

## Barrier Monitoring 2020: West Fork Black River



Tiffany S Love-Chezem and Chase A Ehlo  
Arizona Fish and Wildlife Conservation Office  
U.S. Fish and Wildlife Service  
60911 HWY 95 Parker, AZ 85344



**Submitted to:**  
Bill Stewart  
Bureau of Reclamation  
Phoenix Area Office  
6150 W. Thunderbird Road, Glendale, AZ 85306

## 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 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*, Gila Topminnow *Poeciliopsis occidentalis*, Roundtail Chub *Gila Robusta*, 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. Secondly, 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 West Fork Black River barrier (WFB). Barrier monitoring was previously conducted in 2017 and 2019 (Ehlo 2017; Love-Chezem and Ehlo 2019) but not in 2018. Constructed in May 2016, the barrier on the WFB is located 0.6 kilometers above the confluence with the East Fork Black River. The purpose of the barrier is provide nonnative free habitat for native Apache Trout *Oncorhynchus apache* and Loach Minnow among other native species. The waters above the barrier have yet to be renovated of nonnative fish, but a baseline survey is important in establishing the fish community structure pre- and post-renovation both upstream and downstream of the barrier.

## Methodology

West Fork Black River annual monitoring was conducted August 18-19, 2020. Monitoring upstream and downstream of the barrier was conducted with a Smith-Root type 12 backpack electrofisher. Methods roughly followed Marsh (2014), in which 200 m upstream and downstream of the each barrier was sampled. Mesohabitat length was quantified for each sampling reach. Total length (TL) of the first 50 fish in each reach were measured to the nearest mm, fish were enumerated after that. All nonnative species and Roundtail Chub captured below the barrier had a 134.5 kHz Passive Integrated Transponder (PIT) tag inserted. All nonnative fish captured were scanned with a handheld scanner (BioMark HPRLite) Nonnative fish captured above the barrier were euthanized. Other aquatic wildlife was also noted.

In addition to the normal sampling, pool habitat was sampled downstream to the confluence with the Black River to increase the number of PIT tags deployed in the system.

## Results

### *Downstream efforts*

Habitat within the downstream site was primarily composed of runs with less than 1 m total of riffles interspersed. Near the upstream end of the site there were two pools separated by a short 10 m run. The lower pool was 1 m deep and 10 m long. The pool immediately below the barrier,

at the most upstream end of the site, was approximately 2 m deep and 30 m long. Electrofishing efforts totaled 4,291 seconds with a total of 3 Brown Trout *Salmo trutta*, 62 Speckled Dace, 18 Desert Sucker *Catostomus clarkii*, and 18 Roundtail Chub captured (Table 1). All native fish were measured and returned to the water. Brown Trout were measured, implanted with a PIT tag (if large enough and in good condition), and returned to the water. One Brown Trout was released before the PIT tag was read.

### *Upstream efforts*

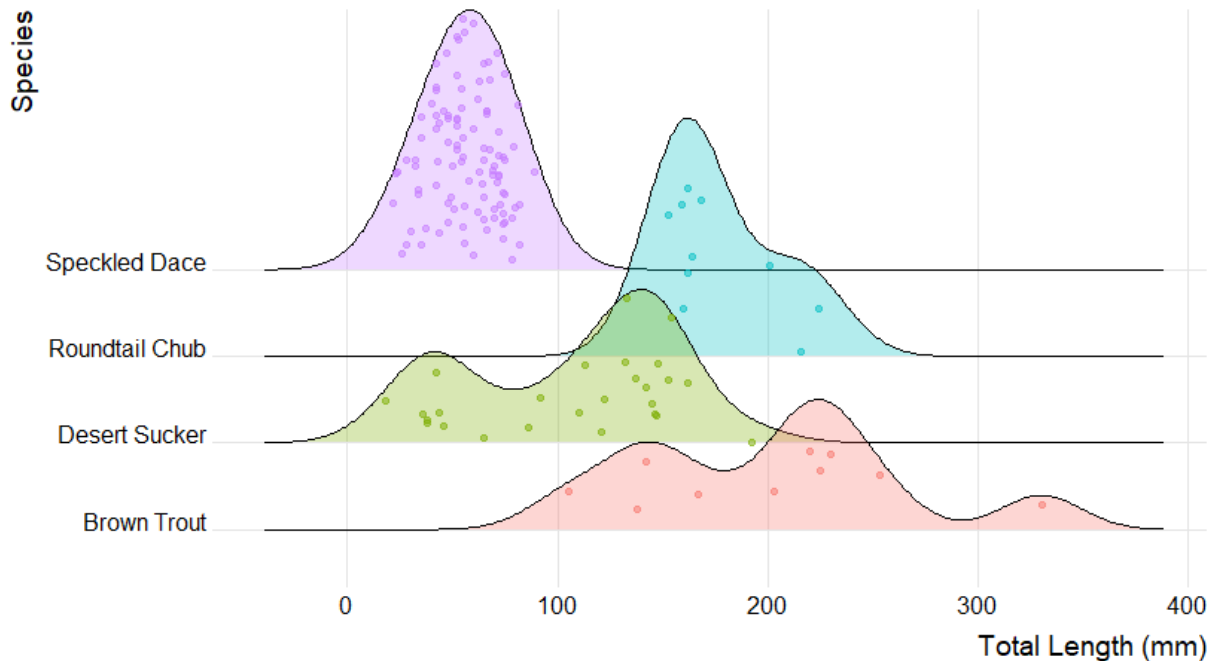
The 200 m upstream transect began at the top of the 100 m long pool immediately upstream of the barrier. The entire 200 m was comprised of run habitat. Electrofishing efforts totaled 1,905 seconds with a total of 2 Brown Trout, 202 Speckled Dace, and 8 Desert Sucker being captured (Table 1). All Brown Trout captured above the barrier were euthanized.

None of the Brown Trout captured upstream or downstream had PIT tags.

<b>Site</b>	<b>Species</b>	<b>Number Collected</b>	<b>CPUE (fish/sec)</b>	<b>Mean TL (range)</b>
<b>Downstream</b>	Desert Sucker	18	0.004	135 (86-192)
	Speckled Dace	62	0.014	64 (30-89)
	Roundtail Chub	18	0.001	163 (159-168)
	Brown Trout	3	0.004	190 (138-230)
	Total	87	0.020	-
<b>Upstream</b>	Desert Sucker	8	0.004	41 (18-65)
	Speckled Dace	202	0.1060	49 (22-78)
	Brown Trout	2	0.0011	163 (105-220)
	Total	212	0.1111	-

### *Population Structure*

Mean length of Roundtail Chub was 163 mm with the majority of individuals (75%) between 100 and 200 mm TL (Figure 1). Mean length of Desert Sucker was 106 mm, with the upstream site having a mean total length of 41 mm vs 135 mm for the downstream site (Figure 1; Table 1). A similar trend was seen with Speckled Dace with the average lengths being 64 mm and 49 mm for the downstream and upstream sites, respectively (Table 1). Brown Trout had a mean length of 179 mm, representing three size classes: 33% below 170 mm, 58% between 170 mm and 275 mm, and 8% above 300 mm (Figure 1).



**Figure 1.** Length-frequency histogram of fish species captured during barrier monitoring on West Fork Black River, AZ. The dots represent individuals and the curves represent frequency distributions. \*One Rainbow Trout was captured but is not included in this graph.

### Discussion

In 2020, catch rates were lower downstream and higher upstream as compared to 2019. Speckled Dace remained the most common species captured in both sites, and account for the increased catch rate in the upstream site. All mean lengths decreased, except for Speckled Dace and Roundtail Chub below the barrier. Fish above the barrier were also notably smaller than fish captured below the barrier. For the second year, Roundtail Chub capture rates increased below the barrier. Virile Crayfish *Faxonius virilis* were present in low numbers both above and below the barrier.

No tagged Brown Trout were captured above the barrier. However, only 40 Brown Trout were tagged in previous sampling events, and no tagged Brown Trout have been recaptured alive during these sampling events. Only five Brown Trout were captured during sampling this year; as a result, supplementary sites were sampled below the barrier to increase the number of tags in the system. An additional eight Brown Trout were captured and tagged in supplemental shocking below the survey site. In addition, all Roundtail Chub captured below the barrier were tagged. A tagged fish captured above the barrier would indicate the barrier is ineffective at preventing upstream movement of fish. Contractually, two more years of monitoring are required for West Fork Black barrier, but more may be needed.

**Appendix. List of PIT Tags inserted into Brown Trout *Salmo trutta* below the West Fork Black River Barrier.**

<b>Species</b>	<b>TL (mm)</b>	<b>PIT Tag Number</b>
<b>2017</b>		
Brown Trout	262	3DD.003C0228C0
Brown Trout	282	3DD.003C0228D9
Brown Trout	260	3DD.003C0228C3
Brown Trout	233	3DD.003C0228BC
Brown Trout	208	3DD.003C022895
Brown Trout	171	3DD.003C0228C1
Brown Trout	202	3DD.003C0228D6
Brown Trout	204	3DD.003C0228A7
Brown Trout	180	3DD.003C02288E
Brown Trout	180	3DD.003C022885
Brown Trout	204	3DD.003C02289A
Brown Trout	120	3DD.003C0228CF
Brown Trout	178	3DD.003C0228B8
Brown Trout	112	3DD.003C0228C9
Brown Trout	115	3DD.003C0228E0
Brown Trout	137	3DD.003C0228BD
Brown Trout	120	3DD.003C0228BA
Brown Trout	305	3DD.003C0228CB
Brown Trout	385	3DD.003C0228B2
Brown Trout	208	3DD.003C0228AB
Brown Trout	288	3DD.003C0228D5
Brown Trout	260	3DD.003C022886
Brown Trout	410	3DD.003C0228B9
Brown Trout	256	3DD.003C0228B5
<b>2019</b>		
Brown Trout	365	3DD.003C0228F2
Brown Trout	233	3DD.003C0228F4
Brown Trout	474	3DD.003C0228F5
Brown Trout	193	3DD.003C02290B
Brown Trout	282	3DD.003C02291F
Brown Trout	178	3DD.003C022927
Brown Trout	172	3DD.003C02292A
Brown Trout	156	3DD.003C02292C
Brown Trout	217	3DD.003C022930
Brown Trout	142	3DD.003C022936
Brown Trout	361	3DD.003C022938
Brown Trout	169	3DD.003C02293C

Brown Trout	175	3DD.003C022943
Brown Trout	455	3DD.003C022949
Brown Trout	202	3DD.003C02294A
Brown Trout	310	3DD.003C02293B
Brown Trout	158	Not Scanned
<b>2020</b>		
Roundtail Chub	160	3DD.003C0228F0
Roundtail Chub	162	3DD.003C0228FA
Roundtail Chub	164	3DD.003C0228FB
Roundtail Chub	224	3DD.003C022905
Roundtail Chub	162	3DD.003C022913
Roundtail Chub	201	3DD.003C022920
Roundtail Chub	153	3DD.003C02292B
Roundtail Chub	162	3DD.003C02292E
Roundtail Chub	139	3DD.003C022937
Roundtail Chub	159	3DD.003C022942
Roundtail Chub	216	3DD.003C022947
Rainbow Trout	303	3DD.003C022935
Brown Trout	212	3DD.003C02226
Brown Trout	230	3DD.003C0228EA
Brown Trout	253	3DD.003C0228EF
Brown Trout	330	3DD.003C0228F6
Brown Trout	167	3DD.003C0228F7
Brown Trout	203	3DD.003C0228F8
Brown Trout	138	3DD.003C022900
Brown Trout	142	3DD.003C022904
Brown Trout	264	3DD.003C022906
Brown Trout	225	3DD.003C022940

## **Literature Cited**

- Marsh, P.C., B.R. Kesner & J.C.G. Marsh. 2014. Blue River fish barrier monitoring. Report, Reclamation Order No. R12PB32035 under BPA No. R10PA32064, Marsh & Associates, Tempe, Arizona. 14 pages.
- Ehlo C.A. 2017. West Fork Black River Barrier Monitoring 2017. Report, Reclamation Order No. R12PB32035 under BPA No. R10PA32064. United State Fish and Wildlife Service, Parker, Arizona. 5 pages.
- Love-Chezem T.S. & C.A. Ehlo. 2019. West Fork Black River Barrier Monitoring 2019. Report, Reclamation Order No. R12PB32035 under BPA No. R10PA32064. United State Fish and Wildlife Service, Parker, Arizona. 5 pages.