

- I. Project Title: Smallmouth bass control in the lower Yampa River
- II. Bureau of Reclamation Agreement Number(s): R11PG40043 or R13PG40020
- Project/Grant Period: Start date (Mo/Day/Yr): 09/16/2011 or 10/01/2012  
End date: (Mo/Day/Yr): 09/30/2016 or 09/30/2017  
Reporting period end date: 09/30/2013  
Is this the final report? Yes \_\_\_\_\_ No  X
- III. Principal Investigator(s): M. Tildon Jones  
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- IV. Abstract: USFWS completed all four scheduled passes in 2013, removing 1,659 smallmouth bass. The majority of bass captured this year were smaller fish, the product of successful spawning in 2012. Due to this increase in smaller fish, overall catch rates increased compared to the last few years. Monitoring passes for overall fish community composition were also completed, and native suckers were the most abundant species, as has been the case since these monitoring reaches were initiated. During this study, four razorback sucker were captured, of which three were found at an historical spawning bar in Echo Park. White sucker were also captured in much higher numbers than previously seen in this project.
- 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.a. Estimate nonnative abundance, status, trends, and distribution  
III.B.2.e. Remove smallmouth bass  
III.B.2.f(2) Remove channel catfish >400mm in Yampa Canyon  
III.B.2.h. Monitor native and endangered fish response
- VII. Accomplishment of FY 2013 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:
- Task 1: Conduct four (FY2013) removal passes and monitor fish community**  
USFWS crews completed four passes of electrofishing between 28 May and 21 June, despite below average run-off in 2013. River discharge during this time ranged from 8,000 cfs to 1,000 cfs, and water temperatures were 14-18°C. These passes coincided with the onset of temperatures conducive to smallmouth bass spawning, and continued

through river levels that allowed raft electrofishing (>800cfs). During the course of this project, 1,659 smallmouth bass were removed (Table 1), including 54 adults (total length  $\geq 200\text{mm}$ ), 1,041 sub-adults (100-199mm), and 564 fish <100mm (age-1). Fifteen adult bass were large enough (>325mm) to be considered piscivores: fish representing a competitive threat to Colorado pikeminnow based on bioenergetics. In addition, 12 channel catfish (>400mm) were removed. Pass 1 included sampling for roundtail chub, and fish community monitoring for large-bodied fishes occurred in pass 4.

During sampling, catch rates for bass  $\geq 100\text{mm}$  increased each pass (Figure 1), although catch rates for adults decreased over the study (Figure 2). The combined catch rate reflects the high proportion of bass 100-199mm in the population. Adults likely were spawning in the early passes and were more susceptible to shoreline electrofishing. During pass 2, several adults expressing gametes were collected. The overall catch rate in 2013 for bass  $\geq 100\text{mm}$  increased compared to the last three years (Figure 3), due to an increase in the number of sub-adult bass spawned in 2012. This group of age-1 fish ranged from 50-175mm, with a unimodal distribution around the 100-125mm size class (Figure 4). Fish smaller than 100mm were not considered young-of-year based on the early time of year when sampling occurred. Based on length frequency histograms, age-1 bass appeared to comprise 97% of the fish captured this year.

Length frequencies in 2013 are notable because data demonstrate a large cohort of fish spawned in 2012 (smaller age-1 fish comprise the majority of the population in 2013). It is therefore appropriate to compare 2008 and 2013 data, because the last large cohort of bass spawned in this section of river occurred in 2007. Relative strengths of the 2007 and 2012 cohorts show that there were more age-1 bass captured in this reach in 2008 than 2013 (Figure 5). Also, the 2008 data show another size class of larger fish, likely spawned in 2006. 2013 data lack this second cohort, as data are dominated by a single size class.

Two tagged bass were recaptured in 2013. One fish was originally tagged within this study (Project 110) in 2010 as a sub-adult and carried a blue tag. When it was recaptured in 2013, this fish was a 324mm adult that had moved from reach 8 to reach 1, approximately 26 river miles upstream. The second tagged fish had a green tag deployed in 2011 in the Echo Park to Split Mountain bass project. This fish had moved from the Echo Park/Whirlpool reach into the most downstream reach of Yampa Canyon. No tagged bass from CSU's reaches upstream in the Yampa River (gray tags) were encountered this year.

The distribution of smallmouth bass within the study area changed from patterns observed over the last several years. This year, sub-adult and smaller age-1 bass were more common in the downstream reaches, and this trend was more pronounced when analyzing catch rates in place of total numbers captured (Figure 6). In past years these sizes of fish were most abundant in the two most upstream reaches. Displacement by higher flows is not a likely explanation for this pattern since average and peak discharges have been well below average in the last two years. It is possible these smaller fish were

spawned within Yampa Canyon, rather than in upstream reaches as has been proposed in the past. Ripe adults were more commonly encountered in the downstream reaches, and piscivore-sized bass (TL>325mm) were also more common in the downstream half of Yampa Canyon (Figure 7). Suitable spawning habitat occurs between Big Joe Rapid and Harding Hole (reach 6), in the vicinity of Mantle Ranch (reach 8), and in the last few miles of the canyon (reach 10), but there has been no indication of significant levels of spawning in this reach in recent years. Favorable low, warm flows in 2012 likely contributed to the suitability and success of these portions of river as bass spawning habitat.

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

Five, one-mile reaches were sampled during pass 4 to assess the large-bodied fish species composition. This sampling occurred 18-21 June 2013, with flows descending from 2,700-1,900 cfs. The species composition for all five reaches combined is presented in Figure 8. Similar to past years, native fishes were the three most abundant species collected, with small chub (*Gila sp.*) increasing in rank compared to 2012. Smallmouth bass also made up a larger proportion of the fish community than last year, again due to an increase in sub-adult fish. White sucker appeared in these reaches in 2013. This species was not common in 2012, but was recorded in the monitoring reaches in 2011.

Other species of fish collected during sampling this year included 16 northern pike, 187 white sucker, 2 green sunfish, 2 walleye, and 12 channel catfish (TL>400mm; Table 2). All northern pike, walleye, and catfish were classified as piscivores based on size. The two walleye collected were in the most downstream reach, and likely came from the Green River, where walleye have been captured in increasing numbers. One northern pike had a gray tag, indicating it was marked and released by crews working upstream. White sucker numbers dramatically increased over previous years. Most of these fish were smaller than 150mm, and they were most abundant in reaches 8-10. Thirty-four individual Colorado pikeminnow were also captured during this project.

### **Roundtail chub monitoring**

All chub were captured and processed on pass1 to monitor the overall chub population and to document possible humpback chub occurrence. During this time, 83 roundtail chub and 178 small, unidentified *Gila sp.* were handled. The majority of these fish (67%) were fish less than 200mm in length (Fig. 9). Sixty-five chub were given PIT tags, and 5 fish were recaptured fish that were already tagged. Three of the recaptured chub were tagged in 2009, and two were from the 2011 sampling. All of the recaptured fish were within ~5 miles of their initial tagging location. Adult chub were distributed throughout the canyon, and sub-adult fish were found in similar numbers in most reaches (Fig. 10). Out of 62 roundtail chub inspected, nine had reproductive signatures such as tubercles.

Baited hoop nets were also deployed on a limited basis to assess the feasibility of using this technique for sampling chub. The nets were set in camp before dark and left overnight. River camps are limited and assigned by the National Park Service, so nets were not deployed in a particular habitat or based on the likelihood of catching chub.

Twelve chub were collected in thirteen net-nights with this gear, which is a high catch rate for this species. Yampa Canyon has a higher density of roundtail chub than most reaches of river in the Green River basin, so the high catch rates were not unexpected. These preliminary results suggest hoop nets are a viable option for sampling chub where their densities are high. They also have the advantages of longer set times that do not require frequent monitoring and the ability to use them in shallower reaches of river where trammel nets may not work well. This method would likely be effective at determining if humpback chub are still present in this reach of river.

VIII. Additional noteworthy observations:

During the first two passes, four razorback sucker were captured. One of these fish was found just below Big Joe rapid at approximately river mile 22. Three other razorback were captured near Echo Park, on an island/cobble complex where razorback spawning has occurred in the past, but has not been observed in recent years. Another razorback was observed at this cobble bar but not netted. Two of the three fish were tuberculated, and the fish were captured among tuberculate and spawning flannelmouth sucker. Larval razorbacks were also collected from the Echo Park drift net site (K. Bestgen, pers. comm.) this year, confirming that spawning occurred in the Yampa River. Stocking records indicate two of these fish were stocked in 2008 at Ouray National Wildlife Refuge, and the other two were stocked at Split Mountain boat ramp in 2009. The fish from Split Mountain are interesting because out of 13,237 fish stocked into the middle Green River in 2009, only 1,839 (14%) were stocked at Split Mountain. As a result of this range expansion and spawning confirmation, Ouray National Fish Hatchery stocked more razorbacks into Dinosaur National Monument this year in an effort to augment the number of adults in the river reaches just below this spawning site.

IX. Recommendations:

- Continue nonnative fish removal at current levels of effort
  - Consider a pass later in the season to sample for age-0 bass and determine the extent of reproduction *within* this reach. To date, data suggested most of the bass in this reach were likely produced upstream. This year's data suggest there may be some reproduction occurring within the lower canyon reaches.
- Continue native fish/community composition monitoring and *Gila* study.
  - Consider an additional dedicated pass using more intensive baited hoop net sampling to assess humpback chub presence.
- Stock some proportion of razorback sucker within Dinosaur National Monument, closer to the Echo Park spawning bar or within the Yampa River. As hatchery-raised fish expand their range throughout the upper Green River, the presence of spawning razorbacks and the high native sucker abundance in this reach suggests it is suitable for the species. The addition of another consistently occupied spawning site in the basin would add redundancy and resiliency to the population as a whole.

- X. Project Status: On track and ongoing
- XI. FY 2013 Budget Status
- A. Funds Provided: \$90,473
  - B. Funds Expended: \$90,473
  - C. Difference: -0-
  - D. Percent of the FY 2013 work completed, and projected costs to complete: 100%
  - E. Recovery Program funds spent for publication charges: -0-
- XII. Status of Data Submission: All data from FY2013 have been submitted to the database manager. Data from the 2013 field season will be submitted by December 2013.
- XIII. Signed: M. Tilden Jones 13 November 2013  
Principal Investigator Date

**Table 1. Sampling passes and smallmouth bass captured in each size class, 2013.**

Pass	Date	<100mm	Subadults	Adults	Piscivores
1	28-31 May	53	95	18	4
2	4-7 June	100	233	15	5
3	11-14 June	190	358	15	4
4	18-21 June	221	355	6	2
Total		564	1041	54	15

**Table 2. Other species captured and number of piscivorous nonnative fishes, 2013.**

Species	Number captured	Piscivores
Northern pike	16	16
White sucker	187	
Green sunfish	2	
Walleye	2	2
Channel catfish	12	12
Razorback sucker	4	
Colorado pikeminnow	36	36
Roundtail chub	110	
Small <i>Gila spp.</i> (<150mm)	211	

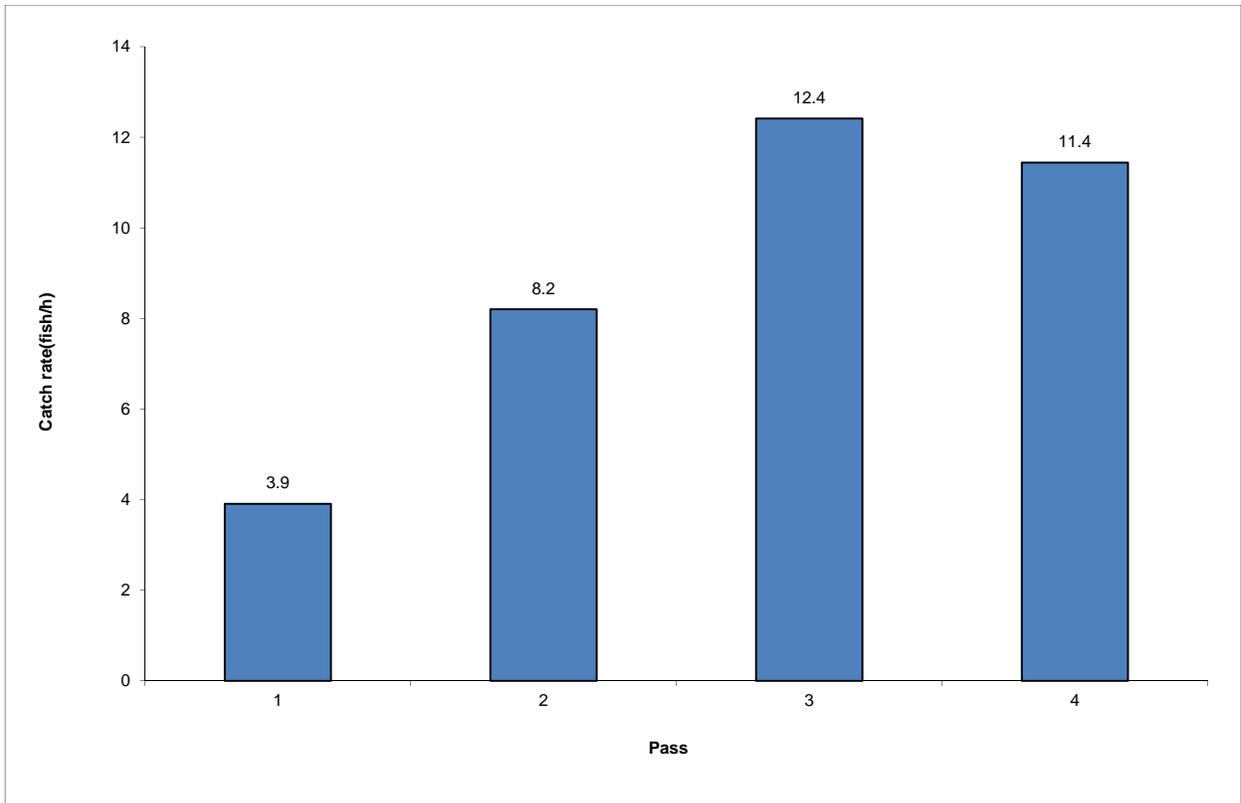


Figure 1. Catch rate for smallmouth bass  $\geq 100\text{mm}$ , by pass, 2013.

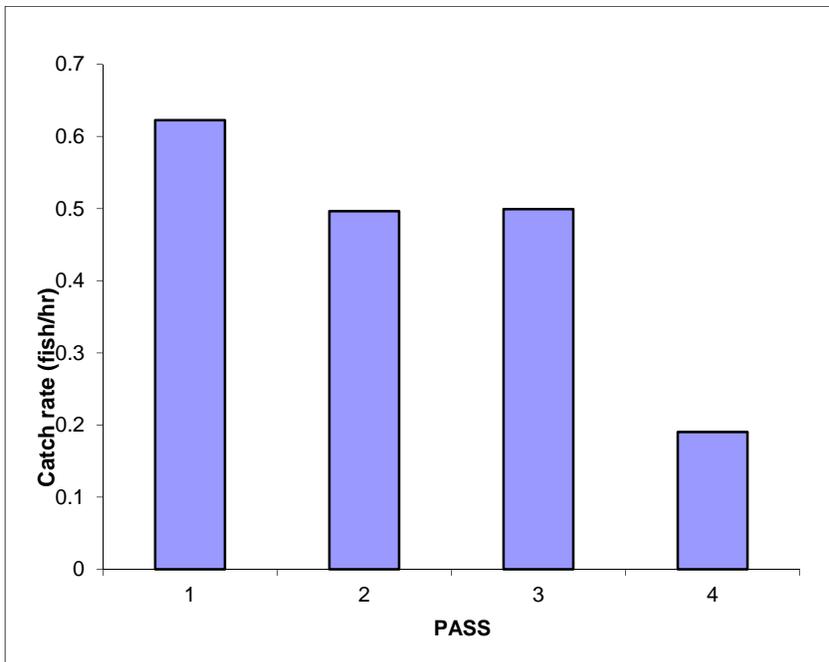


Figure 2. Catch rate for adult bass ( $\geq 200\text{mm}$ ) by pass, 2013.

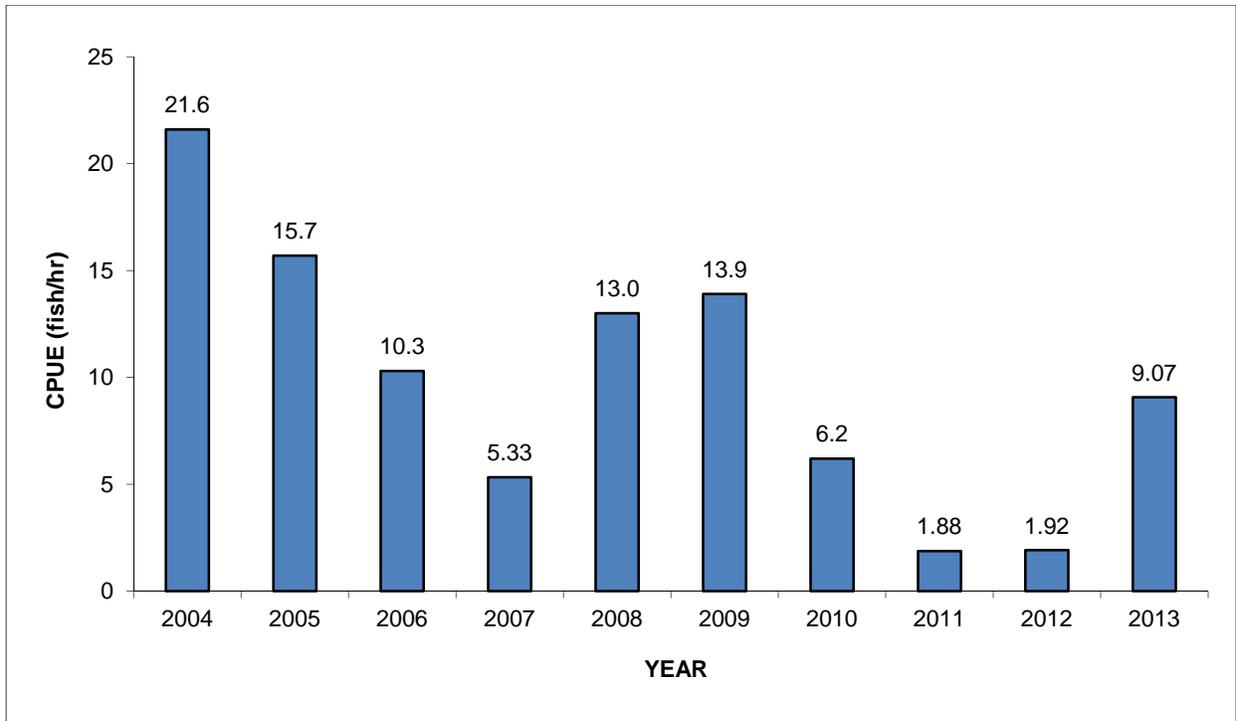


Figure 3. Catch rate for smallmouth bass  $\geq 100$ mm for all passes combined, 2004-2013.

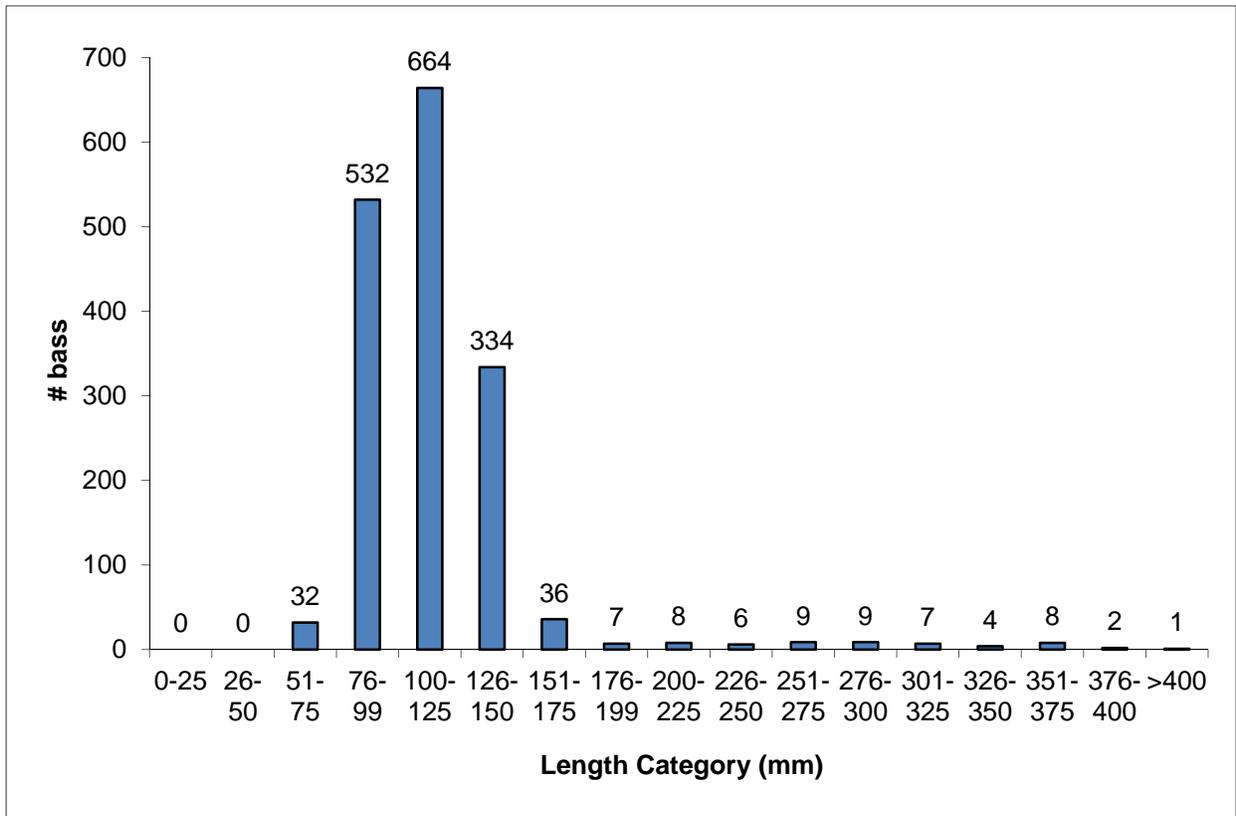


Figure 4. Length frequency histogram for smallmouth bass, 2013.

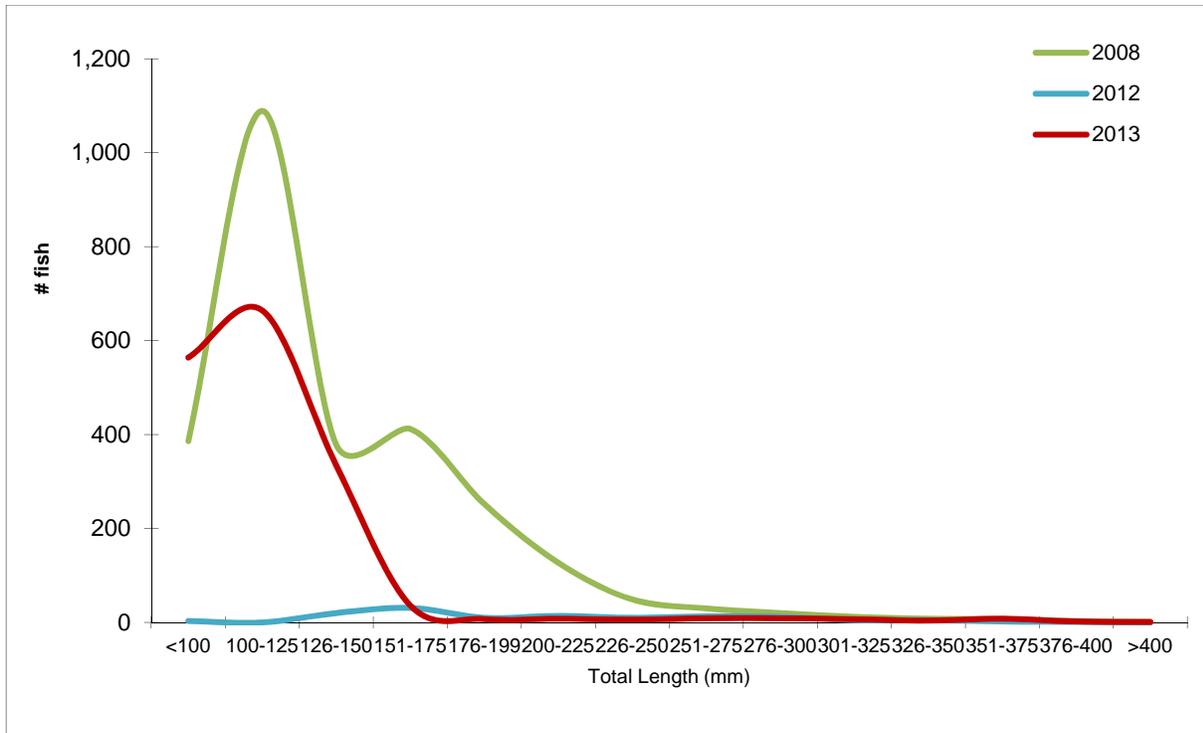


Figure 5. Length frequency comparison of smallmouth bass for 2008, 2012, and 2013.

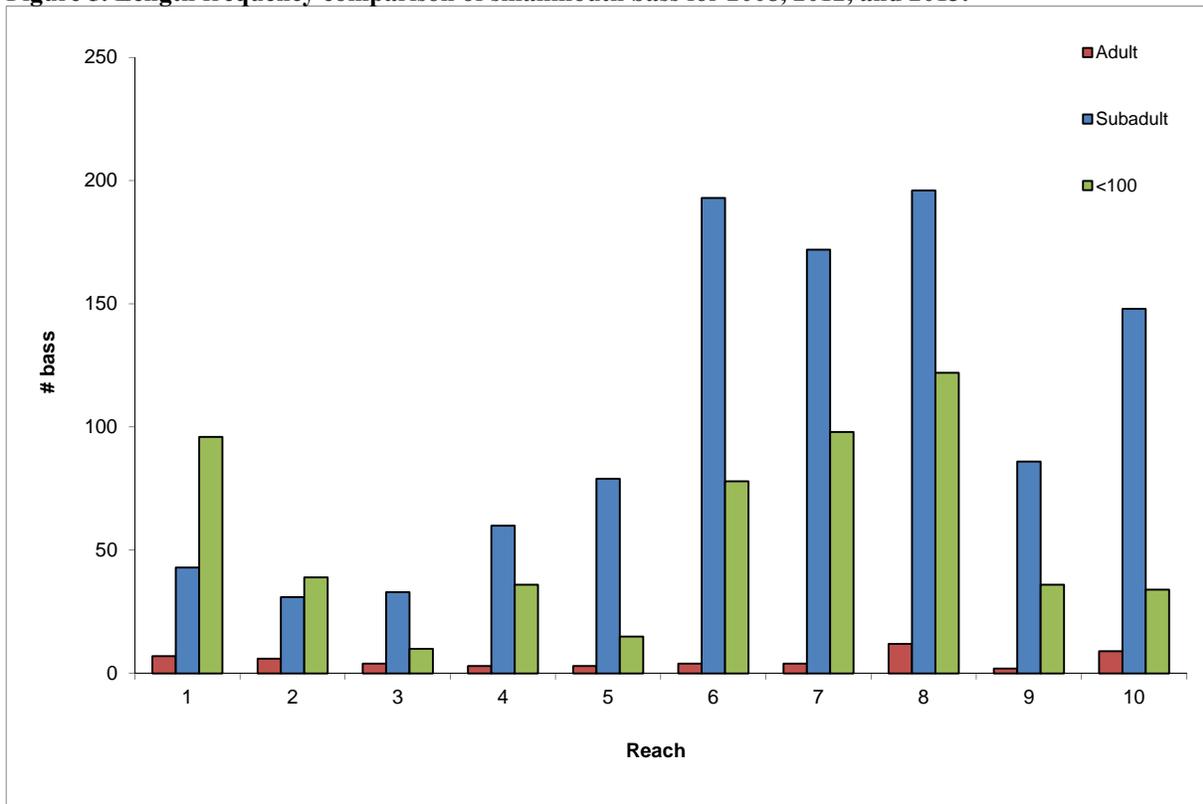


Figure 6. Distribution of smallmouth bass by size class and reach, 2013.

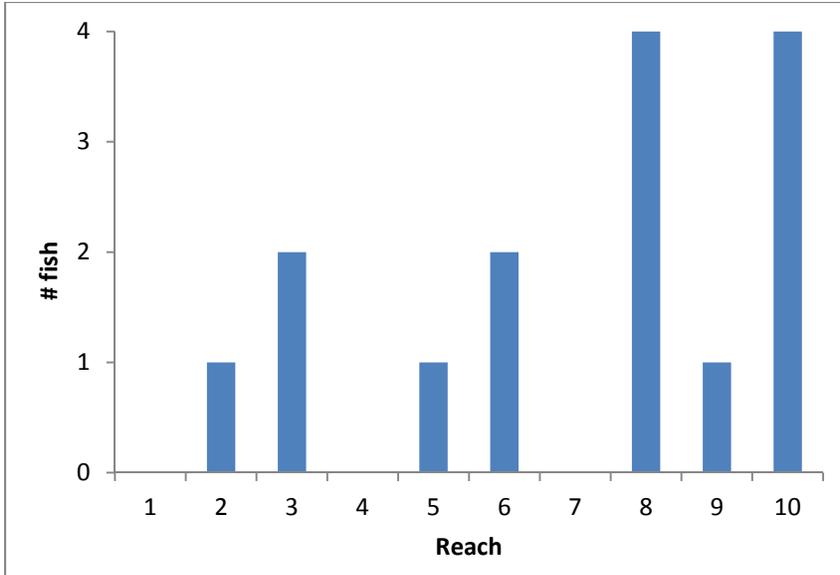


Figure 7. Piscivore-sized smallmouth bass (TL>325mm) by reach in Yampa Canyon, 2013.

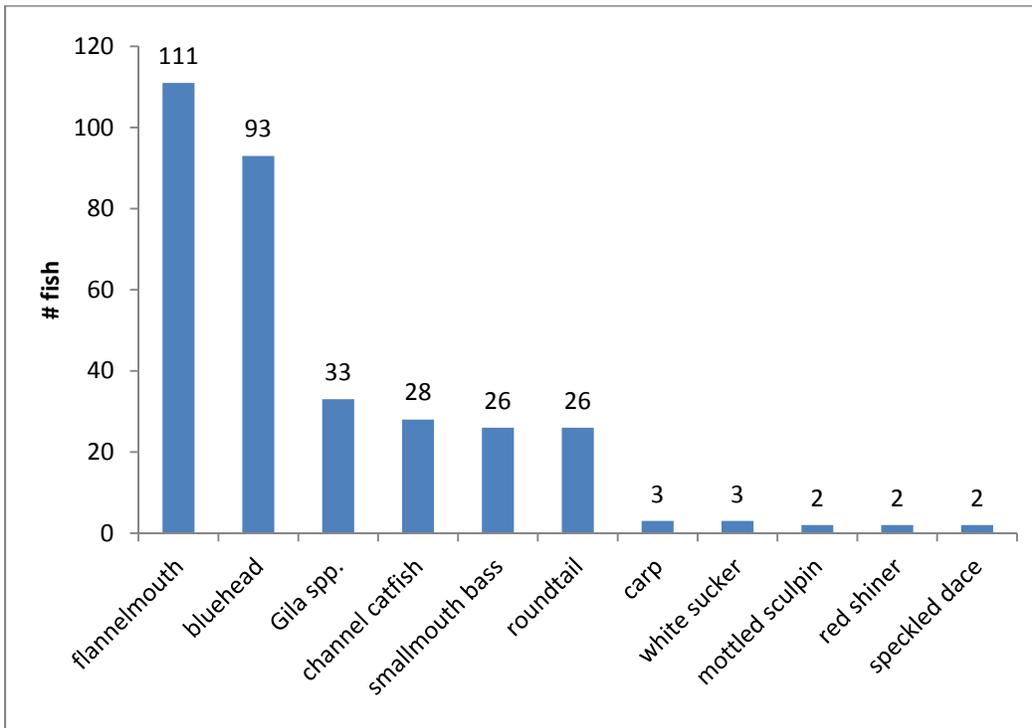


Figure 8. Number of fish captured for each species in five, one-mile monitoring reaches, 2013.

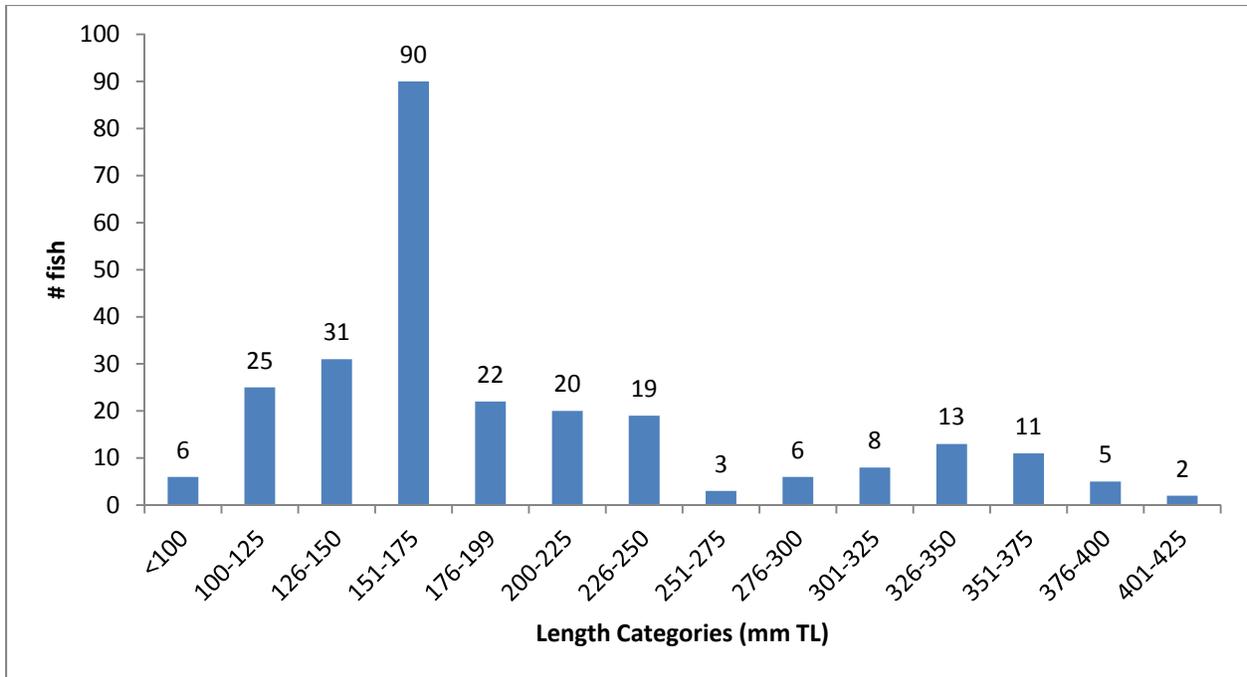


Figure 9. Length frequency of *Gila* collected in Yampa Canyon, 2013.

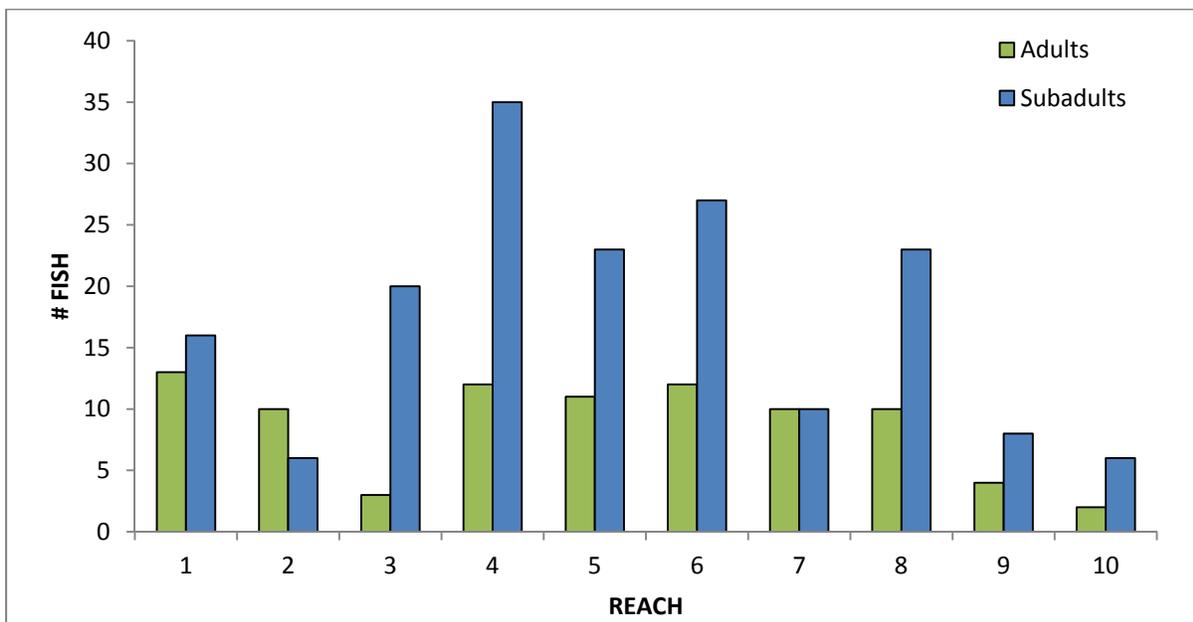


Figure 10. Distribution of *Gila* by reach, 2013.