COLORADO RIVER RECOVERY PROGRAM
FY 2017 ANNUAL PROJECT REPORT

RECOVERY PROGRAM
PROJECT NUMBER: 98b

I. Project Title: Upper Yampa River northern pike management and monitoring

II. Bureau of Reclamation Agreement Number(s): R15PG00083

Project/Grant Period: Start date: 10/01/2014
End date: 09/30/2019
Reporting period end date: 9/30/2017
Is this the final report? Yes _____ No __X___

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IV. Abstract:
This project aims to reduce the abundance of northern pike, smallmouth bass, and white sucker immediately upstream of critical habitat in the Yampa River between Hayden and Craig, Colorado. Electrofishing boats are used to sample this reach during spring and early summer. In 2017 we euthanized 38 smallmouth bass, 1,211 white suckers, and 119 northern pike. Fewer northern pike and white sucker were removed in 2017 than 2016 and seven more smallmouth bass were captured. The number of northern pike removed annually in this project have declined markedly since Colorado Parks and Wildlife (CPW) began using gill nets to remove northern pike from the Yampa River in 2014. We suspect that lower northern pike catch rates in comparison to our efforts previous to 2015 are a result of CPW's gill netting and multi-agency northern pike removal that has occurred for over a decade.

V Study Schedule: 2004-ongoing.

VI. Relationship to RIPRAP:
GREEN RIVER ACTION PLAN: YAMPA AND LITTLE SNAKE RIVERS
III.B.2 Control nonnative fishes via mechanical removal
III.B.2.a. Estimate nonnative status, trends, and distribution
III.B.2.d. Remove northern pike from Yampa River
III.B.2.e. Remove smallmouth bass

VII. Accomplishment of FY 2017 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

We conducted six electrofishing passes within the 38-mile study section of the upper Yampa River where all passes were used as removal passes, and all northern pike, smallmouth bass, and white sucker captured were euthanized. The length of river sampled varied among passes this year due to logistical constraints such as the 2017 Federal government hiring freeze and injuries. Two full passes from the Hayden Pump Station boat ramp (RM 171.6) to the South Beach boat ramp (RM 134.5) and four abbreviated passes from the Dorsey boat ramp (RM 151.5) to South Beach were conducted between 12 June and 19 July 2017. The final three passes occurred in conjunction with "The Surge", which is a component of Project 125 (Colorado State University Larval Fish Lab [LFL]), wherein multiple agencies simultaneously conduct smallmouth bass removal throughout the Yampa River downstream of Hayden, Colorado. Smallmouth bass captured during passes 4 – 6 are reported in the Project 125 Annual Report (Hawkins 2017, in press), however northern pike and white sucker are reported herein.

Northern Pike

We removed 119 northern pike from the study reach in 2017. We consider fish <300mm total length (TL) juveniles, fish ≥300mm TL adults, and fish ≥450mm TL as piscivores. Of the 119 fish removed in 2017, 48 were juveniles and 71 were adults, of which 38 were piscivores (Table 1). More northern pike were removed in 2016, when 198 individuals (14 juveniles and 182 adults, of which 128 were piscivores) were euthanized.

Length-frequency of pike captured in 2017 showed greater representation by small and medium adults than other size classes (Figure 1). The majority (60%) of the fish captured were adults, ranging from 317-968 mm. The proportion of juvenile fish increased from 7 percent in 2016 to 40 percent in 2017, which could suggest that northern pike spawning and recruitment were more successful in 2016 compared to 2015. However, 42 out of 48 of these juvenile pike were caught during "The Surge" and would not have been included in 2016 analysis. Furthermore, juvenile northern pike appear to recruit to electrofishing gear when runoff subsides, water temperature increases, and backwater accessibility becomes limited, conditions which are typically encountered after the bulk of Project 98b work is done.

The overall catch per unit effort (CPUE) in 2017 was the lowest of any year since this project began in 2005 except for 2015 (Figure 2). Increased catch rates in 2016 were attributed to changes in data collection methods rather than higher northern pike densities in the Yampa River. That is, data collected in 2016 and later is biased higher when compared to previous data. Catch rates in the main channel of the Yampa River had been very low for years, so we decided to focus effort in backwater habitat to increase removal efficiency. This change reduced the total electrofishing effort relative to the number of fish being caught, which artificially increased the catch rates. Despite this change in methodology, 2017 northern pike CPUE continued to drop in this stretch of the Yampa River. Northern pike removed within this study reach by CPW gill netting efforts

immediately before this project begins each year have almost certainly affected our early season catch rates since 2014. In addition to gillnetting removal effects, we suspect that overall declining catch rates could be the result of over ten years of coordinated multi-agency (USFWS, LFL, and CPW) northern pike removal efforts.

Catch rates in 2017 were highest during the third pass (June 29th, CPUE = 4.4 NP/hr) and were relatively low in other passes (Figure 4). In general, the number of northern pike removed per pass declined throughout the season (Figure 5), but it seems more likely that this was the result of decreased capture efficiency due to lower flows and restricted access to backwaters/pike concentration areas rather than depletion.

Additionally, we began recording effort, location (UTM), and fish data (TL and number of northern pike caught) at the backwater scale instead of the two-mile reach scale. This method allows the determination of catch rates on the reach scale as well as the identification of where northern pike were captured within each two-mile reach (Figures 6 & 7). We expect that the increased resolution in our data will benefit future targeted northern pike removal, whether it is achieved by electrofishing, gill netting, or other methods.

Northern Pike Tags

One 968 mm northern pike carrying a gray LFL floy tag was captured in a backwater approximately 1.5 miles downstream (RM 167.4) of the Carpenter Ranch. This ripe female was marked at RM 122.5 in 2012 when it measured 442 mm TL, and had therefore grown 526 mm in length and moved upstream at least 45 miles.

Smallmouth Bass

Thirty-eight smallmouth bass (97 – 355 mm TL; 2 juveniles < 200 mm, 36 adults ≥ 200 mm, 3 piscivores ≥ 325 mm) were captured in this study compared to 31 (118 - 340 mm TL) in 2016 (Figure 4; Smith & Jones 2016). The majority, or 33 individuals (average TL = 268.4 mm SE = ±7.5 mm), were caught at the Elkhead Creek confluence or up to ¼ mile upstream within Elkhead Creek. An additional 27 smallmouth bass (average TL = 195.4 mm SE = ±13.4 mm) were caught at this site during Surge passes (Hawkins 2017, in press). Smallmouth bass escapement from Elkhead Reservoir into Elkhead Creek and the Yampa River likely caused the current bass problem in this river system (Modde and Smith 1995). A spillway block net was installed in the fall of 2016 to prevent future introductions, but despite the reservoir source being cutoff, Elkhead Creek continues to promote nonnative influence within the Yampa River. Smallmouth bass spawning and nests were noted at this confluence in 2012 and 2013 (Webber 2012, 2013) and temperatures in Elkhead Creek can be suitable for spawning earlier than in the Yampa River thereby possibly extending the growing season and survival of young-of-year bass within this reach.

White Sucker

We removed 1,211 white suckers (34 -544 mm TL) in 2017, compared to 2,302 white suckers (73 -582 mm TL) in 2016. Of these, 567 measured < 200 mm TL and 644 measured ≥ 200 mm TL compared to 294 and 2,008 in 2016, respectively. While the

proportion of juvenile (< 200 mm TL) white sucker caught was noticeably higher in 2017 than 2016 (46.8% versus 12.7%), this might not reflect actual changes in Yampa River white sucker size structure. The majority of 2017 sampling occurred from late June to mid-July and similar to juvenile northern pike, juvenile white sucker appear to recruit to electrofishing gear after flows have subsided and water temperature has increased. Although fewer white sucker were caught in 2017, catch rates were similar to 2016. If the previously mentioned logistical constraints had not reduced effort this year, it seems likely that we would have removed similar numbers of white sucker to years past and possibly more. Depletion between passes did not occur this year (Figure 9), similar to the past five years (Webber 2012, 2013, Webber et al. 2014, Smith and Jones 2015, 2016). The continued removal of this species is warranted, especially during spring spawning periods, given that we continue to observe increased white sucker abundance every year and are aware of their direct (competition and hybridization) and indirect (prey base for northern pike) threats to native fish in the Yampa River.

VIII. Additional noteworthy observations:

- No bluehead sucker, flannelmouth sucker, or roundtail chub were caught on the Yampa River between Hayden and Craig, Colorado in 2017, nor were any of the four endangered fish species.

IX. Recommendations:

- We recommend conducting 5 passes as early as possible in the spring to remove as many northern pike as possible in backwaters where spawning individuals are concentrated and conducting 2 passes after peak runoff to target the smallmouth bass spawn.

- If deemed necessary, gill netting efforts could be extended later into the spring and into more backwaters by shifting some effort from electrofishing to gill netting. In some cases this will require us to obtain permission from landowners to access backwaters that exist within private property. Crews in electrofishing boats could identify near and off-channel backwaters that are not accessible to jon boats due to constrictions or breach depths at certain flows. We believe that this would increase our efficiency at low and high water levels.

- Using backwater-specific data to locate areas with potentially higher northern pike densities, investigate other northern pike removal methods such as “shock and block” backpack electrofishing to extend removal efforts later into the summer when northern pike could be confined to habitat such as main channel pools, off channel canals, and gravel pit ponds.

X. Project Status: This project is on track and ongoing

XI. FY 2017 Budget Status:
- A. Funds Provided: $91,567
- B. Funds Expended: $91,567
- C. Difference: -0-
- D. Percent of the FY 2017 work completed: 100%
- E. Recovery Program funds spent for publication charges: -0-

XII. Status of Data Submission:

XIII. Signed: Christian Smith — Principal Investigator — 28 November 2017 — Date

References:

Modde, T. and G. Smith. 1995. Flow Recommendations for Endangered Fishes in the Yampa River. Final Report to the Recovery Implementation Program for the Endangered Fishes of the Upper Colorado River Basin. Denver, CO.

Smith, C. and M.T. Jones. 2015. Upper Yampa River northern pike management and monitoring. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO

Smith, C. and M.T. Jones. 2016. Upper Yampa River northern pike management and monitoring. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO

Webber, A. 2012. Management of northern pike from the Yampa River upstream of Craig, Colorado. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Webber, A. 2013. Management of northern pike from the Yampa River upstream of Craig, Colorado. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Webber, A., C. Smith, and M.T. Jones. 2014. Upper Yampa River northern pike management and monitoring. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Table 1. Juvenile (includes all northern pike < 300 mm), adult (300 ≤ 449 mm), and piscivore (≤450 mm) class northern pike removed from the Yampa River for each pass in 2017. Dates sampled are indicated for each pass, with passes 1 and 2 being complete passes wherein all 38 miles of the study reach were sampled. Passes 3 through 6 occurred from the Dorsey boat ramp (RM 151.5) to South Beach (RM 134.5) and passes 4 through 6 occurred in conjunction with The Surge/Project 125.

Pass/Date	Juveniles	Adults	Piscivores	Total
1 - 12-13 June, 21-23 June	0	32	20	32
2 – 22 June, 28-30 June	2	19	11	21
3 - 29 June	4	15	4	19
4 - 10-11 July	12	4	3	16
5 - 12-13 July	22	0	0	22
6 - 18-9 July	8	1	0	9

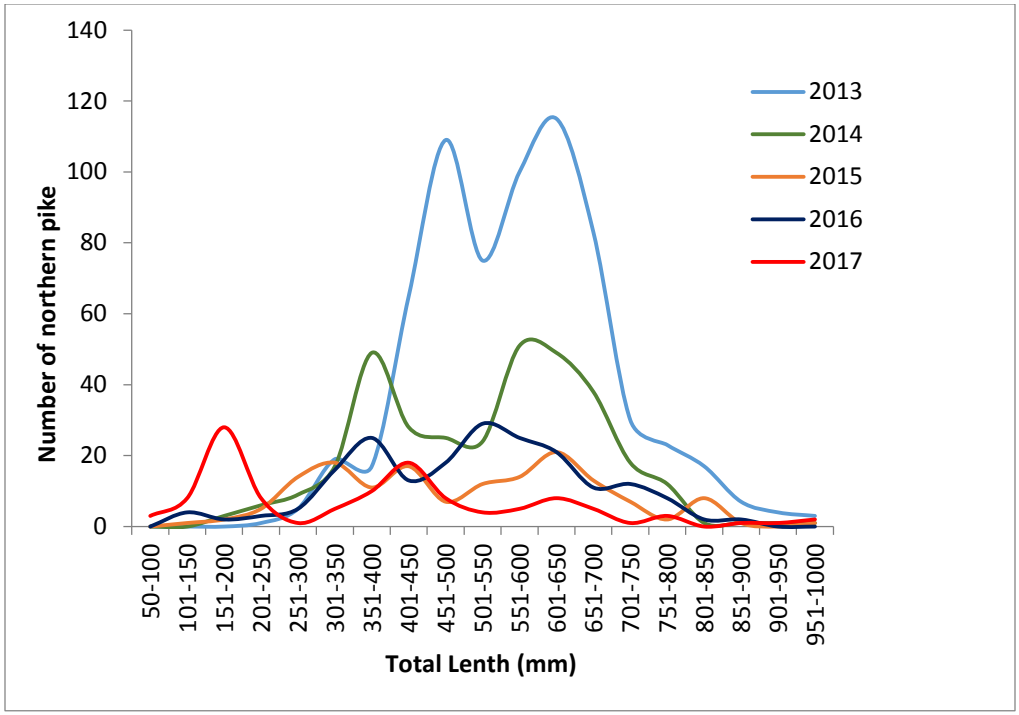

Figure 1. Length frequency of Yampa River northern pike captured in Project 98b, 2013 – 2017.

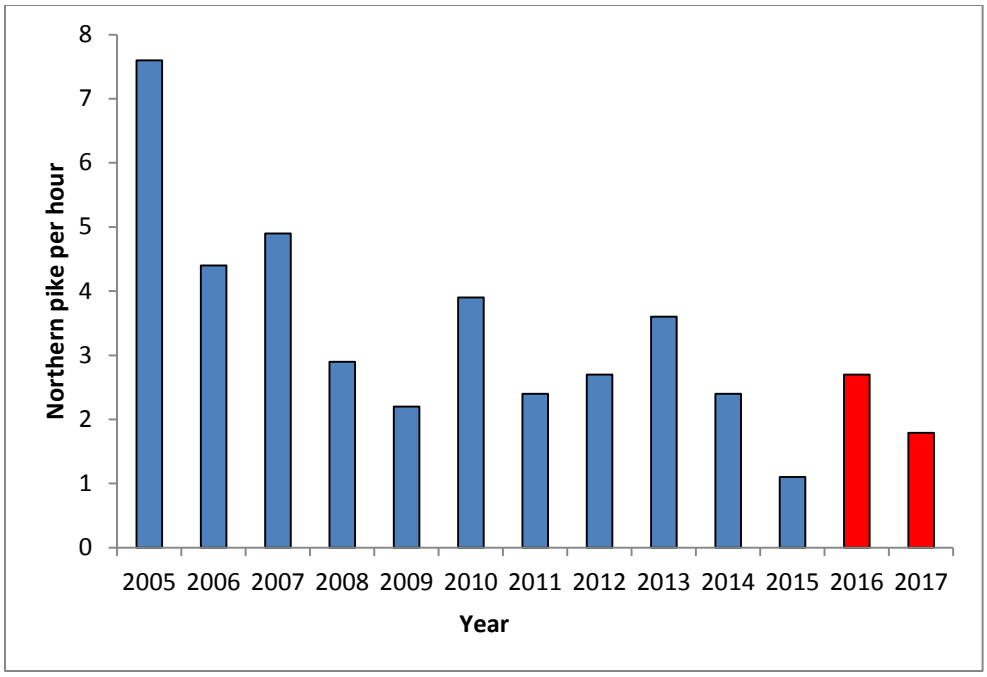

Figure 2. Overall northern pike catch rates per hour (CPUE) from 2005 - 2017 for Project 98b. Changes to northern pike removal and data collection methodology were employed in 2016 and 2017 (red bars) wherein effort was expended and recorded primarily in backwaters. This resulted in catch rates that were biased higher in 2016 and 2017.

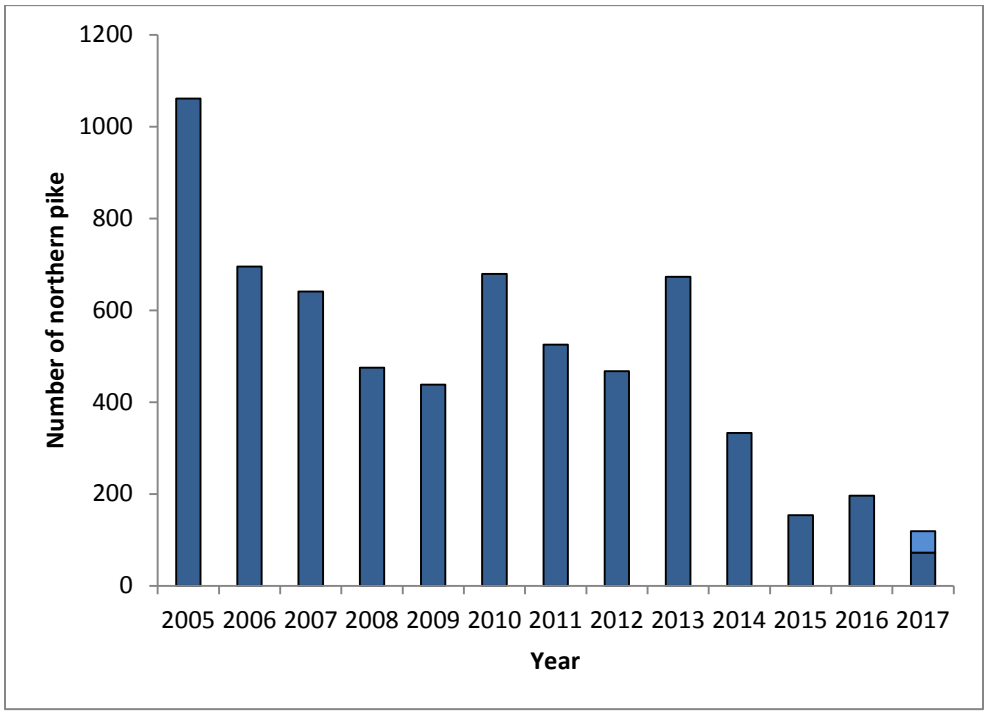

Figure 3. Number of northern pike removed annually in Project 98b from 2005 – 2017 in the Yampa River between Hayden and Craig, Colorado. The portion of northern pike caught in 2017 passes 1 – 3 are shown in dark blue, with passes 4 – 6 (The Surge) displayed in light blue.

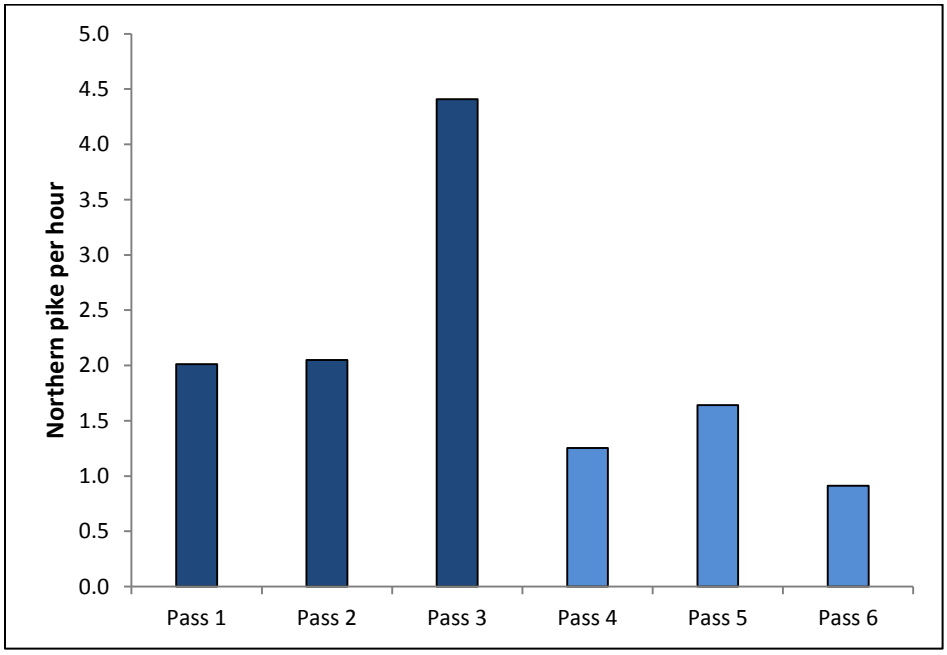

Figure 4. Catch rates for northern pike by pass, Yampa River 2017 in Project 98b. Passes 4 – 6 were concurrent with The Surge/Project 125 in 2017. The Surge typically occurs after Project 98b passes are completed.

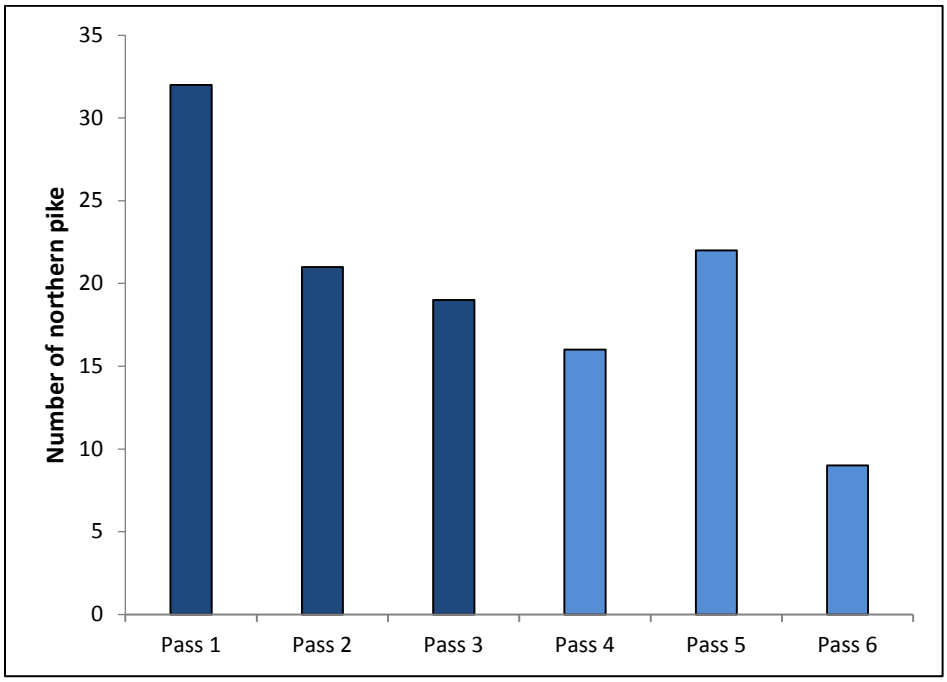

Figure 5. Northern pike captured by pass in the Yampa River, 2017 in Project 98b. Passes 4 – 6 were concurrent with The Surge/Project 125 in 2017. The Surge typically occurs after Project 98b passes are completed.

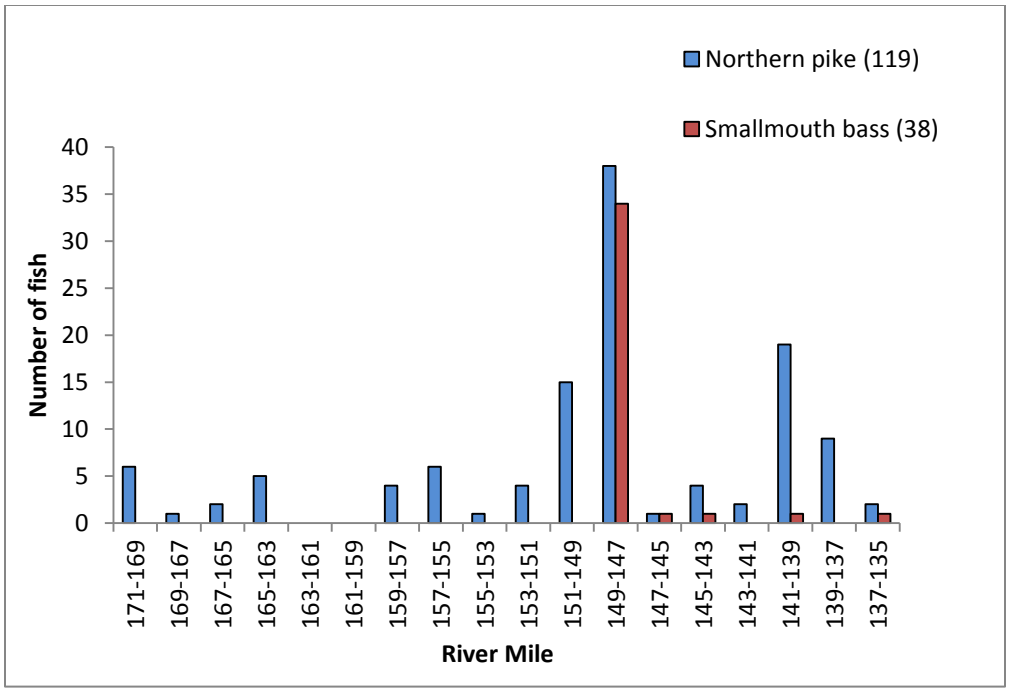

Figure 6. Total number of northern pike and smallmouth bass captured by river mile reach, Yampa River 2017 in Project 98b.

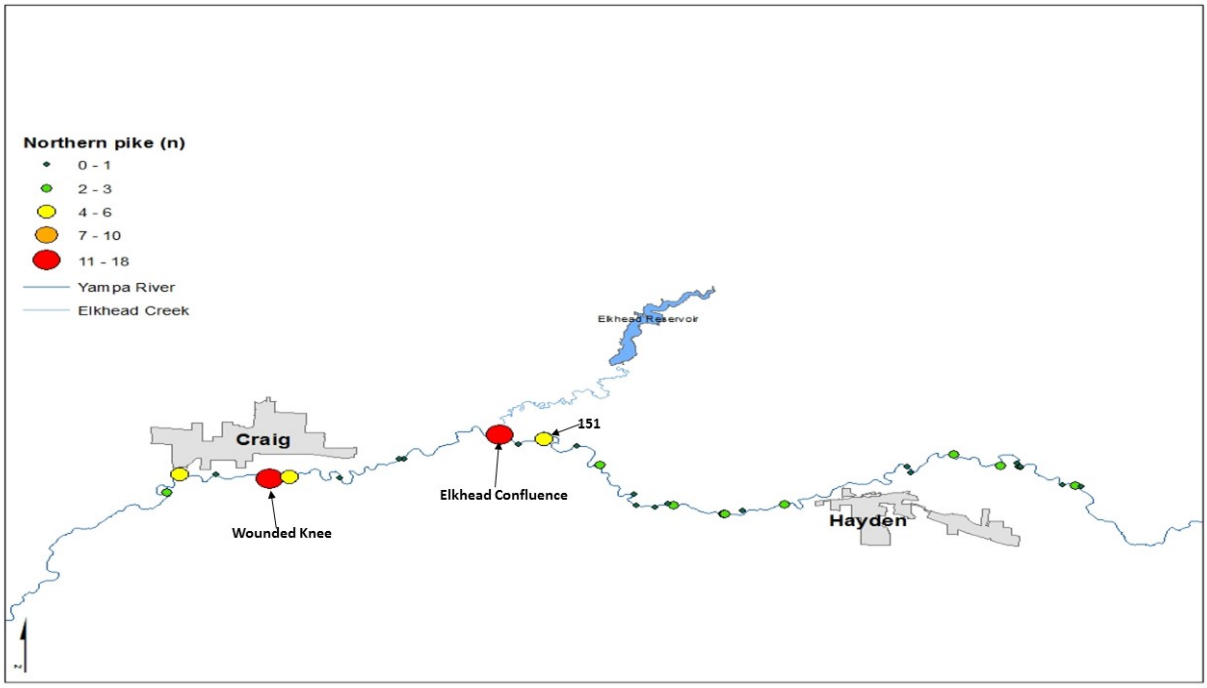

Figure 7. Northern pike (n) captured in backwaters, Yampa River 2017 in Project 98b. More northern pike were caught within the final 0.25 miles of Elkhead Creek than any other discrete location in this study in 2017.

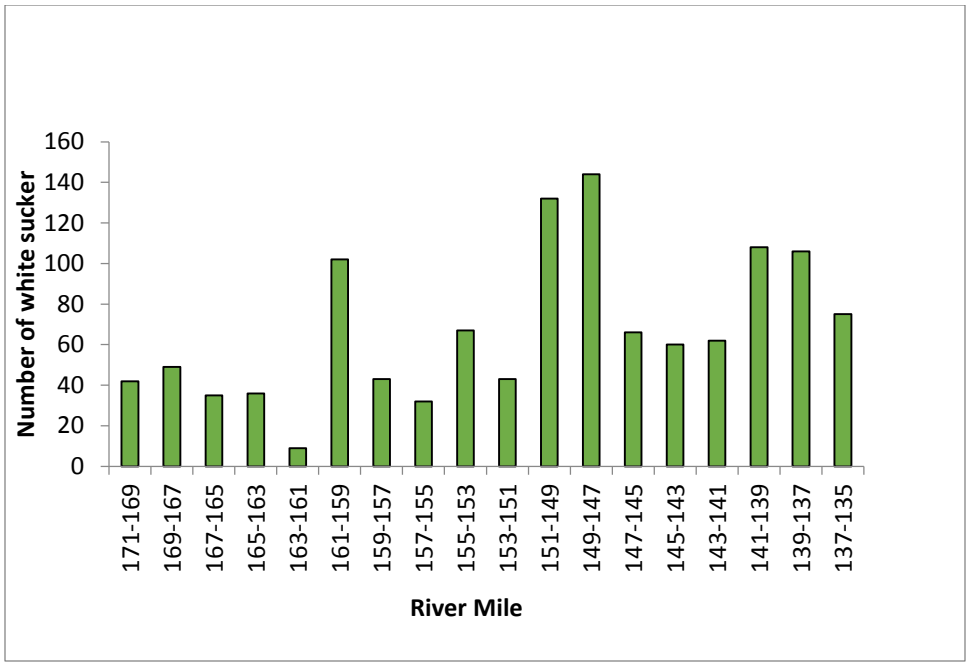

Figure 8. Total number of white sucker captured by river mile reach, Yampa River 2017 in Project 98b.

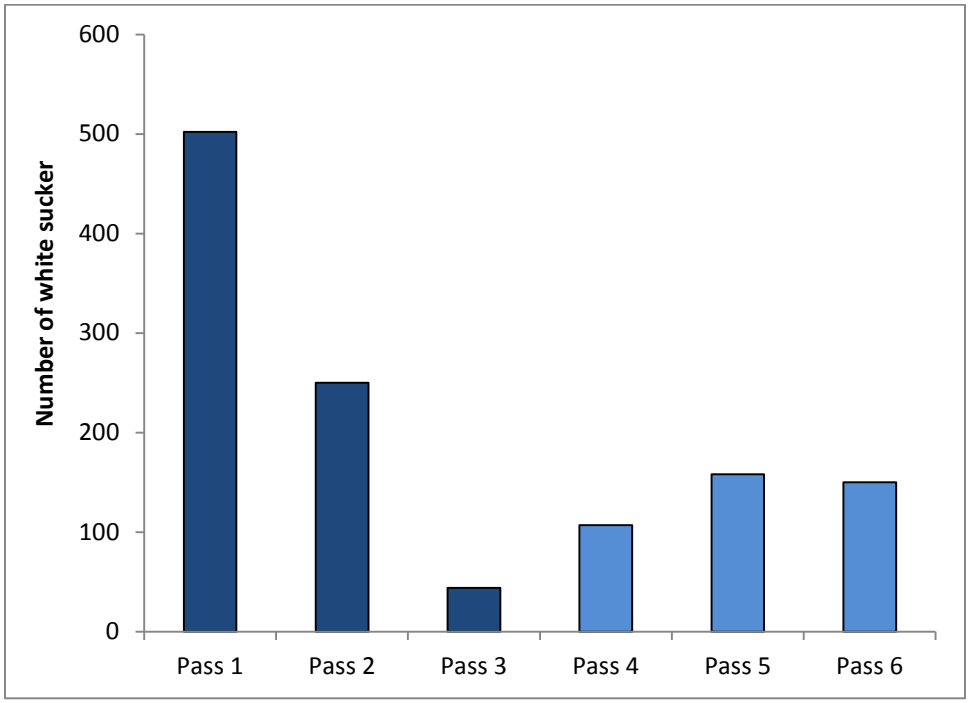

Figure 9. Number of white suckers removed by pass from the Yampa River between Hayden and Craig during 2017 in Project 98b.

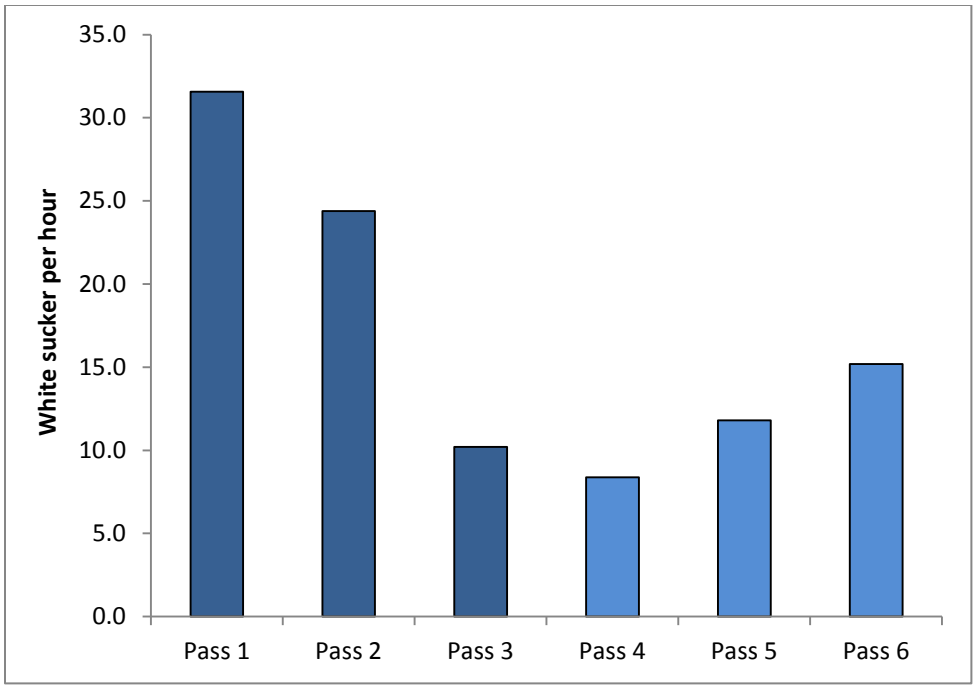

Figure 10. Catch rates for white sucker by pass from the Yampa River between Hayden and Craig during 2017 in project 98b.