

Hot Springs Canyon Fish and Amphibian Monitoring



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Summary

Hot Springs Canyon was visited on October 28, 2013 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 above and below the barrier. Native longfin dace *Agosia chrysogaster* and lowland leopard frog *Lithobates yavapaiensis*, and non-native bullfrog *Lithobates catesbeianus* were the only vertebrate aquatic species encountered. Debris several meters above the stream was evidence of an earlier scouring flood but there was no obvious channel incision. Stream conditions near the barrier were similar to those observed during the last site visit in October 2012 -- the channel above the barrier was at the level of the structure, and a persistent, deep, 30-m long 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, 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. The barrier was completed in December 2010.

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 their reproductive success, and determine the presence and qualitative abundance of lowland leopard frog in the area. This report provides results of the third annual monitoring event, which was conducted in autumn 2013. Marsh et al. (2011, 2012) summarized results from prior surveys in autumn 2011 and 2012.

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 28, 2013 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) site. Sites were measured along the thalweg using a standard hip chain, 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) and species identity and number plus effort (shocking seconds real-time) were recorded in field books and transferred to standard data forms. After fixed site monitoring was concluded, the stream was further examined, concentrating riffles and shear-zone where native loach minnow *Tiaroga cobitis* or spikedace *Meda fulgida* (both stocked upstream) might occur, and on deep or unusual habitats that might harbor non-native fishes, and sampled opportunistically by backpack electroshocker for about 400 m upstream, and approximately 750 m downstream to near the end of flowing surface water. The entire barrier area was examined during 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®-based electronic database, and all entries were verified.

Results

The lower end of the stream was dry and surface water first was encountered approximately 1.2 km below the barrier. Adult and larval fish, presumably longfin dace, were rare and in a variety habitats throughout the reach. Longfin dace nests were present, few in number, and found sporadically along the reach and upstream (Fig. 1).

Substrates in riffles and runs were loose, gravel-cobble with few fines, and in pools were mud-sand and coarse-to-fine organic matter. 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.

Debris high in the riparian vegetation was evidence of scouring flood flow of unknown but substantial magnitude since October 2012 when we last visited the area or prior to that time. 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 (Fig. 2). There was no indication that the channel downstream was incised as had been observed in October 2011 and October 2012 but not present in April 2011. The channel above the barrier was level with the top of the structure and appeared "normal" in every respect.

The downstream 100-m site was comprised of two mesohabitats from which a total of one (1) longfin dace was captured in 268 seconds of electrofishing (Table 1). The upstream 100-m site was comprised of six mesohabitats from which 8 longfin dace were captured in 333 seconds of electrofishing (Table 1). No other fish species was detected within the fixed sites.

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 28, 2013. 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	243	1	0.004
2	Pool	25	0	---
Totals	---	268	1	0.004

Upstream (above barrier) site

Habitat No.	Habitat Type	Effort	Catch	CPE
1	Pool	111	3	0.027
2	Riffle	21	0	---
3	Run	48	0	---
4	Riffle	34	0	---
5	Pool	70	5	0.071
6	Riffle	49	0	---
Totals	---	333	8	0.024

Upstream for about 400 m above the barrier an additional 18 longfin dace were taken in 269 seconds of opportunistic sampling. No other fish species was detected. This portion of the stream exhibited no change in available mesohabitat types compared with the two, fixed sites and was not considered further.

Multiple confirmed and perhaps two dozen unconfirmed adult lowland leopard frog adults were captured or observed; most were downstream from the barrier. No egg masses or tadpoles were encountered, although these life stages both could potentially be present at this time of year (Brennan and Holycross 2006). Non-native bullfrog was encountered in relatively low numbers above and below the barrier. Both amphibian species were photo-vouchered (Fig. 3)

The barrier structure was carefully inspected and photographed. Wire gabion on both sides immediately downstream of the apron was exposed (e.g., Fig. 4); this condition is unchanged from October 2011 and October 2012. It is unknown if this exposure also represents a maintenance issue. 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.

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Fig. 1. Hot Springs Canyon, Cochise Co., Arizona, showing longfin dace *Agosia chrysogaster* nests upstream from the constructed fish barrier; October 28, 2013.



Fig. 2. Hot Springs Canyon, Cochise Co., Arizona, showing persistent pool habitat immediately downstream of the constructed fish barrier. Photo taken from top of barrier, October 28, 2013.



Fig. 3. Hot Springs Canyon, Cochise Co., Arizona, native lowland leopard frog (above) and non-native bullfrog (below); October 28, 2013.



Fig. 4. Hot Springs Canyon, Cochise Co., Arizona, showing exposed wire gabion at the base of the constructed fish barrier apron on river left; October 28, 2013.