

## Work Task C11: Bonytail Rearing Studies

FY12 Estimate	FY12 Actual Obligations	Cumulative Expenditures Through FY12	FY13 Approved Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate	FY16 Proposed Estimate
\$150,000	\$140,147.91	\$787,571.10	\$150,000	\$150,000	\$150,000	\$0

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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 and post-stocking survival of BONY through manipulation of physical, chemical, and biological attributes of the rearing environment.

Objectives:

- Review current practices and prioritize research actions
- Evaluate species specific diet for BONY
- Investigate BONY stressors during the handling process
- Evaluate predator recognition and avoidance training

**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 or are complete.

Five fish feeds were evaluated, four experimental feeds and the currently used feed, to determine whether alternative protein sources and/or lipid levels could improve growth of BONY. All five diets evaluated performed equally well. It was recommended that BONY remain on the current 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. Results showed that fish tagged at 16°C had significantly lower plasma cortisol levels than those tagged at 12°C and 20°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. Recommendation include assessing 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.

**FY12 Accomplishments:** A predator recognition study using classical conditioning techniques while introducing predator-naive BONY to a predator with temporarily incapacitated jaw muscles in the presence of the conspecific alarm substance is in progress. Installation of tanks, drain and inflow plumbing, large holding tanks with a recirculating system, air supply, and a distilled water system are complete. BONY have been obtained from SNARRC and predators (largemouth bass and flathead catfish) have been captured and quarantined. Botulinum toxin concentrations necessary to adequately paralyze the jaw muscles of predator fish have been determined.

**FY13 Activities:** Predator recognition research will continue. BONY will be exposed to the conspecific alarm substance and a predator with a temporarily incapacitated jaw muscle concurrently. Survival trials of conditioned and unconditioned fish when exposed to actively feeding predators will be evaluated over a 24 hour time intervals.

Experiments to investigate long-term survival of conditioned BONY will begin. The first question to be evaluated is whether the frequency of predator avoidance conditioning influences survival of RASU in the presence of actively feeding predators.

**Proposed FY14 Activities:** Pond reconstruction and instillation of remote PIT scanning antennae is to be completed in FY14. Predator recognition studies to investigate whether a subset of conditioned fish may be able to increase survival of unconditioned fish will continue. Investigation of long-term survival of trained BONY will also continue. How the time between conditioning and stocking influences survival in the presence of actively feeding predators will be evaluated.

**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.