

Work Task C11: Bonytail Rearing Studies

FY10 Estimates	FY10 Actual	Cumulative Accomplishment Through FY10	FY11 Approved Estimate	FY12 Proposed Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate
\$165,000	\$160,883.55	\$663,023.50	\$150,000	\$150,000	\$150,000	\$150,000

Contact: Andrea Montony, (702) 293-8203, amontony@usbr.gov

Start Date: FY06

Expected Duration: FY15

Long-term Goal: Improve quantity, quality, and cost-effectiveness of fish reared for the Fish Augmentation Program.

Conservation Measures: BONY3, BONY4, and BONY5.

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

Purpose: Evaluate factors affecting growth of subadult BONY to maximize total length at release and reduce rearing time in hatchery.

Connections with Other Work Tasks (past and future): This work task is a companion study to Razorback Sucker Rearing Studies (C10) 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: Provides funding for investigations into rearing and culture of BONY. 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. The goal is to investigate ways to accelerate growth of BONY 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 3-4 years. However, BONY over 150 mm are generally sexually mature and often times spawn in rearing ponds therefore increasing number of mouths to feed and general biomass in the ponds. Overcrowding reduces growth and increases risk of disease. Funds are expended over numerous studies to fill life history gaps.

Previous Activities: Investigations and evaluations of current culture practices for BONY were performed through literature reviews, survey questionnaires, site visits to culture facilities, and interviews with fish culturists. A workshop was held in August 2007 for fish culturists to review survey findings and prioritize research actions. Research

hypotheses were formulated for study designs and investigations are being carried out. Findings and results will be documented and reported. Dexter NFH developed and initiated an alternative rearing strategy to assist with BONY restoration in Lake Mohave. Hatchery staff investigated the potential for increased growth and resource conservation by rearing larval BONY within the same pond as adult broodstock and determined the effect individual size variation has on growth within an intensive culture environment. In addition, in 2008 researchers began investigating how to improve growth performance of BONY through diet optimization, temperature and rearing density the second year of the study has been completed.

Arizona State University conducted a comprehensive review of available published and gray literature, compiled an annotated bibliography, and submitted a report titled, *BONY Rearing Studies: Literature Review*, 2008.

Investigations into handling stressors in BONY at Achii Hanyo were completed and a report titled, *Passive Integrated Transponders in Gila elegans: Location, Retention, Stress, and Mortality*, 2008 is available on the LCR MSCP website. Recommendations were that fish tagging should be done at temperatures below 16°C.

A site visit to Achii Hanyo National Fish Hatchery during the annual harvest was conducted. Observations were made on the culturing, handling, tagging and transporting procedures at Achii Hanyo. It is recommended to assess tolerances of BONY to hatchery and stocking stressors by evaluating the stress responses at the biochemical, organismal, population, community, and ecological levels to alleviate observed handling stressors. A report titled, *Stress Inducing Factors of BONY Hatchery and Stocking Practices*, 2009 is available on the LCR MSCP website.

FY10 Accomplishments: Dexter NFH with assistance from USGS-New Mexico Cooperative Fish and Wildlife Research, USDA- ARS Hagerman Fish Culture Experiment Station, and the USFWS, Bozeman FTC completed the final year of research associated with the development of a formulated species-specific diet for BONY. All five diets evaluated performed equally well on the following variables measured at the end of the study: % body weight gain, specific growth rate, feed conversion ratio, condition factor, and survival. It is recommended that BONY remain on the RASU diet until further research dictates otherwise.

Research proposals were completed for Physiological Responses in Bonytail and Razorback Sucker to transport stress (C46) and Genetic Monitoring and Management of Recruitment on Bonytail Rearing ponds (C47). Study designs are available upon request.

FY11 Activities: FY11 activities have been limited due to the detection of Large Mouth Bass Virus (LMBV) at Dexter NFH&TC. Dexter maintains the only broodstock of BONY and are currently unable to transport BONY off station. This limits the availability of BONY for research purposes.

Develop a study plan to investigate condition factors of BONY at different stages of development, create standards based on condition factor, and evaluate standards with

regards to predator avoidance. Site visits will be conducted to facilities culturing BONY to evaluate operations, identify research needs, and develop study plans.

Proposed FY12 Activities: Collect previous length and weight data for BONY and determine condition factors for fish dependent upon age, sex, and season. Evaluate hatchery reared BONY versus wild BONY. Use information gathered from BONY culturing facilities to implement research needs from FY11 site visits.

Pertinent Reports: *Passive Integrated Transponders in Gila elegans: Location, Retention, Stress, and Mortality*, and *Bonytail Chub Rearing Studies: Literature Review Final Report* are available on the LCR MSCP website.