

Work Task C65: Evaluation of Immediate Post-Stocking Survival of Razorback Suckers and Bonytail

FY16 Estimate	FY16 Actual Obligations	Cumulative Accomplishment Through FY16	FY17 Approved Estimate	FY18 Proposed Estimate	FY19 Proposed Estimate	FY20 Proposed Estimate
\$120,000	\$99,329.26	\$105,056.43	\$120,000	\$120,000	\$0	\$0

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Start Date: FY15

Expected Duration: FY18

Long-Term Goal: To maintain an effective LCR MSCP Fish Augmentation Program

Conservation Measures: BONY3, BONY4, BONY5, RASU3, RASU4, and RASU6

Location: Reaches 2–5

Purpose: To identify the most important sources of immediate post-stocking mortality and to inform managers of how to best target and prioritize solutions

Connections with Other Work Tasks (Past and Future): This work task is related to Work Tasks B2, B3, B4, C10 (closed), C11 (closed), C25, C46 (closed), and C61. Preliminary planning, acquisition of materials, and study design development occurred in FY14 with funds from Work Task G3. In FY16, documentation of soft release experiments was moved to Work Task C61. Because soft release research is essentially a type of stocking treatment and aims to assess long-term survival through recontact probabilities, it is more appropriately covered under Work Task C61.

Project Description: Observations from past stocking events have indicated relatively high and immediate post-stocking mortality of razorback suckers (*Xyrauchen texanus*) and bonytail (*Gila elegans*). This pattern appears more commonly in backwater situations and occurs even in instances where no or low numbers of predatory fishes are present and where water quality parameters should not be a source of mortality. Transport and handling stress and predation by piscivorous birds have been suspected as causes of this low survival. Only anecdotal evidence exists to support the speculation that piscivorous birds are the

major cause of this mortality, and although handling and transport stress have been measured for stocked fishes, little evidence exists that connects this stress to actual latent mortality.

This work task builds directly on the knowledge gained from Work Task C46 (closed) and takes the next step from observing stress indicators in stocked fishes to investigating how they translates into actual latent post-stocking mortality. This work may involve holding a subset of stocked fishes in a protected area for observation and recording survival rates after 24, 48, and 72 hours. Longer durations may also be explored if deemed necessary. A subsample of these fishes may also have their blood tested for levels of stress-indicating compounds.

In addition, a bioenergetics model of piscivorous bird predation will be further developed and tested, and observational studies may be employed to help calibrate the model. These studies may include performing counts of confirmed feeding of piscivorous birds on stocked razorback suckers and bonytail. This model is intended to help inform managers of the relative pressure that bird predation may be having on stocked native fishes.

Data collected during this study will be used to assess the effect of stocking treatments relative to stress-related mortality, bird predation, or other factors that may be accounting for immediate post-stocking mortality and will allow managers to better prioritize and target solutions, like those being tested under Work Task C61, or find new ways to improve survival of stocked fishes by identifying what factors are the greatest sources of immediate mortality.

Previous Activities: This was a new start in FY15. Previous activities have been conducted under Work Task G3 and included the development of a protocol and study plan to assess latent mortality of stocked fishes. The development of a bioenergetics model was initiated in FY14. The purpose of the model was to suggest the potential pressure that available piscivorous birds could exert on stocked fishes.

Latent mortality within the first 72 hours following stocking of razorback suckers in Reach 2 was evaluated. No mortality was observed in the first 72 hours of stocking within the subsample of fish that was held at the stocking location.

In FY15, preliminary efforts were initiated under Work Task G3 to document bird predation on native fishes using remote passive integrated transponder (PIT) tag scanners. Scanning was initiated in Laughlin Lagoon following a bonytail release in September 2015. Scanners were deployed on the tops of poles out of the water within the stocking area where cormorants (*Phalacrocorax auritus*) were

regularly observed. Game cameras were attached to the scanners to document bird usage and to correlate any PIT tag contacts with a particular species of bird. Two PIT tags were detected on multiple scanners within 24 hours post-release, and photo corroboration confirmed that the fishes were consumed by cormorants. Additional scanning beneath the known roost sites in the lagoon documented 23 stationary tags that are assumed to be from deceased fishes. These tags were from fishes which had been released throughout the LCR MSCP planning area, and some were from fishes released as early as 2003.

The energy content (measured in calories) of razorback suckers and bonytail was planned to be collected and assessed in FY15; however, specialized equipment was not available.

FY16 Accomplishments: Scanning of known bird roosts immediately following stocking events continued in FY16. Continuous avian scanning for 10 days following a December 2015 release of bonytail resulted in the detection of 24 tags, which was 2.53% of the stocked fishes. Scanning following the May release of bonytail detected seven tags (1%) consumed by avian predators. Bird activity was noticeably different during the May trial due to local temperatures. Scanning in combination with game cameras from September through May confirmed predation by three species: osprey (*Pandion haliaetus*), cormorant, and great blue heron (*Ardea herodias*). This study confirms that bird predation on stocked fishes is occurring. Although the percentage of confirmed initial post-stocking predation appears low, sampling efforts are likely underrepresenting bird predation mortality. The bird roost scanners are limited in number and can only detect tags in birds that recently consumed fishes and who landed on the roost scanners during that period. Evidence of bird predation on fishes from previously releases (roost-scanned PIT tags) suggests that bird predation may be continuous on stocked fishes. Over time, these small percent of mortalities attributed to bird predation could lead to a substantially larger number of predated fishes. Additional longer-term scanning efforts will be necessary to suggest if continuous bird predation is occurring. These data will also help inform a bioenergetics model that will provide a more quantitative assessment of the potential magnitude and variability of bird predation on stocked fishes. A study plan was completed and includes post-release bird scanning directed at refining the parameters needed for bioenergetics modeling.

Latent mortality trials were continued in FY16 with a modification to the original study protocol for simplified data analyses and to be consistent with the current literature's critical stress response period. The latent mortality holding period was reduced to three replicates for one 48-hour time period. Three trials were conducted in FY16, and the results are presented in table 1.

Table 1.—Latent Mortality Results – Date, Species, Rearing Origin, Stocking Location, Number of Test Fish, and Number of Mortalities After 48 Hours of Holding (Post-Stocking) in FY16

Date	Species	Rearing Origin	Stocking Location	Number of fish tested	Number of mortalities
4/30/2016	Razorback sucker	Bubbling Ponds Fish Hatchery	Park Moabi	36	6 ¹
05/19/2016	Bonytail	Southwestern Native Aquatic Resources and Recovery Center in Dexter, New Mexico	Laughlin Lagoon	28	0 ²
12/07/16	Bonytail	Achii Hanyo Native Fish Rearing Facility	Laughlin Lagoon	24	0

¹ The condition of these fish was noted to be poor at the time of harvest, so these mortalities may not be attributable to transport or stocking stress; two mortalities were recorded at the hatchery, and one was recorded during transit to the stocking location.

² Eight fish escaped from one of the net pens during this trial. These fish were not counted as mortalities, but it is unknown how long they were held in the net pen.

FY17 Activities: Additional bird predation trials have been initiated in order to continue to refine the bioenergetics model. This work will accompany several native fish stocking events and primarily those scheduled for the Imperial Ponds Conservation Area.

Latent mortality trials will continue in FY17 concurrent with fish stocking events whenever possible. The locations will be determined based on local conditions and species of fishes stocked.

Proposed FY18 Activities: Avian predation work will continue as needed in order to complete the bioenergetics model. Paired cohorts of soft releases will continue for the third year, and data will be analyzed to determine if there are any differences in survival.

Based on results from previous years, latent mortality trials may continue in FY18 concurrent with fish stocking events whenever possible. The locations will be determined based on local conditions and species of fishes stocked. A summary report of these results will be provided at the end FY18.

This work task will be closed in FY18.

Pertinent Reports: N/A