

I. Project Title: Smallmouth bass control in the lower Yampa River

II. Bureau of Reclamation Agreement Number: R15PG00083
Project/Grant Period: Start date: 10/01/2014
End date: 09/30/2019
Reporting period end date: 09/30/2019
Is this the final report? Yes No

III. Principal Investigator:
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IV. Abstract:

Green River Basin Fish and Wildlife Conservation Office completed five smallmouth bass removal passes in the lower Yampa River in 2019, removing 1,200 smallmouth bass. The majority of bass (83%) captured this year were bass <200mm in length, including a large class of age-2 fish. The overall catch rate for smallmouth bass almost tripled from 2017 and was similar to that of 2010. The number and distribution of age-2 bass point to a successful year class being produced in 2017 but less so for 2018. Fish community composition monitoring reaches were also sampled, and native suckers again were the most abundant species, as has been the case since these monitoring reaches were initiated.

V. Study Schedule: 2004-ongoing

VI. Relationship to RIPRAP:
Green River Action Plan: Yampa River
III.B.2. Control nonnative fishes via mechanical removal
III.B.2.e. Remove smallmouth bass
III.B.2.d. Remove northern pike from Yampa River designated critical habitat
III.B.2.f. Control channel catfish in Yampa Canyon

VII. Accomplishment of FY 2019 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Nonnative Fish Removal

Green River Basin Fish and Wildlife Conservation Office (GRB FWCO) completed five electrofishing passes in the lower Yampa River from 11 June to 19 July 2019. During this time, daily flows ranged from 15,780 cfs to 2,270 cfs, and mean water temperatures increased from 10°C to 20.9°C (USGS gauge # 9260050 located at Deerlodge Park, CO). Mean water temperatures exceeded 16°C around 30 June, and we were able to conduct

three removal passes after the river reached this temperature threshold when spawning is more likely to commence. We began noting ripe bass on the first pass, but only five out of 205 adults captured were noted as ripe.

We were able to remove 1,200 smallmouth bass (SMB), including 128 fish <100mm, 867 juveniles (100-199mm), and 205 adults (≥ 200 mm) (Table 1). Of the adults, 21 were large enough (≥ 325 mm) to be classified as piscivores posing a competitive threat to adult Colorado pikeminnow.

Catch rates for 2019 were moderate compared to past years (Fig. 1). For all passes combined, the catch rate for bass ≥ 100 mm was 7.7 fish/hour. The total catch rate from this year consisted of 7.14 juveniles/hr and 1.47 adults/hr. The catch rate for bass ≥ 100 mm was variable across passes (Figure 2), and catch rates for all bass were largely driven by juvenile numbers.

Length frequency data for 2019 showed a skewed distribution with high captures of fish ranging from 151-175 mm TL (Fig. 3). This distribution reflects a large year class of bass likely spawned in 2017, which was also evident as age-1 bass in 2018 (Figs. 4a-b). Since river conditions were extremely dry in 2018, we expected bass that were spawned last year to comprise a large proportion of this year's sample. Although this was not realized to the extent expected, bass <125 mm TL constituted 21.9% of total catch. Given that budget reductions necessitated the elimination of two removal passes in 2020, it will be necessary to optimize effort in this reach during suitable river conditions in order to reduce these recently produced year classes.

Smallmouth bass distribution was variable by size class and exhibited different patterns (Fig. 5). Adult bass catch rates were similar across reaches. Juvenile and age-1 catch rates were highest in the lower half of the canyon, below Big Joe rapid. This is consistent with sampling in 2017 and 2018 where we observed spawning activity in reach 6, as well as high captures of age-0 bass in the Green River below the confluence. This pattern could also represent a shift in distribution compared to previous years when bass spawning occurred primarily upstream of Deerlodge Park and small bass moved into the reach the following year.

A component of this project is to remove channel catfish >400mm. This is the length at which catfish are believed to transition to a higher level of piscivory, making them a competitive threat to Colorado pikeminnow and a predatory threat to native fishes. We removed thirty-six channel catfish meeting this size threshold.

Sampling for fish community composition

We sampled four, one-mile subreaches during pass five (July 7-19) in order to monitor fish community species composition (Fig. 6). These reaches were established in 2002 to monitor the overall fish community response to nonnative fish removal, and were chosen specifically based on previous capture locations of humpback chub (Fuller and Modde 2002). As in previous years, native suckers (flannelmouth and bluehead) were the two most abundant species captured (Figs. 7-8). Other species captured, in decreasing abundance, were channel catfish, roundtail chub, smallmouth bass, white sucker, white x

flannelmouth hybrids, and common carp (Fig. 6).

We also collected several other nonnative fish species over the course of the five passes, including northern pike, walleye, white sucker, and white sucker hybrids (Table 2). All northern pike (N=6) and walleye (N=3) captured were large enough to be classified as piscivores. Northern pike were only caught in reaches 9 and 10, which are the most downstream reaches. Finally, we encountered 35 Colorado pikeminnow this year. Twenty-six of the of the pikeminnow were recaptures that already had tags, but none with an old frequency tag (400 kHz). Nineteen of the pikeminnow were tuberculated at capture, and tuberculate individuals were encountered throughout the sampling period.

Roundtail chub monitoring

Roundtail chub monitoring was conducted during the initial pass when flows ranged between 13,700 cfs to 10,500 cfs. We also processed all chub encountered in the monitoring reaches on pass five. In total, 202 roundtail chub were captured, consisting of 82 adults and 120 juveniles, and 174 of these were PIT-tagged. We recaptured four roundtail chub that were previously tagged. All of these fish had been previously captured within this study reach, with one fish tagged in 2009, one tagged in 2016, and two in 2017. Of the 82 roundtail chub adults encountered, 16 were tuberculated and three fish were listed as ripe. We collected 41 small chub 105-150mm in length, demonstrating successful spawning and recruitment in this reach over the last two years. The net meshed being used for sampling was too large to effectively collect small chub less than 100mm, so fish of this size are underrepresented in our data.

VIII. Additional noteworthy observations:

IX. Recommendations:

- Optimize nonnative fish removal in response to the large class of fish produced in 2017. Effort should again focus on the time period when water temperatures are likely to initiate bass spawning ($>16^{\circ}\text{C}$).
- Continue to monitor chub. Data collected over the last five years indicate that long term data is needed to assess movement and to allow for recaptures of marked fish. Colorado Parks and Wildlife has stocked bonytail in this reach at Hell's Canyon Ranch (RM 11.8) and monitoring chubs may assist in estimating survival and movement of these fish.
- Adjust chub sampling to produce more robust data for future estimation
- Continue fish community monitoring to characterize any changes in the overall species composition through time. This work has recently been used to make comparisons between fish communities in the regulated Lodore Canyon reach of the Green River and this reach, which is virtually unregulated. Our fish monitoring in the Yampa has also been useful in tracking native fish response to invasion by smallmouth bass and corresponding effects based on bass abundance.

X. Project Status: On track and ongoing

XI. FY 2019 Budget Status

- A. Funds Provided: \$ 108,999
- B. Funds Expended: \$ 108,999
- C. Difference: -0-
- D. Percent of the FY 2019 work completed: 100%
- E. Recovery Program funds spent for publication charges: -0-

XII. Status of Data Submission: Data have been submitted to the database manager.

XIII. Signed:

Christian Smith
Principal Investigator

11/2/2019
Date

Literature Cited

Fuller, M. and T. Modde. 2002. Development of a channel catfish control program in the lower Yampa River. Project #110. Annual report to the Recovery Implementation Program, U.S. Fish and Wildlife Service, Denver, CO.

Table 1. Sampling passes and smallmouth bass captured by size class, 2019.

PASS	Date	<100 mm	Juvenile	Adult	Piscivores
1	11-14 June	13	162	61	5
2	18-21 June	17	141	40	6
3	1-4 July	15	136	31	2
4	9-12 July	50	289	39	4
5	16-19 July	33	139	34	4
Total		128	867	205	21

Table 2. Other species captured during removal passes in Yampa Canyon, 2019.

Species	Number captured	Piscivores
Black crappie	8	
Channel catfish	36	36
Green sunfish	3	
Northern pike	6	6
Roundtail chub	26	
White sucker and hybrids	346	
Walleye	3	3
Colorado pikeminnow	35	
Roundtail chub	202	

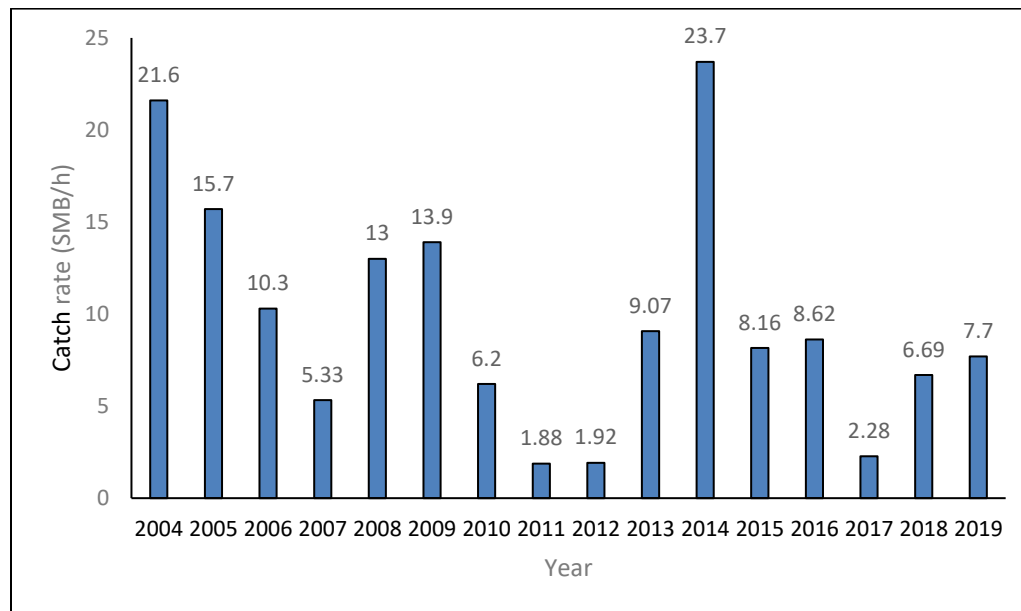


Figure 1. Overall catch rate of smallmouth bass $\geq 100\text{mm}$, Yampa Canyon 2004-2019.

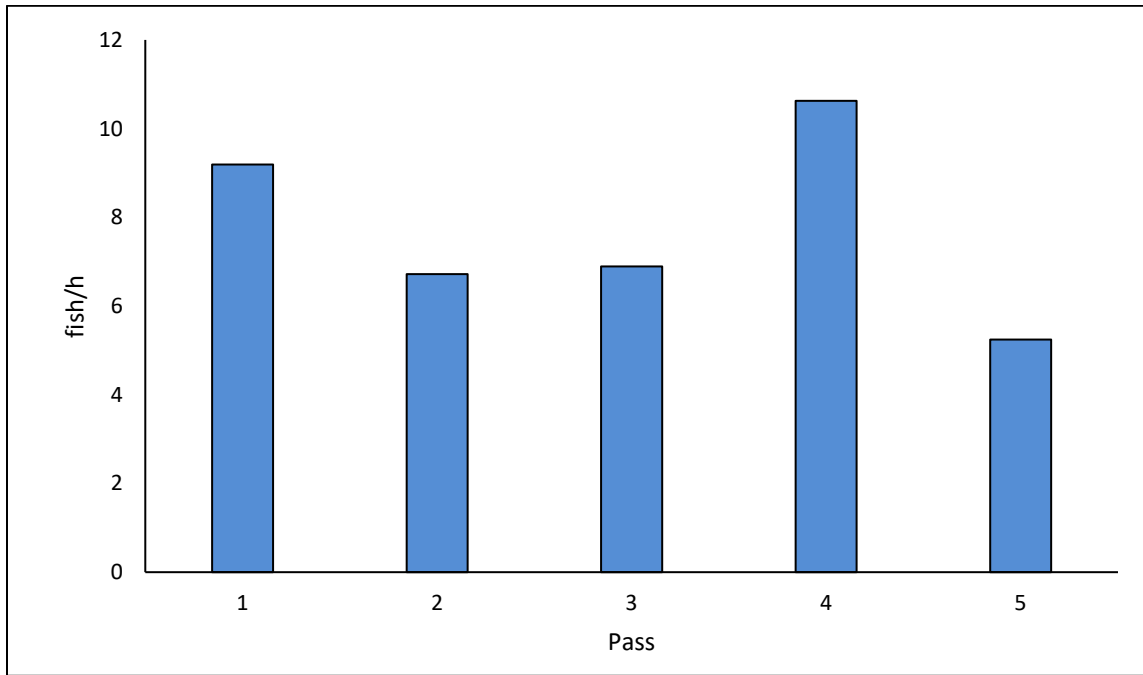


Figure 2. Catch rates by pass for smallmouth bass >100mm, Yampa Canyon 2019.

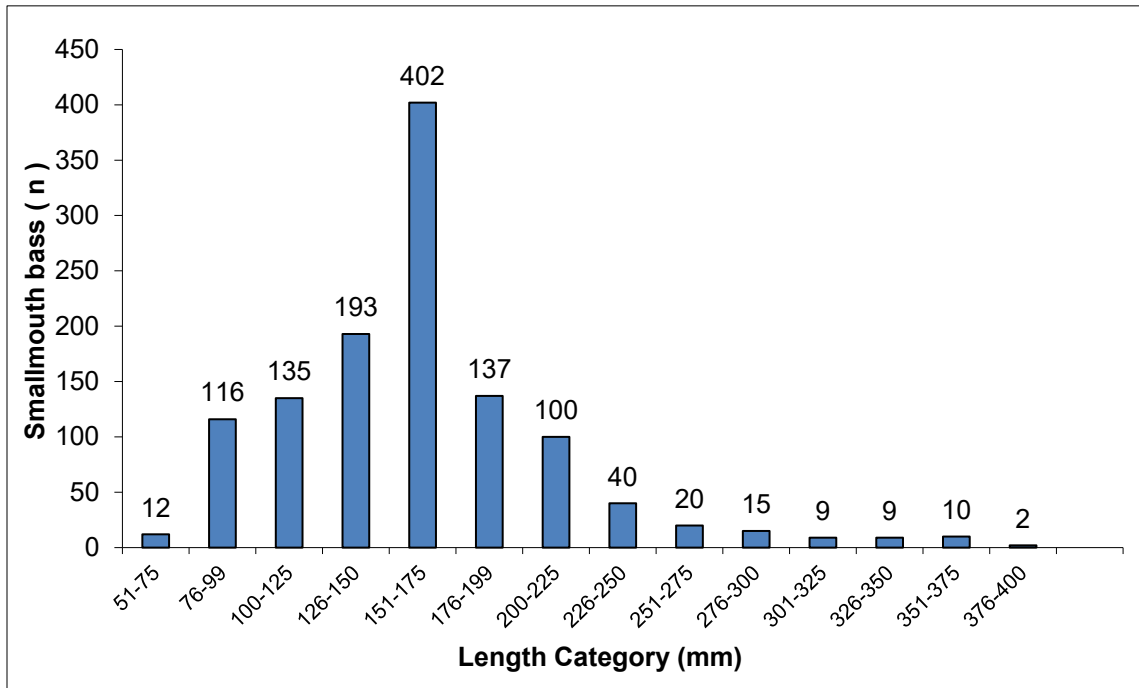


Figure 3. Length frequency histogram for smallmouth bass captured in Yampa Canyon, 2019.

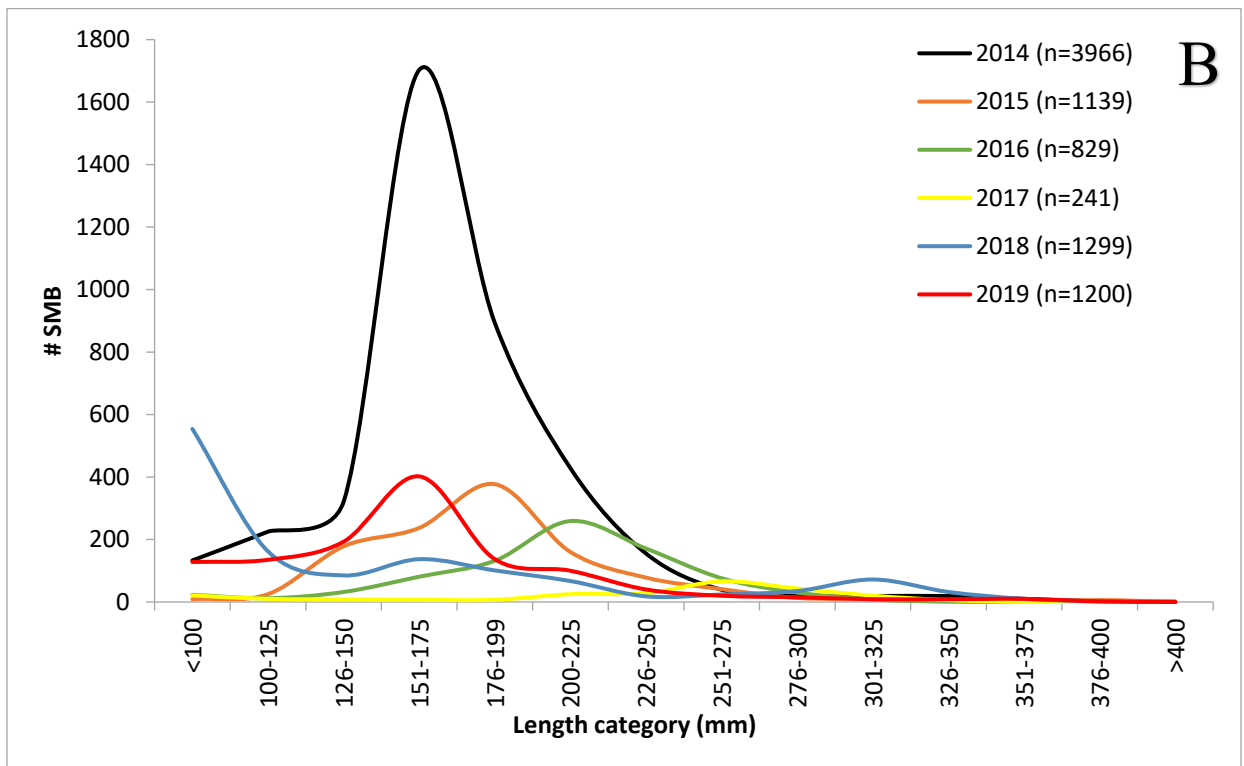
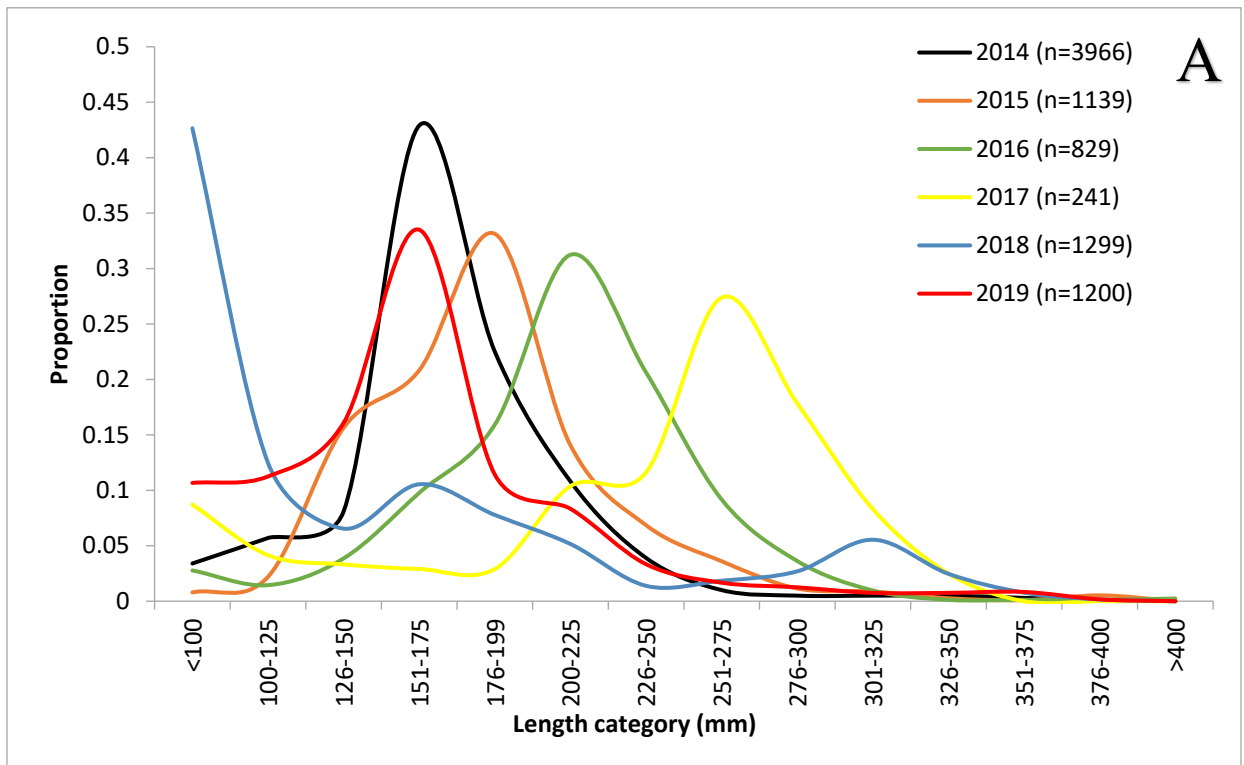


Figure 4a-b. Length-frequencies for smallmouth bass captured in Yampa Canyon in 2014-2019. Figure 4a shows percent fish caught in each size range, as a proportion of total catch each year, and Fig. 4b shows total numbers of fish caught in each size range.

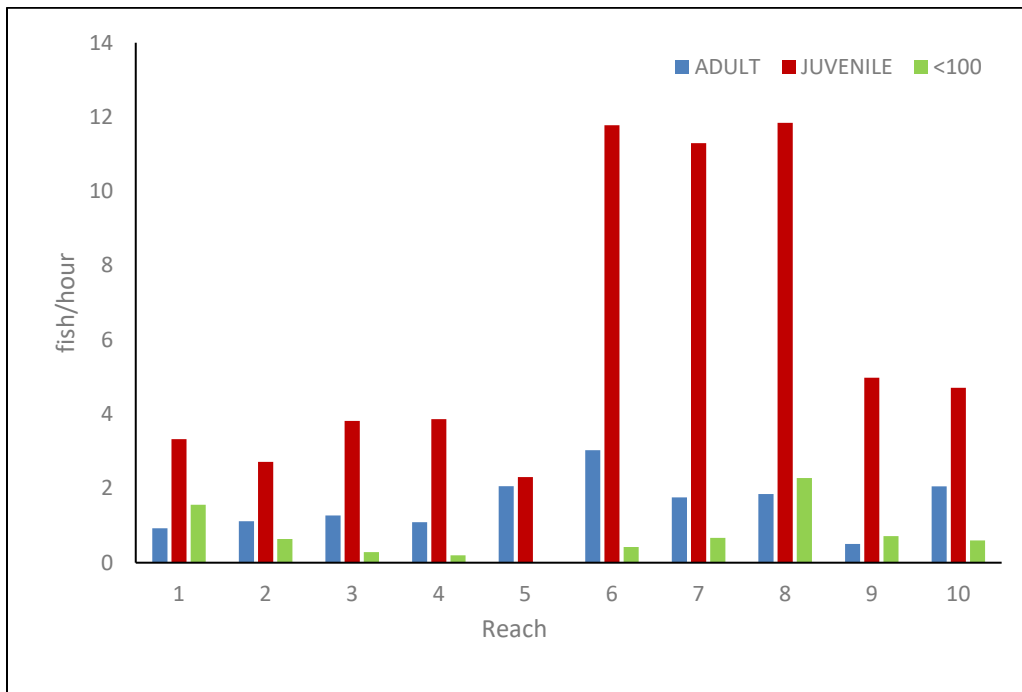


Figure 5. Catch rates of smallmouth bass in Yampa Canyon by reach, 2019.

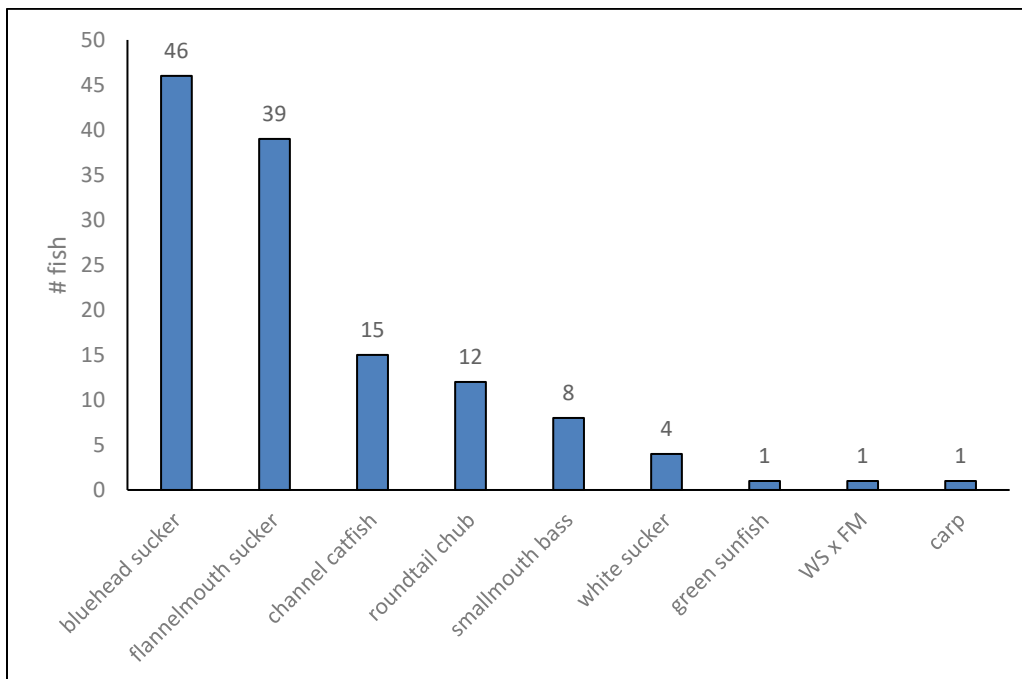


Figure 6. Total species composition for five, 1-mile monitoring reaches in Yampa Canyon, 2019.

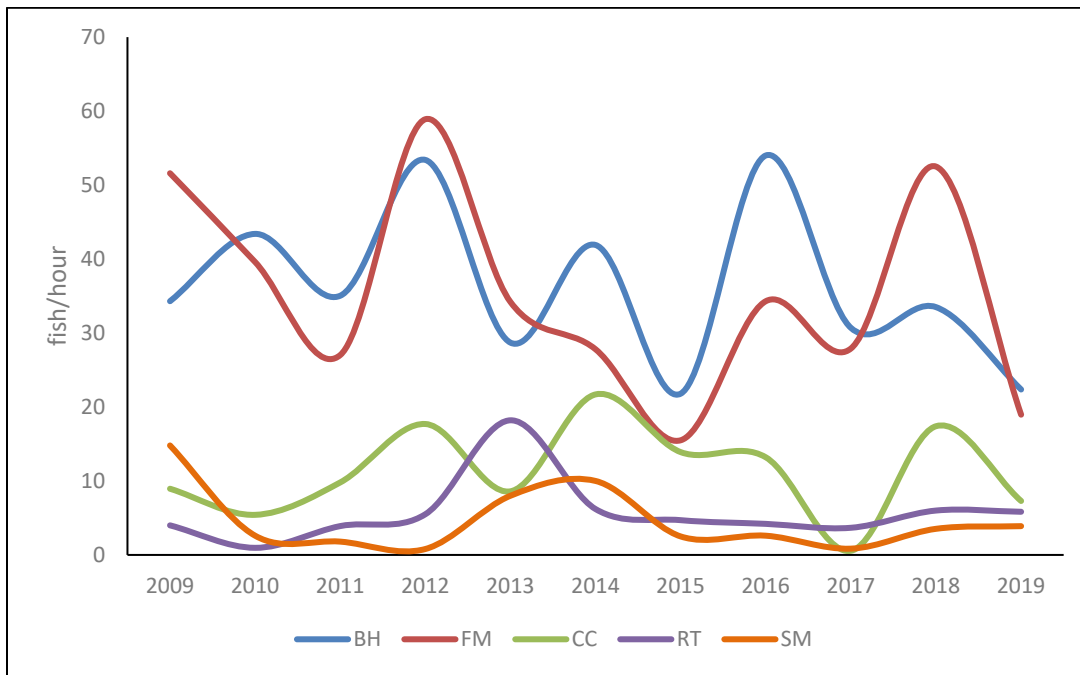


Figure 7. Annual catch rates of five most common species found in 1-mile monitoring reaches in Yampa Canyon, 2009-2019. Species codes are BH (bluehead sucker), FM (flannemouth sucker), CC (channel catfish), RT (roundtail chub), and SM (smallmouth bass).

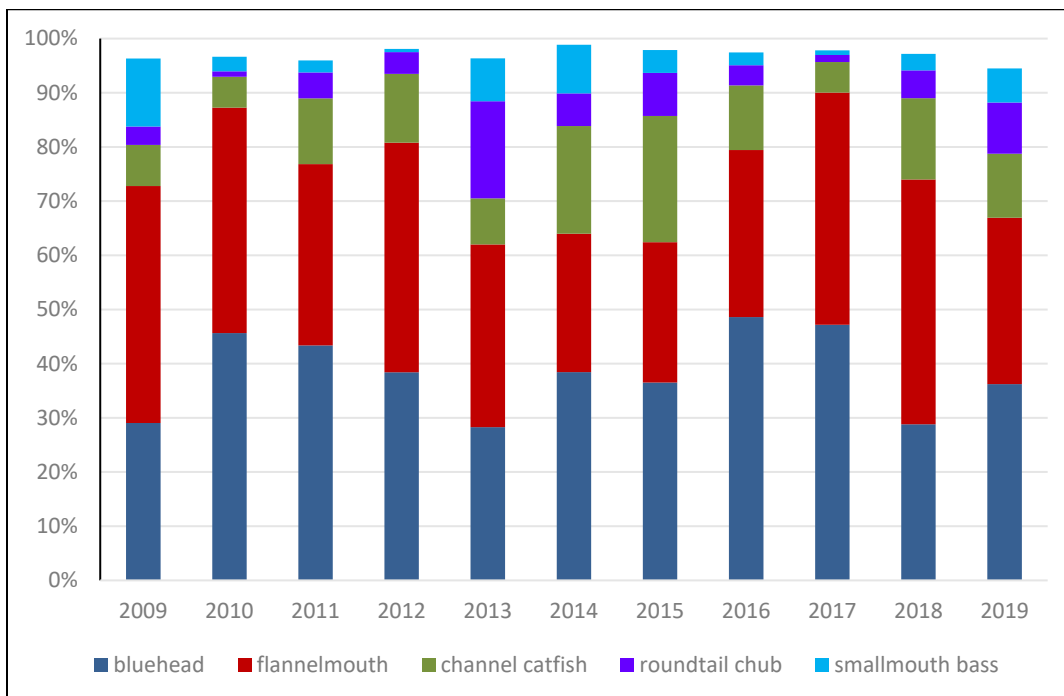


Figure 8. Percent catch of five most common species encountered in annual fish community monitoring reaches.