

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

FY 2020 ANNUAL REPORT

PROJECT: 140

Project Title:

Evaluating effects of non-native predator removal on native fishes in the Yampa River, Colorado

Bureau of Reclamation Agreement Number:

R19AP00058

Project/Grant Period:

Start date: 10/01/2018

End date: 09/30/2023

Reporting period end date: 09/30/2020

Is this the final report? No

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Abstract:

Control actions for several non-native fish predators have been implemented in rivers of the Upper Colorado River Basin. Understanding the response of the native fish community to predator removal is needed to determine if removal programs are having the desired effect. The objective of this project is to document fish community changes in response to predaceous fish removals in a reach of the Yampa River, Colorado. Native species richness increased during the removal period compared to early sampling (2003-2004) conducted in this project, as has native species frequency and abundance. Increases were particularly notable in higher flow years when water temperatures were cooler. We provide summary data for 2020 here but a more complete version will be provided when data analyses are more complete. Data will also be incorporated into a comprehensive summary which will be completed in 2021.

Study Schedule:

Ongoing as needed, agreement extends through September 2023.

Relationship to RIPRAP:

REDUCE NEGATIVE IMPACTS OF NONNATIVE FISHES AND SPORTFISH MANAGEMENT ACTIVITIES (NONNATIVE AND SPORTFISH MANAGEMENT)

Green River Action Plan: Yampa and Little Snake Rivers

III.A.1. Implement Yampa Basin aquatic wildlife management plan to develop nonnative fish control programs in reaches of the Yampa River occupied by endangered fishes. Each control activity will be evaluated for effectiveness and then continued as needed.

Green River Action Plan: Mainstem

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III. Reduce negative impacts of nonnative fishes and sportfish management activities (Nonnative and sportfish management)

III.A.2.c Evaluate the effectiveness (e.g., nonnative and native fish response) and develop and implement an integrated, viable active control program.

Accomplishment of FY 2020 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

In 2020, flows were relatively low in the study area and water temperatures warmed early in the year (Figure 1). The 2020 flows and water temperatures were more similar to the very low flow year 2007, than the high and cold flow year of 2011. A typical fish response in a warm and relatively low flow year is reduced native fish abundance and corresponding higher smallmouth bass abundance, with especially higher smallmouth bass growth rates.

In 2020, we sampled 165 locations distributed among control (n = 46) and treatment (YOY removal reaches; n = 87) reaches in the Yampa River study area, as well as 32 samples from isolated pools. Because we only finished sampling in October this year, data have not been fully analyzed but will be summarized here and included in the comprehensive report where data for all years will be examined.

In all samples, we captured 50,980 fish. Native fishes were captured in each of the control and treatment reaches in 2020, as well as in isolated pool samples (Tables 1-3). Native species speckled dace, bluehead sucker, roundtail chub, mottled sculpin, flannelmouth sucker, and mountain whitefish, were captured, in order of highest to lowest abundance (n = 5,827 total fish). Speckled dace were, by far, the most abundant native fish taxon captured (n = 5,679), and were abundant in control and treatment reaches as well as in isolated pools. Similar to the high flow and cold year in 2011, and in 2019, native fish were relatively abundant in the Yampa River and comprised over 11% of all fish captured in all reaches. The relatively high native fish abundances we observed in 2020 are atypical for this relatively low flow and warm year.

Native fishes were particularly abundant in the control reach, comprising 25% of the fish community. Comparatively, smallmouth bass were only the 4th-most abundant species in the control reach (12.3%), which is considerably less than in most years when they are typically the dominant taxa. Native fishes were rarer in the treatment reach (7.6% of the total) and smallmouth bass was the most abundant taxa (29.8%). Although rare, captures of bluehead and flannelmouth suckers, and Roundtail chub were higher in treatment reach than in the control reach.

The juxtaposition of fish abundances in control and treatment reaches—lower native fish abundance in the treatment reach where bass were removed—does not meet expectations. On the other hand, it may be a reasonable expectation given the much higher abundance of bass in the treatment section. These issues deserve additional discussion in the future after the data are more fully analyzed and compared.

Native fishes were relatively rare in isolated pool samples, at only 4.6% of the total number captured. Smallmouth bass were similarly rare; all 429 bass were captured from a single isolated pool.

Additional future analyses will incorporate sampling effort, which may explain differences in species composition among control and treatment reaches. This is because more sampling occurred in the treatment reach than in the control reach.

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We also completed sampling in the White River in 2020 (Table 4), adding to data collected in 2018 and 2019. Smallmouth bass were relatively abundant in 2018, the year of a flushing flow from Kenney Reservoir, but declined slightly in 2019. Further apparent reductions in bass abundance in 2020 may have been due to altered habitat, where bass were observed escaping to a large and deep pool at the upstream portion of the site that could not be sampled efficiently. Smallmouth bass captured were relatively large with a mean length of 92 mm TL (64-117 mm TL).

Additional noteworthy observations:

Recommendations:

Complete summary of data in 2021 regarding the native fish response evaluation in a comprehensive report.

Continue sampling in 2021 and out years. The reduced level of effort employed in 2020 was effective. Sampling each year maintains the continuity of the data to capture fish response in a variety of flow and water temperature conditions as well as their response to predator removal

Project Status:

This project was completed with about 70% of the normal budget in 2020. This was accomplished by streamlining data collection, which was mainly collecting fewer measures of individual fish and sampling more treatment reach sites that are more accessible, so that more sites could be sampled.

Ongoing and on-track.

FY 2020 Budget Status

Funds Provided: \$67,515

Funds Expended: 67,515

Difference: 0

Percent of the FY 2020 work completed, and projected costs to complete: 85% completed, no new funds needed to complete

Recovery Program funds spent for publication charges: 0

Status of Data Submission

NA

Signed:

Principal Investigator: Kevin R. Bestgen

Date: 11 December 2020

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Table 1. Species composition of native and nonnative fishes captured in the Yampa River, 2020, in the control reach (no young smallmouth bass removed).

Species	# fish	Percent (%)
<i><u>Non-natives</u></i>		
Brown Trout	2	0.0
Brook Stickleback	188	1.4
Creek Chub	998	7.7
Fathead Minnow	1853	14.3
Green Sunfish	138	1.1
Iowa Darter	404	3.1
Lepomis Spp.	1	0.0
Northern Pike	2	0.0
Redside Shiner	9	0.1
Smallmouth Bass	1594	12.3
Sand Shiner	1761	13.6
White Sucker	2735	21.1
Total	9685	74.6
<i><u>Natives</u></i>		
Bluehead Sucker	1	0.0
Flannelmouth Sucker	3	0.0
Mottled Sculpin	7	0.1
Mountain Whitefish	4	0.0
Rountail Chub	10	0.1
Speckled Dace	3277	25.2
Total	3302	25.4

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Table 2. Species composition of native and nonnative fishes captured in the Yampa River, 2020, in the treatment reach (young smallmouth bass removed).

Species	# fish	Percent (%)
<i><u>Non-natives</u></i>		
Black bullhead	842	3.3
Brown Trout	1	0.0
Brook Stickleback	232	0.9
Common Carp	6	0.0
Creek Chub	1219	4.7
Fathead Minnow	1136	4.4
Green Sunfish	79	0.3
Iowa Darter	223	0.9
Northern Pike	1	0.0
Redside Shiner	21	0.1
Redside Shiner x Speckled Dace Hybrid	2	0.0
Smallmouth Bass	7701	29.8
Sand Shiner	6814	26.4
White Sucker x Bluehead Sucker Hybrid	2	0.0
White Sucker	5616	21.7
Total	23895	92.4
<i><u>Natives</u></i>		
Bluehead Sucker	29	0.1
Flannelmouth Sucker	7	0.0
Mottled Sculpin	7	0.0
Mountain Whitefish	0	0.0
Roundtail Chub	26	0.1
Speckled Dace	1895	7.3
Total	1964	7.6

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Table 3. Species composition of native and nonnative fishes captured in the Yampa River, 2020, in isolated pools.

Species	# fish	Percent(%)
<i>Non-natives</i>		
Black Bullhead	1	0.0
Brook Stickleback	338	2.8
Creek Chub	177	1.5
Fathead Minnow	4105	33.8
Green Sunfish	6	0.0
Iowa Darter	15	0.1
Redside Shiner	3	0.0
Smallmouth Bass	429	3.5
Sand Shiner	1397	11.5
White sucker x Bluehead Sucker Hybrid	2	0.0
White sucker x Flannelmouth Sucker Hybrid	1	0.0
White Sucker	5099	42.0
Total	11573	95.4
<i>Natives</i>		
Bluehead Sucker	37	0.3
Flannelmouth Sucker	1	0.0
Mottled Sculpin	2	0.0
Mountain Whitefish	0	0.0
Roundtail Chub	14	0.1
Speckled Dace	507	4.2
Total	561	4.6

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Table 4. Results for White River smallmouth bass sampling in 2018, 2019, and 2020. SMB = smallmouth bass, CSU = Colorado State University. The catch per unit effort data were from electric-seine sampling conducted just downstream of Kenney Reservoir, near Rangely, Colorado. The first two passes in 2018 bracket a flushing flow event (90 minutes, 1,100 ft³/sec) from Kenney Reservoir on 19 July.

2018

Pass	Sampling Period	Agency	Effort (hrs)	Number of SMB				CPUE (#fish/hr)			
				Juv	Sub-adult	Adult	All sizes	Juv	Sub-adult	Adult	All sizes
1	10-Jul	CSU	1.48	95	76	1	172	64.2	51.4	0.7	116.2
2	24-Jul	CSU	1.29	110	44	3	157	85.3	34.1	2.3	121.7
3	21-Aug	CSU	1.44	98	6	2	106	68.1	4.2	1.4	73.6
4	3-Oct	CSU	1.22	286	15	2	303	234.4	12.3	1.6	248.4
			5.43	589	141	8	738	108.5	26.0	1.5	135.9

2019

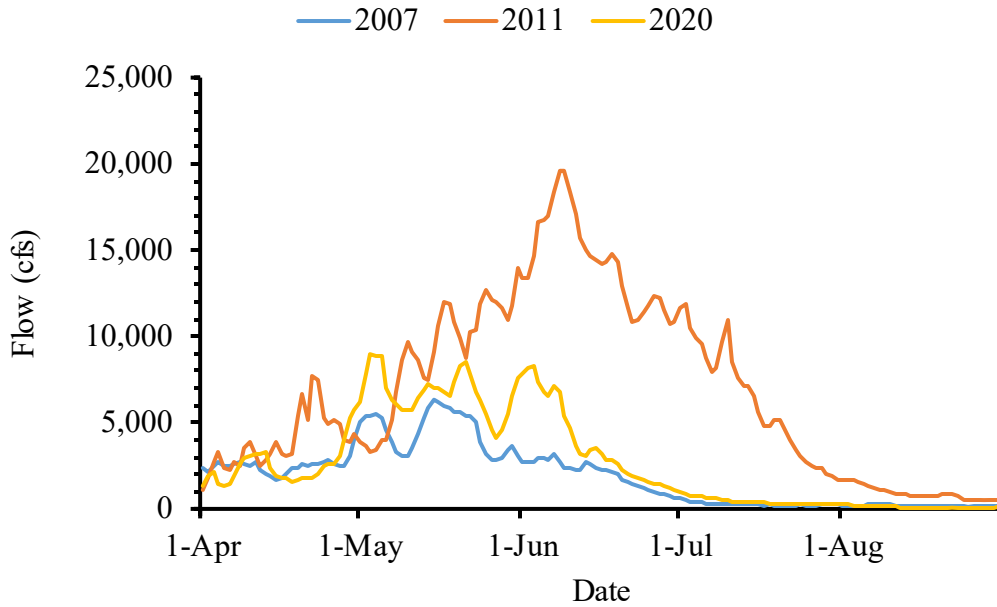
Pass	Sampling Period	Agency	Effort (hrs)	Number of SMB				CPUE (#fish/hr)			
				Juv	Sub-adult	Adult	All sizes	Juv	Sub-adult	Adult	All sizes
1	23-Aug	CSU	2.1	185	30	1	216	88.1	14.3	0.5	102.9

2020

Pass	Sampling Period	Agency	Effort (hrs)	Number of SMB				CPUE (#fish/hr)			
				Juv	Sub-adult	Adult	All sizes	Juv	Sub-adult	Adult	All sizes
1	9/29/2020	CSU	2.16	161	27	0	188	75	13	0	87

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A.



B.

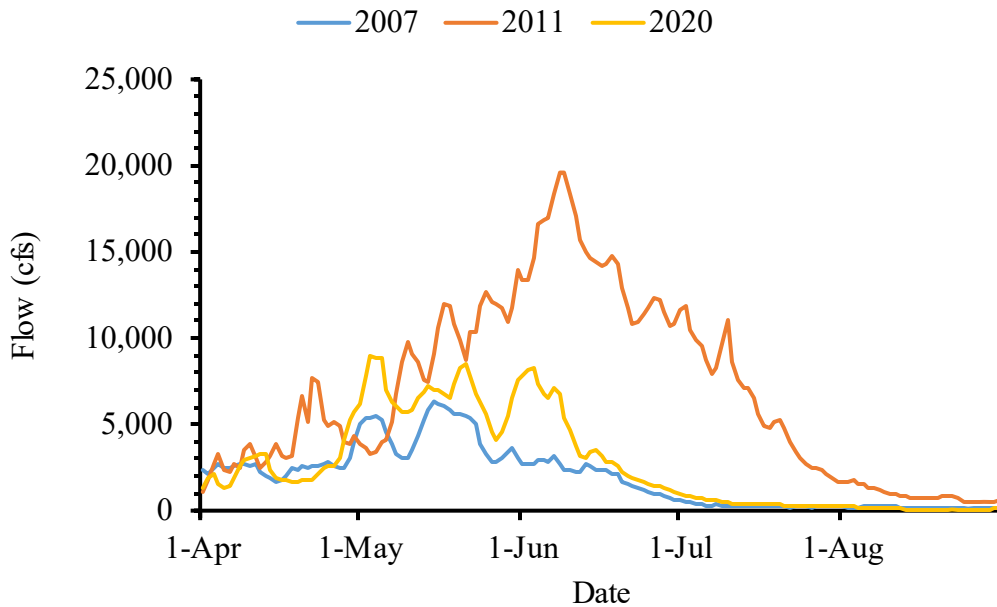


Figure 1. Flow (upper, Panel A) and water temperature (lower, Panel B) regimes for the Yampa River in 2020. A low flow and warm year (2007) and a high flow and cold year (2011) are shown for comparison.