

## Work Task C11: Bonytail Rearing Studies

FY11 Estimate	FY11 Actual Obligations	Cumulative Expenditures Through FY11	FY12 Approved Estimate	FY13 Proposed Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate
\$150,000	\$57,589.11	\$713,586.43	\$150,000	\$150,000	\$150,000	\$150,000

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**Start Date:** FY06

**Expected Duration:** FY15

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

**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:** This work task 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). Funds are expended over numerous small studies which provide information to fill in gaps in this species' life history.

**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 currently being carried out. 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 brood stock 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. 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.

Arizona State University conducted a comprehensive review of available published and gray literature, compiling it into an annotated bibliography.

Investigations into handling stressors in BONY at Achii Hanyo Rearing Facility were completed. Recommendations were that fish tagging should be done at temperatures below 16°C.

A site visit to Achii Hanyo Rearing Facility during the annual harvest was conducted. Observations were made on the culturing, handling, tagging, and transporting procedures at Achii Hanyo Rearing Facility. 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.

**FY11 Accomplishments:** FY11 activities were limited due to the detection of Largemouth Bass Virus (LMBV) at Dexter NFH. Dexter maintains the only broodstock of BONY and were unable to transport BONY off station most of FY11, limiting the availability of BONY for research purposes. The 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.

Site visits were made to Cibola High Levee Pond, Parker Dam Pond, Davis Cove, and Imperial Ponds to evaluate cover available at backwaters where BONY are known to persist and spawn. This information was used to develop Work Task C58, Investigating Habitat Cover for BONY. Discussions were held with research agencies to improve survival of BONY after stocking into the LCR. A research proposal was designed with AGFD to investigate predator recognition associated with an alarm substance in BONY.

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

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

**Pertinent Reports:** Scopes of work and project reports are available upon request. *BONY Rearing Studies: Literature Review; Passive Integrated Transponders in Gila elegans: Location, Retention, Stress, and Mortality; and Stress Inducing Factors of BONY Hatchery and Stocking Practices*, are available on the LCR MSCP website.