

Work Task C30: Development and Evaluation of Measures to Reduce Transport of Quagga Mussel During Fish Transfer and Stocking Activities

FY12 Estimate	FY12 Actual Obligations	Cumulative Expenditures Through FY12	FY13 Approved Estimate	FY14 Proposed Estimate	FY15 Proposed Estimate	FY16 Proposed Estimate
\$150,000	\$65,684.91	\$306,464.71	\$160,000	\$0	\$0	\$0

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Start Date: FY09

Expected Duration: FY13

Long-term Goal: Maintain effectiveness of the fish augmentation program.

Conservation Measures: BONY2, BONY3, BONY4, BONY5, RASU2, RASU3, RASU4, RASU5, RASU6, and RASU8.

Location: Various state and federal hatcheries and laboratories in Boulder City, Nevada; Willow Beach, Arizona; Cornville, Arizona.

Purpose: To develop and test measures to assure non-transmittal of quagga mussel larvae and adult quagga mussels during the fish transport and stocking activities of the LCR MSCP Fish Augmentation Program.

Connections with Other Work Tasks (past and future): This work is related to all fish facilities in B2, B3, B4, B5, B6, B7, and B11 as RASU and/or BONY are moved between these sites and the lower Colorado River. Work began as a literature investigation under G3.

Project Description: This study will develop and test means to assure that quagga mussel larvae and adult mussels are not being transported throughout the Colorado River system as a result of the Fish Augmentation Program. The original Fish Augmentation Plan called for capture of wild RASU larvae from Lake Mohave, which are provided to Willow Beach NFH (B2), SNARRC (B4), and Bubbling Ponds SFH (B5). In addition, RASU larvae and juveniles are transported from Willow Beach NFH to Lake Mead SFH (B6) and to lake-side rearing ponds (B7). BONY are transferred from SNARRC to Willow Beach NFH and to Achii Hanyo Rearing Station (B3), and directly to the river system. This is an acceptable pathway because quagga mussels are already present at the Willow Beach and Achii Hanyo facilities; therefore, no quagga-free facility is exposed to quagga infestation as the result of this strategy. Transfers of fish from quagga-infested facilities to non-infested facilities have been halted until such time that assurances can be

made that quagga mussels are not being carried along with these fish. This study will attempt to develop measures to allow such certification.

Previous Activities: During January 2007, the exotic quagga mussel was discovered in Lake Mead, and subsequently found in both Lake Mead SFH (B6) and Willow Beach NFH (B2). Larval RASU that were to be transferred to Bubbling Ponds SFH (B5) were not collected (B1) and no RASU of any size or year class were delivered to waters outside the Lower Colorado River corridor. Quagga mussels have not severely impacted the maintenance or operations at Willow Beach NFH. However, quagga mussels continue to have an impact on delivery of fish.

Preventing further movement or transfer of quagga mussels is a priority for state and federal agencies. Fish transport protocols for the lower Colorado River corridor have been developed and are under review by cooperating resource agencies. Studies conducted by the USFWS determined that concentrations of potassium chloride (KCl) and formalin, which had been recommended for killing quagga mussel larvae in transport water, were not effective in killing quagga larvae under the water conditions at Willow Beach NFH and the levels of KCl/formalin tested may be toxic to native fish species.

In FY10 three chemicals were chosen for testing by USFWS at Willow Beach NFH to evaluate their effectiveness at killing quagga mussel life stages. Quagga mussel veligers exhibited resistance to most of the concentrations of all three chemicals tested in the 6-7 hour time frame allotted which simulates the average transportation time for stocking fish into the lower Colorado River. Mortality in 100% of veligers was observed only in the two highest concentrations of peracetic acid; however, BONY exposed to one half concentrations died in less than 30 minutes.

In FY11 research refocused based on the ability of quagga mussel veligers to withstand relatively high concentrations of chemicals for the duration of a simulated 8-hour transportation time. Research looked into development of a pretreatment to relax the veligers and prevent them from closing their shells, subsequently allowing a molluscicide to be applied in lower doses that will not be toxic to fish. Formalin was chosen as the molluscicide to be tested in combination with each of six chemicals. All six chemicals were found either to be highly toxic to fish at concentrations required to kill 100% veligers, or treatment duration required was too long.

FY12 Accomplishments: Five chemical compounds and a biological control agent were selected for research. All five chemicals were potassium-based compounds (potassium monobasic, potassium pyrophosphate, langbeinite, potash, and a potassium chloride/magnesium chloride mix), which were tested with the addition of formalin in most of the trials.

The treatment observed to be the most effective at killing 100% of veligers within the 8-hour time frame was a 4-hour treatment of 1000 mg/L potassium pyrophosphate followed by a 2-hour treatment of 25 mg/L formalin. In acute toxicity tests exposing juvenile bonytail to the potassium pyrophosphate treatment, no mortalities were observed. Further

testing is required before considering the efficacy of this treatment in controlling quagga mussel veligers.

The trials with the biological control agent *Pseudomonas fluorescens* (Pf-CL145A SDP Zequanox) were not successful because the product settled on the bottom of the test wells and was not taken up by the filter feeding veligers.

FY13 Activities: Closed in FY12.

Proposed FY14 Activities: Closed in FY12.

Pertinent Reports: The scope of work is available upon request. Annual reports from each year will be posted to the LCR MSCP website.