

## Hot Springs Canyon Fish and Amphibian Monitoring, 2014



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Submitted to

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Blanket Purchase Agreement R13PA32006

October 27, 2014

## Summary

Hot Springs Canyon was visited on October 16, 2014 to monitor fishes at the site of the fish barrier constructed by Reclamation in autumn-winter 2010. Fishes were sampled by backpack electroshocker from two, 100-m fixed sites and opportunistically by shocker and minnow traps above and below the barrier. Native longfin dace *Agosia chrysogaster* and lowland leopard frog *Lithobates yavapaiensis* were the only vertebrate aquatic species collected; a mummified non-native bullfrog *Lithobates catesbeianus* also was found. Stream conditions near the barrier were similar to those observed during prior site visits in autumn 2011-2013 -- the channel above the barrier was at the level of the structure, and a persistent, deep, plunge pool was immediately below the barrier. Wire gabion baskets were exposed at the downstream base of the barrier apron on both sides of the channel, but the barrier otherwise appeared intact and undamaged.

## Introduction

Hot Springs Canyon is a tributary to San Pedro River that drains the western Winchester and extreme southern Galiuro mountains in Cochise and Graham counties, Arizona. The stream historically was occupied by longfin dace, speckled dace, Gila chub, Sonora sucker, and desert sucker (Silvey et al. 1984). To protect these and other, translocated native species from non-native fishes in the San Pedro River, in 2010 Reclamation constructed a fish barrier (cover photo) at the lower end of the perennial portion of the stream, approximately 9 km upstream from its mouth.

Reclamation commissioned Marsh & Associates to conduct annual, post-barrier construction fish monitoring. The primary purpose of this activity is to assess the presence of non-native fishes in vicinity of the barrier. Subordinate objectives are to document species abundances and structure of the fish community, assess reproductive success, and determine the presence and qualitative abundance of lowland leopard frog in the area. This report provides results of the fourth annual monitoring event, which was conducted in autumn 2014. Marsh et al. (2011, 2012, and 2013) summarized results from prior surveys in autumn 2011 through 2013.

## Methods

The constructed fish barrier is located at UTM 563912E 3578602N (NAD83) and is accessed with landowner consent by an approximately 5.7-km hike upstream from the Saguaro-Juniper parking area at the end of the lower Hot Springs Canyon road off Cascabel (Redington) Road. We visited the barrier site on October 16, 2014 and followed protocols and procedures described by Clarkson et al. (2011).

Two, 100-m monitoring sites were established. The upstream boundary of the lower (downstream) site was 30-m downstream from the barrier because the plunge pool below the barrier was too deep (> 1.5 m) to be effectively sampled by either backpack

electrofishing or seining. The barrier was the downstream boundary of the upper (upstream) fixed site. Sites were measured along the channel thalweg using a hand-held laser range finder, and up- and downstream boundaries plus transitions between mesohabitat types (riffle, run, or pool) were visually marked. Photographs were taken with views up- and downstream from the up- and downstream boundaries of upper and lower sites (total of eight photos). Fishes were captured from individual mesohabitats using a Smith-Root type 24-A backpack electrofisher (nominal settings I-5, 200 VDC; approximately 0.5 output amps). In addition, four (4), 0.32-cm mesh collapsible Promar minnow traps baited with Aquamax were deployed in the pool below the barrier. Species identity and number plus effort (shocking seconds real-time; minnow trap net hours) were recorded in field books and transferred to standard data forms.

After fixed site monitoring was concluded, the stream was further examined by backpack electroshocker for about 400 m upstream, and approximately 1.1 km downstream to near the end of flowing surface water. This effort focused on pools, deep riffles, and shear-zones where native Gila chub *Gila intermedia*, loach minnow *Tiaroga cobitis* or spikedace *Meda fulgida* (the latter two both stocked upstream) might occur, and on deep or unusual habitats that might harbor non-native fishes. The short (ca 5 m) reach between the downstream terminus of the plunge pool below the barrier and the upstream boundary of the lower fixed site also was electrofished.

The entire sampled area also was examined during fish sampling for leopard frog eggs, tadpoles and adults, and the condition and potential maintenance issues of the barrier structure were evaluated.

Field data were checked for completeness and any errors corrected prior to departing the site. Data were later entered into Reclamations' Access<sup>®</sup>-based electronic database, and all entries were verified.

## Results

The lower end of the stream was dry and surface water first was encountered approximately 1.4 km below the barrier. Adult fish, presumably longfin dace, were rare and in a variety of habitats widely scattered throughout the reach. No larval fishes were seen, and no longfin dace nests were present; the latter had been prominent on prior visits.

Substrates in riffles and runs were loose, gravel-cobble with few fines, and in pools were mud-sand and coarse-to-fine organic matter with sparse aquatic vegetation. Bedrock was exposed along the channel in many places and was prominent at the barrier site. Boulders were few and largely restricted to the mouths of side canyons and rock-falls.

There was a large, sand-bottomed plunge pool immediately below the barrier that measured approximately 25 m long, 5 m wide and > 1.5 m deep. The channel above the barrier was level with the top of the structure and appeared “normal” in every respect.

The downstream 100-m fixed site was comprised of three mesohabitats from which a total of five (5) longfin dace was captured in 246 seconds of electrofishing (Table 1). The up-stream 100-m fixed site was comprised of eight mesohabitats from which no fish were captured in 279 seconds of electrofishing (Table 1). No fish were captured during 47 seconds of qualitative electrofishing in the short reach between the downstream terminus of the plunge pool below the barrier and the upstream boundary of the lower fixed station. Promar minnow traps deployed in the plunge pool below the barrier each fished for 1.3 hours (total effort of 5.2 hours) and captured no fish.

**Table 1.** Results of fish monitoring within 100-m fixed sites above and below the constructed fish barrier on Hot Springs Canyon, Cochise Co., Arizona, October 16, 2014. Effort is seconds of real-time electrofishing, catch is number of longfin dace *Agosia chrysogaster*, and CPE is number of fish per unit effort.

Downstream (below barrier) site

Habitat No.	Habitat Type	Effort (s)	Catch	CPE
1	Riffle	81	5	0.062
2	Run	113	0	---
3	Riffle	52	0	---
Totals	---	146	5	0.034

Upstream (above barrier) site

Habitat No.	Habitat Type	Effort	Catch	CPE
1	Run	60	0	---
2	Pool	25	0	---
3	Riffle	14	0	---
4	Run	46	0	---
5	Riffle	59	0	---
6	Pool	37	0	---
7	Pool	21	0	---
8	Riffle	17	0	---
Totals	---	279	0	---

Upstream for about 400 m above the barrier an additional five (5) longfin dace were taken in 205 seconds of opportunistic sampling. No other fish species was detected there. This portion of the stream exhibited no obvious change in available mesohabitat types compared with the two, fixed sites and was not considered further.

Downstream for about 1.1 km below the barrier an additional six (6) longfin dace were taken in 280 seconds of opportunistic sampling. No other fish species was detected.

Multiple confirmed adult lowland leopard frog adults were captured or observed; most were seen downstream from the barrier. One frog egg mass (Fig. 1) was found associated with aquatic vegetation at the margin of the plunge pool below the barrier; species could not be reliably determined. No tadpoles were encountered, although this life stage could potentially be present at this time of year (Brennan and Holycross 2006). A single non-native bullfrog carcass (desiccated) was observed below the barrier but no live individuals were encountered. Several live bullfrog adults were observed near the barrier site during 2013 monitoring for the first time (Marsh and Marsh 2013).

The barrier structure was carefully inspected and photographed. Wire gabion on both sides immediately downstream of the apron was exposed (e.g., Fig. 2); this condition is unchanged from previous visits. The structure itself appeared intact and there was no evidence of cracking or other failure, or of erosion of material. However, access around the barrier now requires difficult scaling of the near-vertical adjacent bedrock walls or wading/swimming through the deep scour hole below the barrier. This is because the channel bed has been lowered by removal of stream sediments across the entire stream width between the walls immediately downstream of the barrier apron.

### **Acknowledgements**

R.W. Clarkson (Reclamation, Glendale, Arizona) and C.E. Ehlo (M&A) assisted with logistics and participated in the monitoring. Permission to park, camp, and access the barrier site in lower Hot Springs Canyon was provided by Saguaro-Juniper Corp., Tucson, Arizona. Collections were authorized by permits issued by Arizona Game and Fish Department and U.S. Fish and Wildlife Service (Region 2, Albuquerque, New Mexico).

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Fig. 1. Hot Springs Canyon, Cochise Co., Arizona. Amphibian egg mass found associated with aquatic vegetation in the plunge pool below the constructed fish barrier; October 16, 2014.



Fig. 2. Hot Springs Canyon, Cochise Co., Arizona, showing exposed wire gabion at the base of the constructed fish barrier apron on river left; October 16, 2014.