sample counts were performed every two months and feed, temperature, and mortality data were collected daily.

A workshop to review the status of culturing native Colorado River Fishes was planned to be held in Boulder City, Nevada in August. However, the workshop was postponed due to travel restrictions. The workshop may be held at a later date.

FY12 Activities: Classical conditioning techniques will be used while introducing predator-naive RASU to predators with temporarily incapacitated jaw muscles in the presence of its conspecific alarm substance. Survival of conditioned and unconditioned RASU exposed to a single predatory species will be compared.

The USFWS will stock growth study fish, compile data, evaluate results, and submit a final report.

Proposed FY13 Activities: Conditioning studies are to continue with survival of conditioned and unconditioned RASU exposed to multiple predatory species compared.

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.