

Hot Springs Canyon Fish and Amphibian Monitoring



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Summary

Hot Springs Canyon was visited on October 11, 2012 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*, Gila chub *Gila intermedia*, and lowland leopard frog *Lithobates yavapaiensis* were the only aquatic species encountered. Debris several meters above the stream was evidence of an earlier scouring flood and the channel was incised 0.2 to 1 m or more for several hundred meters downstream from the barrier. Stream conditions near the barrier were as observed during the last site visit in October 2012 - the stream channel above the barrier was at the level of the structure, and a 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 species and other natives that are being translocated from non-native fishes in the San Pedro River, Reclamation constructed a fish barrier (cover photo) at the lower end 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 the species abundance and structure of the fish community, assess their reproductive success, and determine the presence and abundance of lowland leopard frog in the area. This report provides results of the second monitoring event, which was conducted in autumn 2012. Marsh et al. (2011) summarized results from autumn 2011.

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 11, 2012 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, pool) were marked with colored flags. 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 0.4 output amps) and species identity and number plus effort (shocking seconds real-time) were recorded onto standard data forms. After fixed site monitoring was concluded, the stream was further examined, concentrating on deep or unusual habitats that might harbor non-native or rare fishes, and sampled opportunistically by backpack electroshocker for about 400 m upstream, and downstream approximately 750 m to 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 forms 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 0.75 km below the barrier. Adult, post-larval, and larval fish, presumably longfin dace, were seen in a variety habitats throughout the reach, few in numbers initially and increasing upstream toward the barrier. 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, and boulders were strewn about at side-canyon mouths and rock-fall sites.

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), and the channel downstream was incised 0.2 to 1-m or more for at least 100-m, both conditions present a year earlier in October 2011 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 three mesohabitats from which a total of 56 longfin dace was captured in 418 seconds of electrofishing (Table 1). The upstream 100-m site was comprised of seven mesohabitats from which 82 longfin dace were captured in 409 seconds of electrofishing (Table 1). No other fish species was detected within the fixed sites.

Table 1. Results of fish monitoring within two, 100-m fixed sites above and below the constructed fish barrier on Hot Springs Canyon, Cochise Co., Arizona, October 11, 2012. Effort is seconds 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	97	20	---
2	Run	173	10	---
3	Riffle	148	26	---
Totals	---	418	56	0.135

Upstream (above barrier) site

Habitat No.	Habitat Type	Effort	Catch	CPE
1	Run	112	46	---
2	Riffle	23	4	---
3	Run	89	5	---
4	Riffle	40	5	---
5	Pool	59	6	---
6	Riffle	58	2	---
7	Run	28	14	---
Totals	---	409	82	0.200

Upstream for about 400 m from the fixed site above the barrier 17 longfin dace plus one, age 1+ Gila chub (Fig. 3) were taken in 26 seconds of opportunistic sampling. No other fish species was detected. The Gila chub was captured from a plunge pool at the base of a small cascade. This portion of the stream otherwise exhibited no change in available mesohabitat types compared with the two, fixed sites and was not considered further.

One confirmed and three unconfirmed adult lowland leopard frog adults were observed. No egg masses or tadpoles were encountered, although these life stages all could potential be present at this time of year (Brennan and Holycross 2006). One adult canyon tree frog *Hyla arenicolor* was encountered in the near-stream riparian.

The barrier structure was carefully inspected and photographed. Wire gabion on both sides immediately downstream of the apron was exposed (e.g., Fig. 4), representing a

potential hazard to hikers because of sharp wire projections; this condition is unchanged from October 2011. 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.

Acknowledgements

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Literature Cited

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Fig. 1. Hot Springs Canyon, Cochise Co., Arizona, showing longfin dace *Agosia chrysogaster* nets upstream from the constructed fish barrier; October 11, 2012.



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 11, 2012.



Fig. 4. Hot Springs Canyon, Cochise Co., Arizona, Gila chub *Gila intermedia* from a plunge pool below a small cascade upstream from the fish barrier; October 11, 2012.



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 11, 2012.