

# UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

FY 2021 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: 09/30/2021

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 2021 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 2022.

**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.

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Green River Action Plan: Mainstem

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 2021 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:**

In 2021, flows were relatively low in the study area and water temperatures warmed early in the year (Figure 1). The 2021 flows and water temperatures were more similar to the very low flow year 2007, than the high and cold flow year of 2011, and were lower and warmer, respectively, than in 2020. 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 2021, we sampled 160 locations distributed among control (n = 59) and treatment (YOY smallmouth bass removal reaches; n = 107) reaches in the Yampa River study area, as well as 23 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 61,163 fish. Native fishes were captured in each of the control and treatment reaches in 2021, as well as in isolated pool samples (Tables 1-3). Native species speckled dace, bluehead sucker, roundtail chub, and mottled sculpin were captured, but unlike in 2020, flannelmouth sucker and mountain whitefish, were not. Speckled dace were, by far, the most abundant native fish taxon captured (n = 1,144), and were modestly abundant in the control reach (8.3% of all fishes) but comprised < 1% of all fishes captured in the treatment reach and in isolated pools. Unlike last year when native fishes were relatively abundant in the Yampa River and comprised over 11% of all fish captured in all reaches, in 2021 they comprised only 1.9% of all fishes captured. The relatively high native fish abundances we observed in 2020 are atypical for that relatively low flow and warm year; 2021 was more typical of the fish community under those conditions.

Native fishes were most abundant in the control reach, comprising 8.3% of the fish community. Smallmouth bass were the 2<sup>nd</sup>-most abundant species in the control reach (17.1%), but remained less than in most years when they are typically the dominant taxa; white sucker was 41.4% of the fish community. Native fishes were rarer in the treatment reach (0.9% of the total) and white sucker (38.5%), smallmouth bass (25.1%), and fathead minnow (15.7%) were the most abundant taxa. Bluehead sucker, mottled sculpin, and roundtail chub were very rare (6 total specimens), with the balance of native fishes being speckled dace. Unlike last year, in 2021 flannelmouth sucker were not captured.

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.

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Native fishes were relatively rare in isolated pool samples, at only 0.9% of the total number captured. Smallmouth bass were rarer; only 42 bass (0.15%) were captured from the 23 habitats sampled.

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.

We also completed sampling in the White River in 2021 (Table 4), adding to data collected in 2018-2020. 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 and 2021 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. The 2020 smallmouth bass captured were relatively large with a mean length of 92 mm TL (64-117 mm TL), while 2021 bass were slightly smaller in August (mean TL = 83 mm, 65-98) but grew to 93 mm TL in October (65-124 mm).

### **Additional noteworthy observations:**

#### **Recommendations:**

Complete summary of data in 2022 regarding the native fish response evaluation in a comprehensive report.

Continue sampling in 2022 and out years. The reduced level of effort due to funding cuts employed in 2020 and 2021 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:**

Ongoing and on-track. This project was completed with about 70% of the normal budget in 2021. 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.

#### **FY 2021 Budget Status**

Funds Provided: \$68,278

Funds Expended: \$67,515

Difference: \$763

Percent of the FY 2021 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: 18 November 2021

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Table 1. Species composition of native and nonnative fishes captured in the Yampa River, 2021, in the control reach (no young smallmouth bass removed).

<b>Control Reach (River miles 112-124)-59 samples</b>		
	Number	Percent
<u>Non-natives</u>	fish	(%)
Brook Stickleback	8	0.10
Creek Chub	387	4.80
Fathead Minnow	1,116	13.84
Green Sunfish	89	1.10
Iowa Darter	55	0.68
Plains Killifish	1	0.01
Northern Pike	6	0.07
Redside Shiner	2	0.02
Smallmouth Bass	1,378	17.08
Sand Shiner	1,011	12.53
White Sucker	3,340	41.41
<b>Total</b>	<b>7,393</b>	<b>91.66</b>
<u>Natives</u>		
Mottled Sculpin	5	0.06
Speckled Dace	668	8.28
<b>Total</b>	<b>673</b>	<b>8.34</b>
Grand Total	8,066	100

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Table 2. Species composition of native and nonnative fishes captured in the Yampa River, 2021, in the treatment reach (young smallmouth bass removed).

<b>Treatment Reach (River miles 100-112)-107 samples</b>		
	Number fish	Percent (%)
<b><i>Non-natives</i></b>		
Black bullhead	1,259	5.16
Brook Stickleback	34	0.14
Creek Chub	891	3.65
Fathead Minnow	3,842	15.74
Green Sunfish	165	0.68
Iowa Darter	72	0.29
Northern Pike	2	0.01
Redside Shiner	6	0.02
Smallmouth Bass	6,119	25.07
Sand Shiner	2,409	9.87
White Sucker	9,388	38.46
<b>Total</b>	<b>24,187</b>	<b>99.09</b>
<b><i>Natives</i></b>		
Bluehead Sucker	2	0.01
Mottled Sculpin	1	0.00
Roundtail Chub	3	0.01
Speckled Dace	215	0.88
<b>Total</b>	<b>221</b>	<b>0.91</b>
<b>Grand Total</b>	<b>24,408</b>	<b>100</b>

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Table 3. Species composition of native and nonnative fishes captured in the Yampa River, 2021, in isolated pools.

<b>Isolated Pools Species Composition (River miles 100-124)-23 samples</b>		
	Number	Percent
<i><u>Non-natives</u></i>	fish	(%)
Black Bullhead	224	0.78
Brook Stickleback	2,454	8.55
Creek Chub	115	0.40
Fathead Minnow	24,432	85.16
Green Sunfish	18	0.06
Iowa Darter	120	0.42
Northern Pike	1	0.00
Redside Shiner	9	0.03
Smallmouth Bass	42	0.15
Sand Shiner	129	0.45
White Sucker	884	3.08
<b>Total</b>	<b>28,428</b>	<b>99.09</b>
<i><u>Natives</u></i>		
Speckled Dace	261	0.91
<b>Total</b>	<b>261</b>	<b>0.91</b>
Grand Total	28,689	100.00

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Table 4. Results for White River smallmouth bass sampling in 2018, 2019, 2020, and 2021. SMB = smallmouth bass, CSU = Colorado State University. The catch per unit effort (CPUE) data were electric-seining conducted just downstream of Kenney Reservoir, near Rangely, Colorado. The first two passes in 2018 bracket a flushing flow event (90 minutes, 1,100 ft<sup>3</sup>/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

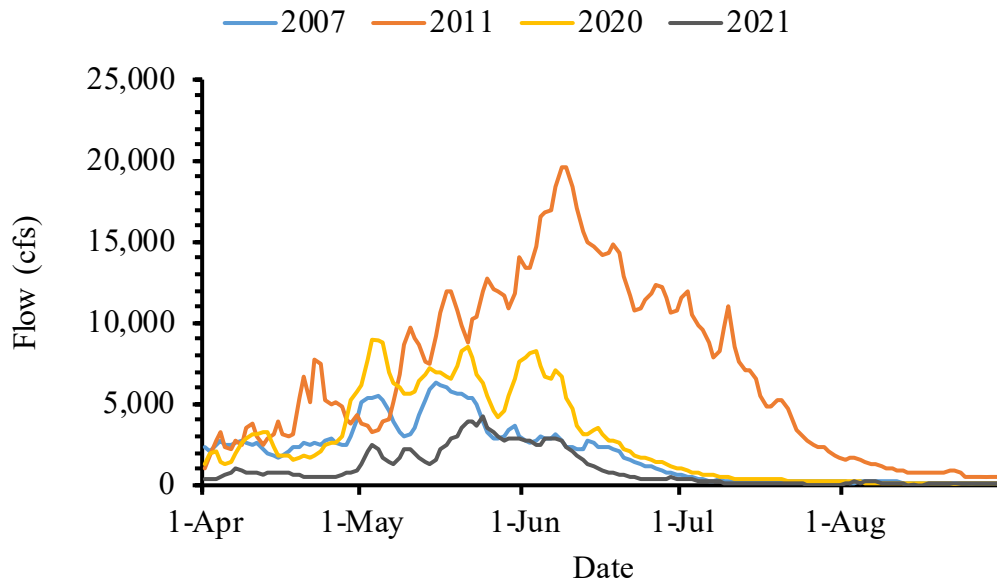
Pass	Sampling Period	Agency	Effort (hrs)	Number of SMB				CPUE (#fish/hr)			
				Juv	Sub-adult	Adult	All sizes	Juv	Sub-adult	Adult	All sizes
1	9/29/2020	CSU	2.16	161	27	0	188	75	13	0	87

2021

Pass	Sampling Period	Agency	Effort (hrs)	Number of fish				CPUE (#fish/hr)			
				Juvenile	Sub-adult	Adult	All	Juvenile	Sub-adult	Adult	All
1	10-Aug	CSU-LFL	1.04	70	13	3	86	67.3	12.5	2.9	82.7
2	9-Oct	CSU-LFL	1.23	47	50	2	99	38.2	40.7	1.6	80.5
Total			2.27	117	63	5	185	51.5	27.8	2.2	81.5

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A.



B.

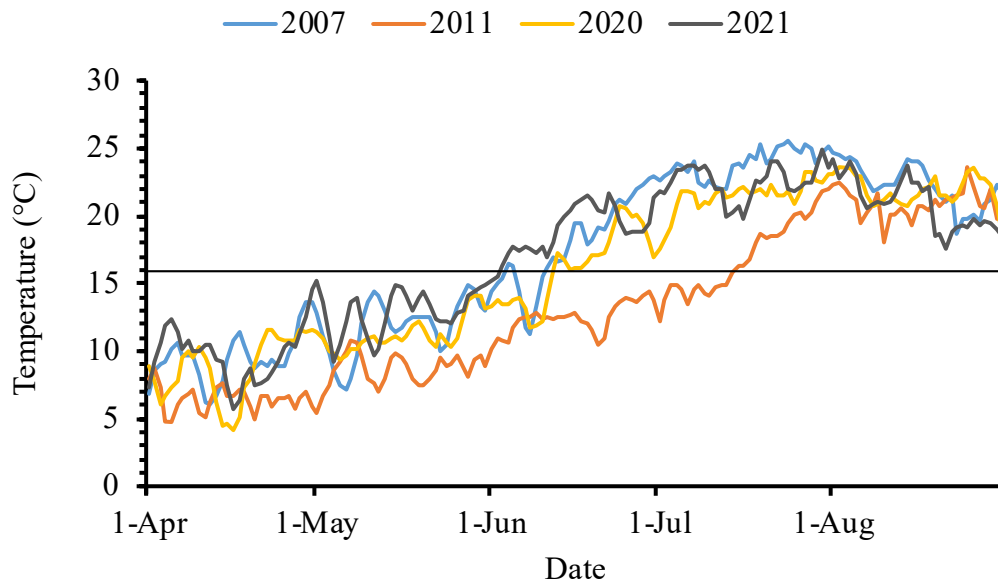


Figure 1. Flow (upper, Panel A) and water temperature (lower, Panel B) regimes for the Yampa River in 2021. A low flow and warm year (2007), a high flow and cold year (2011), and 2020 are shown for comparison.