

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: 09/30/2018  
Is this the final report? Yes  No

III. Principal Investigator:  
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IV. Abstract:

USFWS completed three smallmouth bass removal passes in the lower Yampa River in 2018, removing 1,299 smallmouth bass. The majority of bass (80%) captured this year were bass <200mm in length, including a large class of age-1 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-1 bass point to a successful year class being produced in 2017. 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 2018 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

#### **Nonnative Fish Removal**

We completed three electrofishing passes in the lower Yampa River during 5-22 June 2018. During this time, mean daily flows ranged from 3,500 cfs to 1,000 cfs, and mean water temperatures increased from 17.3°C to 21.2°C. Mean water temperatures exceeded 16°C around June 4, and we were able to conduct all 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 bass expressing gametes represented roughly 32% of the adults captured on pass two (June 12-15).

We were able to remove 1,299 smallmouth bass (SMB), including 554 fish <100mm, 485 sub-adults (100-199mm), and 260 adults ( $\geq 200$ mm) (Table 1). Of these adults, forty-six were large enough ( $\geq 325$ mm) to be classified as piscivores posing a competitive threat to adult Colorado pikeminnow. Piscivore sized bass exhibited a marked increase in both total number and catch rate (0.41 fish/h), representing the highest values since 2008. The next highest values were 32 piscivore bass (0.2 fish/h) in 2014.

Catch rates for 2018 were moderate compared to past years (Fig. 1). For all passes combined, the catch rate for bass  $\geq 100$ mm was 6.69 fish/hour. The total catch rate from this year consisted of 4.36 sub-adults/h and 2.33 adults/h. The catch rate for bass  $\geq 100$ mm was variable across passes (Figure 2), and catch rates for all bass were largely driven by sub-adult and age-1 numbers.

Length frequency data for 2018 showed a skewed distribution with high captures of age-1 fish (Fig. 3). This distribution reflects a large year class of bass spawned in 2017, which is only comparable to 2013 (Figs. 4a-b). In that year, we captured a large group of age-1 smallmouth bass produced during the 2012 drought. Despite a decrease in abundance, this year class is still discernable in proportional length-frequency data (Fig. 4a) as a group of fish around 300mm. River conditions were extremely dry in 2018, and we expect a large year class of bass were produced, although no sampling has occurred since bass spawned. A similar scenario occurred in the pair of dry years in 2012 and 2013, where two large year classes of bass have been detectable as a single cohort until present (Fig. 4a), albeit at much lower abundance. It will be necessary to maximize the number of passes in this reach during suitable river conditions in order to reduce these recently produced year classes.

Bass distribution was variable by size class and exhibited different patterns (Fig. 5). Adult bass catch rates were similar across reaches. Sub-adult and age-1 catch rates showed a decreasing gradient from reach 1 to 5, but then these size classes exhibited high catch rates in the lower half of the canyon, below Big Joe rapid. This is consistent with sampling in 2017 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 fifty-six channel catfish meeting this size threshold. The higher catch of catfish is likely due to the warmer, low flows, which makes the species more susceptible to electrofishing.

### **Sampling for fish community composition**

We sampled five, one-mile subreaches during pass two (June 12-15) 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, common carp, and northern pike (Fig. 6).

We also collected several other nonnative fish species over the course of the four passes, including northern pike, walleye, white sucker, and white sucker hybrids (Table 2). Sixteen of the eighteen northern pike and the three walleye captured were large enough to be classified as piscivores. Northern pike were caught in eight of the ten reaches, and were most numerous (N=6) in reach 10, the most downstream reach. Finally, we encountered twenty Colorado pikeminnow this year. Fifteen of the pikeminnow were recaptures that already had tags, but none with an old frequency tag (400kHz). Thirteen of the pikeminnow were tuberculated at capture, and most of these individuals were encountered on passes two and three (mid-June).

### **Roundtail chub monitoring**

In order to accommodate the chub sampling this year, along with other components of the project, we split chub sampling between the first two passes. We also processed all chub encountered in the monitoring reaches on pass two. We were able to capture 172 roundtail chub, consisting of 47 adults and 125 sub-adults, and tagged 54 of these. We recaptured seven roundtail chub that were previously tagged. All of these fish had been previously captured in in this study reach, with two fish tagged in 2009, two tagged in 2016, and one each in 2010, 2011 and 2015. Of the 47 roundtail chub adults encountered, 31 were tuberculated. Twenty-two fish were listed as ripe. Ripe fish were collected in reaches 2-8, but the majority were once again observed in reaches 6 and 7. We collected 115 small chub 59-150mm 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. Despite the success in capturing and tagging roundtail chub in this project, discussions with a biometrician indicate that splitting the sampling reaches between trips can limit the data's usefulness in future abundance estimation. The recommendation was to conduct sampling over the entire reach in one pass, or to randomize the reach into chub sampling strata. We suggest determining the most appropriate sampling strategy to address the monitoring needs for this species. One possibility would be to add another person to the chub monitoring pass who could assist the baggage raft in processing fish while electrofishing rafts continue sampling.

VIII. Additional noteworthy observations:

IX. Recommendations:

- Continue nonnative fish removal at current levels, or increase effort in 2019 in response to the large classes of fish produced in 2017 and 2018. Effort should again focus on the time period when water temperatures are likely to initiate bass spawning (>16°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

Deerlodge Park and Hell's Canyon Ranch (formerly Mantle Ranch) after our sampling season, 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 2018 Budget Status

- A. Funds Provided: \$ 104,112
- B. Funds Expended: \$ 104,112
- C. Difference: -0-
- D. Percent of the FY 2018 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: M. Tildon Jones 11/2/2018  
Principal Investigator Date

#### Literature Cited

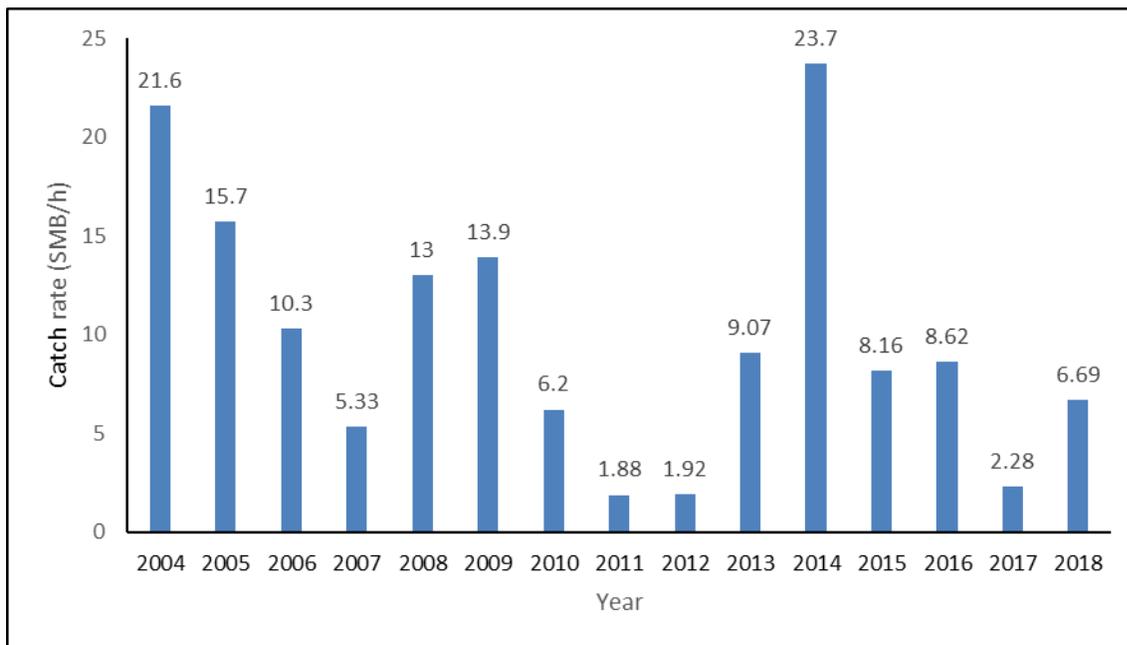
Fuller, M. and T. Modde. 2002. Development of a channel catfish control program in the lower Yampa River. Project #110. Annual report to the Recovery Implementation Program, U.S. Fish and Wildlife Service, Denver, CO.

**Table 1. Sampling passes and smallmouth bass captured by size class, 2018.**

Pass	Date	<100mm	Sub-adults	Adults	Piscivores
1	5-8 June	144	155	81	15
2	12-15 June	121	91	75	17
3	19-22 June	289	239	104	14
Total		554	485	260	46

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

Species	Number captured	Piscivores
Black crappie	8	
Green sunfish	2	
Northern pike	18	16
White sucker and hybrids	504	
Walleye	3	3
Channel catfish	56	56
Colorado pikeminnow	20	
Roundtail chub	96	
Small, unidentified <i>Gila</i>	76	



**Figure 1. Overall catch rate of smallmouth bass  $\geq 100$ mm, Yampa Canyon 2004-2018.**

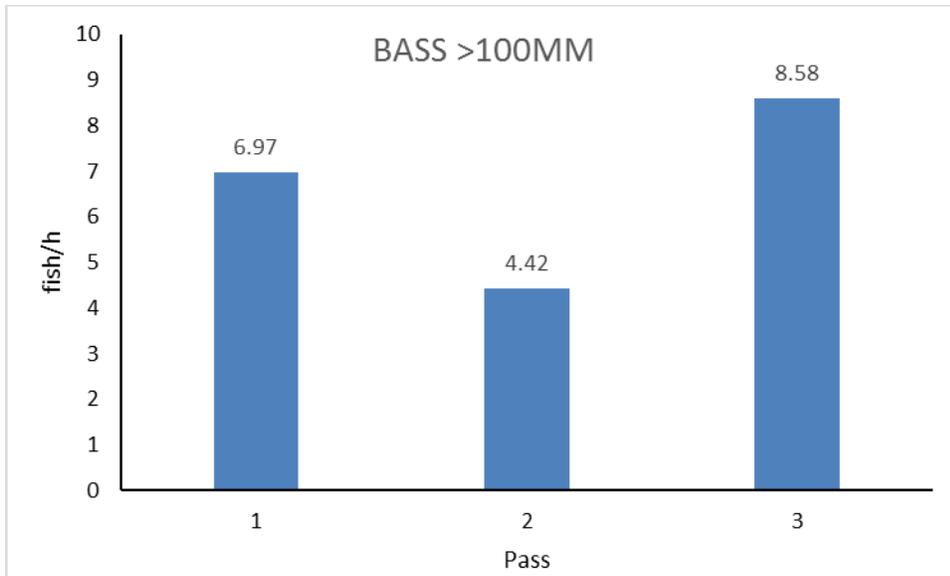


Figure 2. Catch rates by pass for smallmouth bass >100mm, Yampa Canyon 2018.

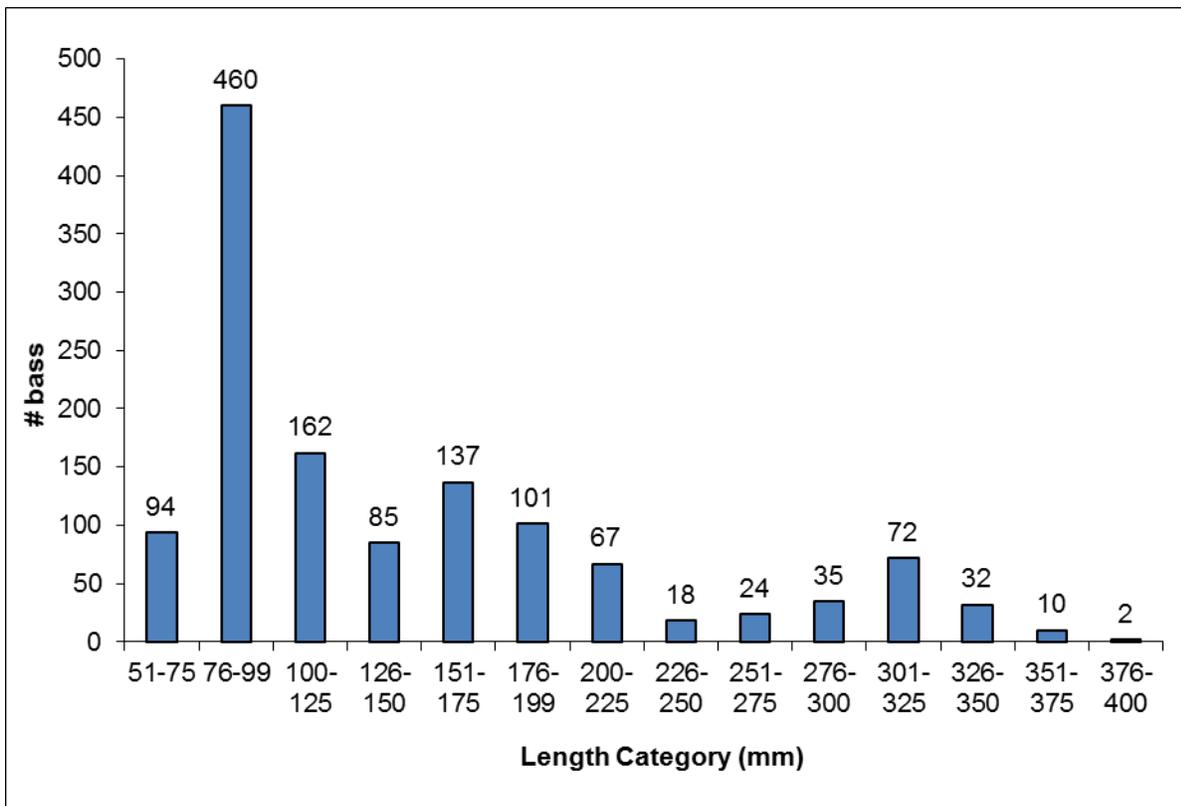


Figure 3. Length frequency histogram for smallmouth bass captured in Yampa Canyon, 2018.

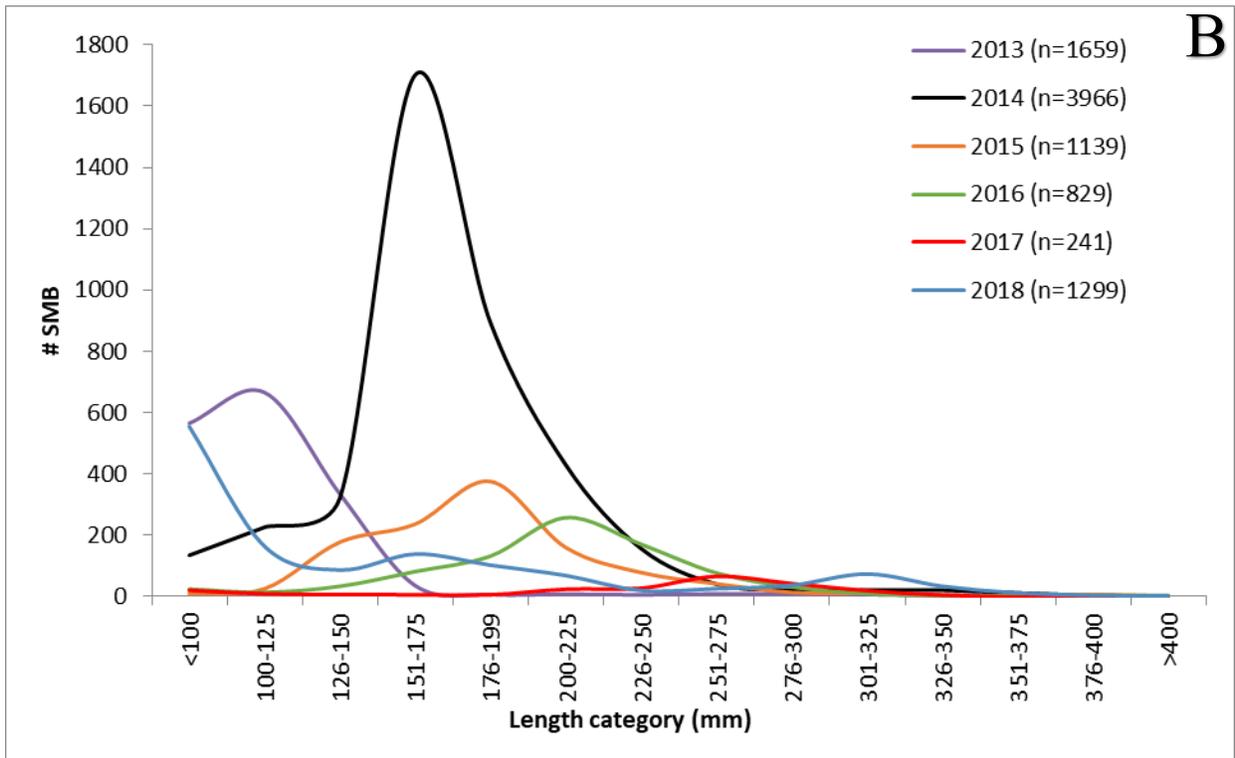
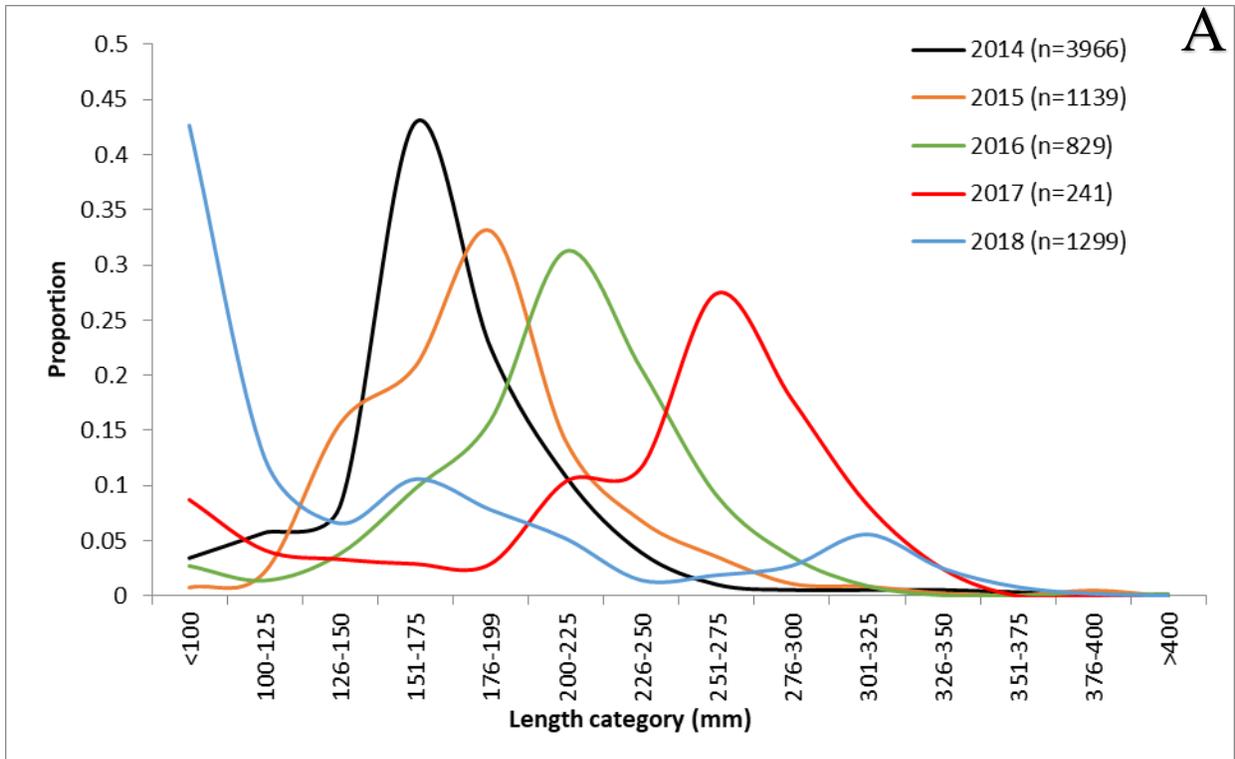


Figure 4a-b. Length-frequencies for smallmouth bass captured in Yampa Canyon in 2013-2018. Figure 4a shows percent fish caught in each size range, as a proportion of total catch each year, and Fig. 4b shows total numbers of fish caught in each size range.

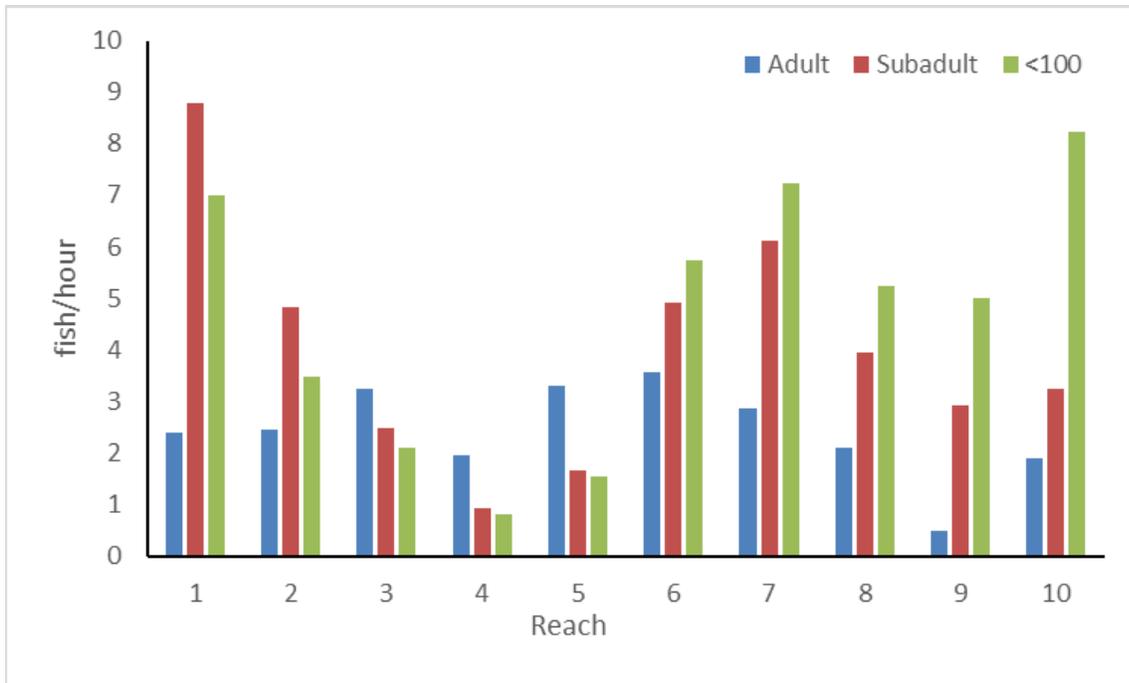


Figure 5. Catch rates of smallmouth bass in Yampa Canyon by reach, 2018.

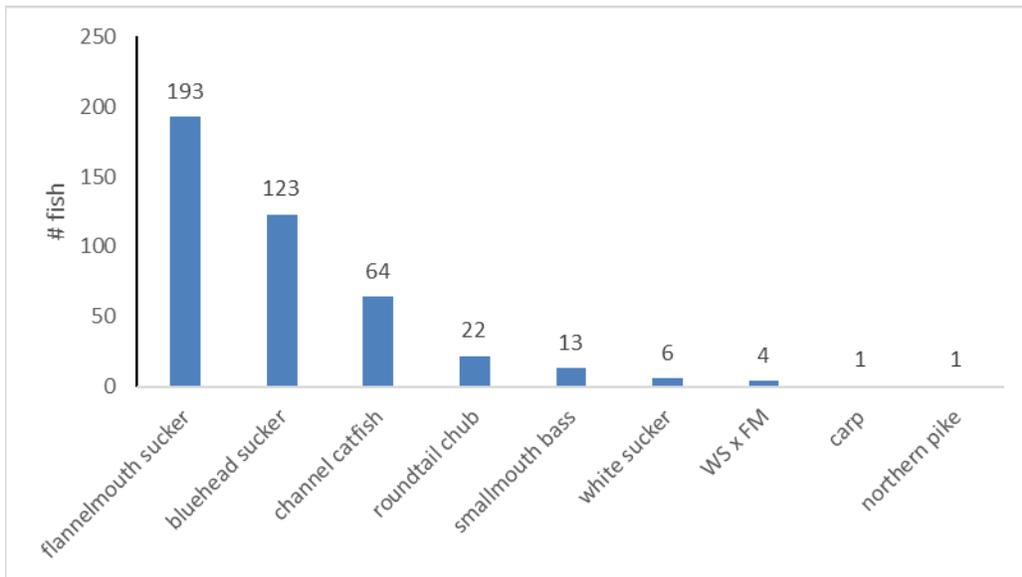
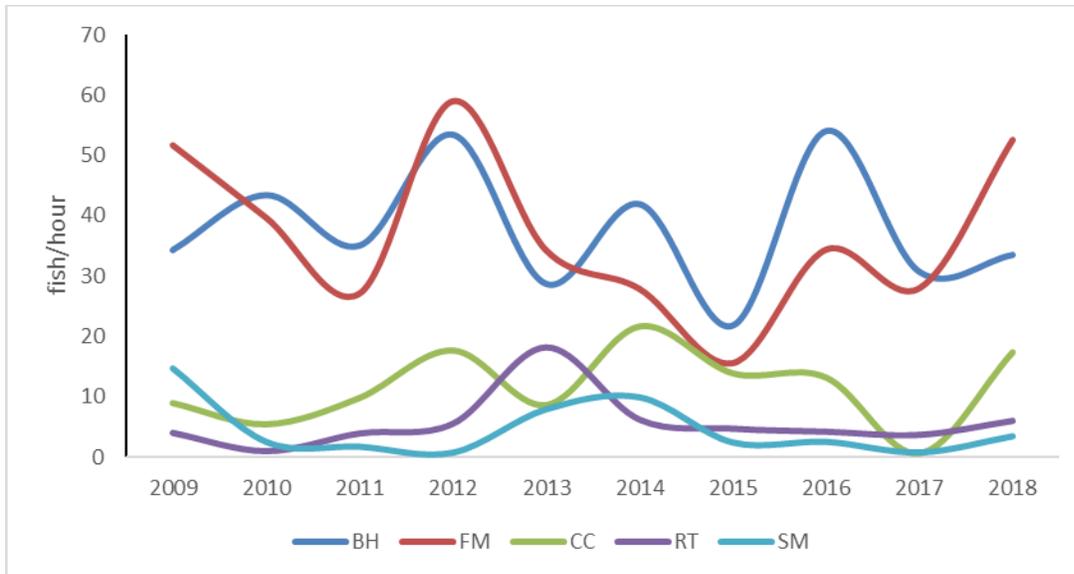
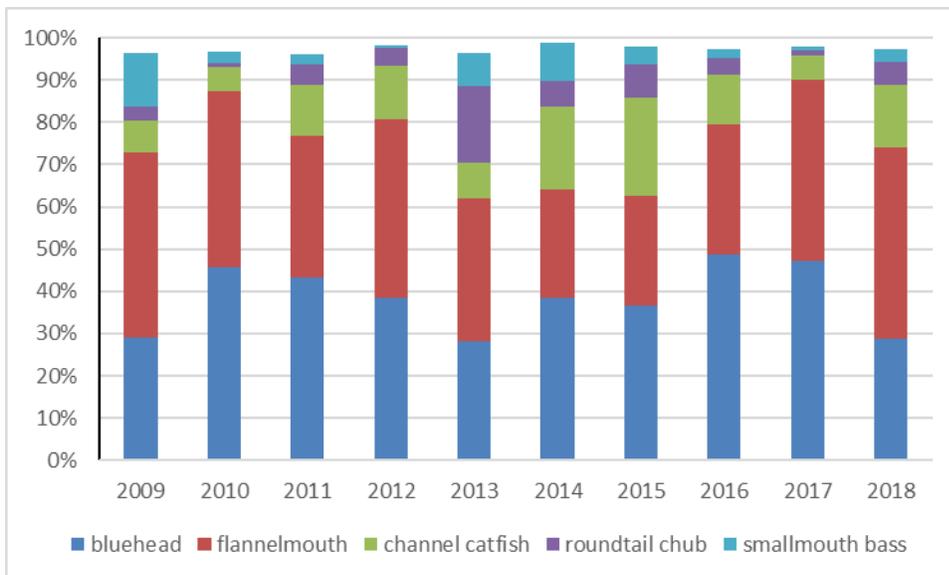


Figure 6. Total species composition for five, 1-mile monitoring reaches in Yampa Canyon, 2018.



**Figure 7. Annual catch rates of five most common species found in 1-mile monitoring reaches in Yampa Canyon, 2009-2018. 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.**