

## Barrier Monitoring 2020: Spring Creek



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## Background

Native fishes are declining throughout Arizona, primarily due to deleterious interactions with nonnative aquatic species. One tool used to curtail the decline is the construction of physical stream barriers to impede upstream migration of nonnative fish species. The Bureau of Reclamation (Reclamation) has constructed several barriers on stream sites to protect and conserve endangered and candidate/proposed species including: Loach Minnow *Tiaroga cobitis*, Spikedace *Meda fulgida*, Roundtail Chub *Gila Robusta*, Gila Topminnow *Poeciliopsis occidentalis*, and Gila Chub *Gila Intermedia*, and other aquatic wildlife including amphibians and reptiles. Reclamation is committed to monitoring stream barriers constructed in accordance with requirements related to the Central Arizona Project for a minimum of five years post-construction. The primary purpose of the monitoring is to evaluate the effectiveness of the barriers. Secondarily, monitoring will also provide information on the fish and aquatic community of each stream. Funding was provided to the Arizona Fish and Wildlife Conservation Office to monitor barrier effectiveness over a 5 year period. This report details the third year of monitoring on the Spring Creek Barrier. The Spring Creek Barrier was constructed in 2015. Nonnative Green Sunfish *Lepomis cyanellus* were eradicated from the stream in 2016. The purpose of the barrier is to prevent reinvasion of nonnative fish into Spring Creek providing nonnative-free habitat for native Gila Chub, Spikedace, and Gila Topminnow.

## Methodology

Monitoring of Spring Creek barrier occurred on September 9, 2020. Sampling was conducted with a Smith-Root model 12 backpack electrofisher, baited Promar collapsible hoop nets (30.5 by 30.5 by 61 cm), and baited Promar collapsible minnow traps (25.5 by 25.5 by 45.7 cm). Methods roughly followed Marsh (2014), in which 200 m upstream and downstream of the barrier was monitored. However, due to private land boundaries, only 120 m downstream of the barrier could be accessed. Mesohabitat length was quantified for each sampling reach. During electrofishing, total length (TL) of the first 50 fish in each reach were measured to the nearest mm, fish were enumerated after that. Fish captured during trapping were classified into size classes: small bodied fish (<30 or >30-mm TL) and large bodied fish (<50, 50-100, or >100-mm TL). Presence of other native aquatic wildlife such as Lowland Leopard Frog *Lithobates yavapaiensis*, Sonora Mud Turtle *Kinosternon sonoriense*, or Mexican Garter Snake *Thamnophis eques* were also noted.

## Results

### *Downstream efforts*

Mesohabitat downstream of the barrier was compromised of approximately 55 meter of run mixed with pool habitat and 84 m of pool habitat located between a diversion structure and immediately downstream of the barrier. Efforts totaled 1,115 seconds of electrofishing and 23.6 trap hours with a total of 360 individuals captured. Captures were comprised of all native

species with Gila Chub being the most common species (Table 1 and 2). There were four nonnative Redeye Bass *Micropterus coosae* captured below the diversion dam. One Sonora Mud Turtle was captured in a trapped and released alive. Nonnative Virile Crayfish *Faxonius virilus* were captured in traps and observed during electrofishing.

#### *Upstream efforts*

Mesohabitat upstream of the barrier was comprised of approximately 125 m of pool habitat, 50 m of run habitat, and 25 m of riffle habitat. Efforts totaled 1,389 seconds of electrofishing and 17.4 trap minutes with a total of 291 individuals captured. Gila Chub and Desert Sucker were the most common species captured (Table 1 and 2). The only nonnative species captured above the barrier was Virile Crayfish; no nonnative fish were detected above the barrier.

**Table 1.** Summary of fish captured in electrofishing efforts on Spring Creek, AZ. Site refers to downstream and upstream of the barrier. CPUE refers to fish per second of Electrofishing. Total seconds electrofishing were 1,115 and 1,389 for downstream and upstream, respectively. Numbers and parentheses represent the minimum and maximum total lengths (TL) for each species.

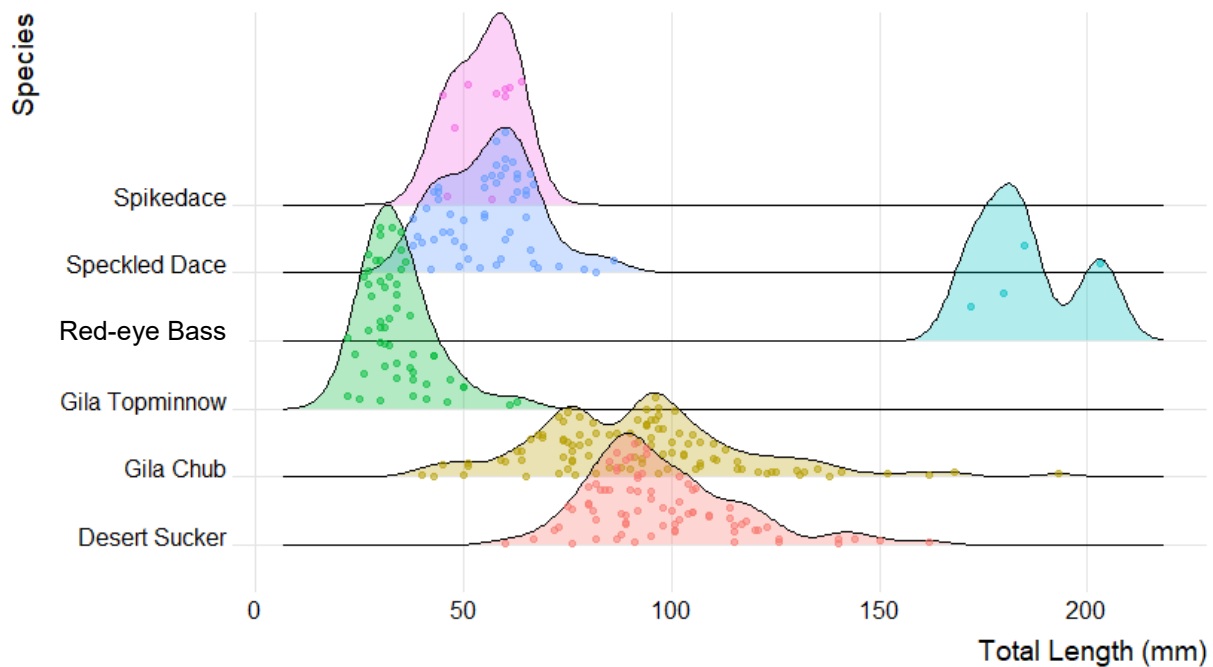
<b>Site</b>	<b>Species</b>	<b>Number Collected</b>	<b>CPUE (fish/sec)</b>	<b>Mean TL (range)</b>
<b>Downstream</b>	Gila Chub	115	0.10	94 (59-162)
	Gila Topminnow	28	0.03	31 (22-50)
	Speckled Dace	31	0.03	55 (38-86)
	Desert Sucker	26	0.02	112 (60-150)
	Longfin Dace	1	0.00	71
	Spikedace	9	0.01	55 (45-64)
	Red-eye Bass	4	0.00	185 (172-203)
	<i>TOTAL</i>	<i>215</i>	<i>0.19</i>	
<b>Upstream</b>	Gila Chub	79	0.06	93 (40-193)
	Gila Topminnow	25	0.02	38 (24-63)
	Speckled Dace	23	0.02	58 (38-79)
	Desert Sucker	93	0.07	92 (67-162)
	Longfin Dace	1	0.00	48
	Spikedace	1	0.00	57
		<i>TOTAL</i>	<i>228</i>	<i>0.16</i>

**Table 2.** Summary of fish captured in trapping efforts on Spring Creek, AZ. Site refers to downstream and upstream of the barrier. CPUE refers to fish per hour of trapping. Total hours of trapping were 1,115 and 1,389 hours for downstream and upstream, respectively.

<b>Site</b>	<b>Species</b>	<b>Number Collected</b>	<b>CPUE</b>
<b>Downstream</b>	Gila Chub	191	8.14
	Gila Topminnow	5	0.21
	<i>TOTAL</i>	<i>209</i>	<i>8.86</i>
<b>Upstream</b>	Gila Chub	24	1.38
	Gila Topminnow	38	2.18
	Speckled Dace	1	0.06
	<i>TOTAL</i>	<i>63</i>	<i>3.62</i>

### *Population Structure*

Mean length of Gila Chub was 93 mm with the majority of individuals (79%) between 50 and 110 mm TL (Figure 1). Mean length of Gila Topminnow was 34 mm and the majority of individuals (77%) were >30 mm TL. Mean length of Desert Sucker was 99 mm with the majority of individuals (57%) between 50 and 100 mm TL (Figure 1). Mean length of Speckled Dace was 56 mm with all individuals >30 mm TL (Figure 1; Table 1; Table 2). Mean length of Spikedace was 55 mm with all individuals between 45 and 65 mm TL (Figure 1). The only nonnative fish species captured was Red-eye Bass with a mean total length of 185 mm (Table 1).



**Figure 1.** Length-frequency density plot for fish species captured in barrier monitoring efforts on Spring Creek, AZ. Each point represents one fish and the curves represent frequency distributions. \*Several Longfin Dace were also captured and not included in this graph.

## Discussion

More native fish, particularly endangered species, were captured in comparison to the previous year. Spikedace were encountered both above and below the barrier, but were all adult size suggesting that there is a lack of recruitment. In contrast, multiple size classes of Gila Topminnow were collected indicating successful recruitment. Monitoring this year continued to indicate a robust native fish assemblage

No nonnative fish were captured above the barrier during sampling indicating that the barrier is effective in preventing upstream movement of fish. However, nonnative Red-eye Bass were captured below the barrier. All individuals were adults and were not ripe at time of capture. Barrier monitoring will continue for the next three years to ensure the barrier remains effective against nonnative fish moving upstream from Oak Creek.

## **Acknowledgements**

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## **Literature Cited**

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