

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

FY 2021 ANNUAL REPORT

PROJECT: 98a

Project Title

Middle Yampa River nonnative fish management

Bureau of Reclamation Agreement Number:

R17AP00301

Project/Grant Period:

Start date: 09/22/2017

End date: 09/30/2022

Reporting period end date: 11/19/2021

Is this the final report? Yes _____ No X

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Abstract:

This project is one of several designed to facilitate the removal of nonnative northern pike and smallmouth bass within the Yampa River Basin, with an evaluation of the efficiency of such efforts. The study area consisted of the middle Yampa River miles (RM) 170.0-122.0 (spring backwater gill netting) and 134.2 to 50.5 (mainstem electrofishing) which were sampled to capture and remove smallmouth bass and northern pike. Colorado Parks and Wildlife (CPW) and the U.S. Fish and Wildlife Service (USFWS) removed 123 northern pike during spring (April 6th – May 14th) backwater gill netting efforts. CPW and Colorado State University (CSU) removed 100 northern pike during electrofishing efforts which began May 18th and continued through June 25th. The northern pike electrofishing catch rate was 0.44 fish/hour, continuing a downward trend of annual northern pike CPUE since 2019. Please see CSU's 2021 Annual Report for Project #125 for a detailed analysis of smallmouth bass data collected in the study area.

Study Schedule:

2005 (CPW assisted CSU in 2004)-Ongoing

Relationship to RIPRAP:

This study involved removing nonnative fish, primarily northern pike and smallmouth bass, from the middle Yampa River near Craig, Colorado (RM 134.2). CPW evaluated the efficiency of that northern pike removal, while CSU evaluated the smallmouth bass removal effort.

General Recovery Program Support Action Plan

III. Reduce negative impacts of nonnative fishes and sportfish management activities (nonnative and sportfish management).

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III.A. Reduce negative interactions between nonnative and endangered fishes.

III.A.2. Identify and implement viable active control measures.

Green River Action Plan: Yampa and Little Snake rivers:

III.B. Implement CPW Yampa Basin aquatic wildlife management plan (CDOW 1998) and the Recovery Program's Yampa River Nonnative Fish Control Strategy. Each control activity will be evaluated for effectiveness and then continued as needed.

III.B.2. Control nonnative fishes via mechanical removal.

III.B.2.d. Remove (formerly "and translocate") northern pike from Yampa River designated critical habitat.

III.B.2.d. (1) Remove northern pike above Craig, Colorado

III.B.2.e. Remove (formerly "and translocate") smallmouth bass.

Accomplishment of FY 2021 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task 1. Establish landowner contacts, obtain permission to access property and backwaters for sampling.

Schedule: February-Mid March

Deliverable: Task completed. Access was not granted to sample the 151 backwater.

Task 2. Plan logistics, hire and train personnel, order and maintain equipment, and prepare for sampling.

Schedule: February-April

Deliverable: Task partially completed. Ongoing agency restrictions due to COVID-19 prevented the hiring of a full crew.

Task 3. Complete early spring backwater removals utilizing gill nets to target northern pike during the spawning period in the area covering Project #98a and #98b sections of river.

Schedule: Mid March-April

Deliverable: Task completed. See below for information regarding the work that was completed.

Task 4. Complete main channel and backwater electrofishing within the study area to remove northern pike and smallmouth bass. This task is included in Scope of Work 128 in FY18, 21, and 22 because it will focus on providing data for Colorado pikeminnow population estimates.

Schedule: May

Deliverable: Task completed. See below for information regarding work that was completed.

Task 5. Complete main channel and backwater electrofishing within the study area to remove northern pike and smallmouth bass. Assist CSU with the Surge to target smallmouth bass utilizing raft electrofishing and other methods during the spawning period and low hydrograph conditions.

Schedule: Early to Mid June; Early July

Deliverable: Task partially completed due to COVID-19 agency guidelines and hydrologic conditions. Fourteen of 18 sampling days on the river were completed. See below for information regarding work that was completed.

Task 6. Maintenance of equipment, data entry, data analysis, and preparation of final report. Present findings during the Annual Nonnative Fish Control Workshop/Coordination Conference Calls, and at the Annual Recovery Program Researchers Meeting.

Schedule: August- January

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Deliverable: Annual Report completed. Findings will be discussed during the Annual Nonnative Fish Control Coordination conference calls.

Study Area

The study area includes 47.3 river miles of the middle Yampa River from just downstream of Craig, Colorado (RM 134.2) to just upstream of Cross Mountain Canyon (RM 60.6). Specific river segments include: South Beach: RM 134.2 (South Beach launch) to RM 124.0 (Round Bottom), Juniper: RM 100.0 (upstream of Government bridge) to RM 91.0 (mouth of Little Juniper Canyon), Juniper Canyon: RM 91 to RM 89.5 (downstream end of Little Juniper Canyon), Upper Maybell: RM 88.7 (downstream of Juniper Canyon) to RM 79.2 (Maybell bridge launch), Lower Maybell: RM 79.2 to RM 71.0 (Sunbeam launch), and Sunbeam: RM 71.0 to RM 60.6 (just upstream of Cross Mountain launch).

Northern pike were not removed by CPW in 24 miles of river through Little Yampa Canyon, RM 124.0 (Round Bottom) to RM 100.0 (near Government Bridge). CSU has established this reach as a smallmouth bass study area. These 24 miles have also been included in previous studies for northern pike removal. Therefore, CSU removed northern pike within these stretches in conjunction with their smallmouth bass study. CSU also removed smallmouth bass and northern pike from downstream of Cross Mountain Canyon (RM 55.5) to just downstream of the Little Snake River confluence (RM 50.5). CPW and CSU's combined study area includes a total of 77.8 river miles. CSU's northern pike data were collated with CPW data and reported by CPW in this report. CPW also removed smallmouth bass across the entire CPW study area. CPW's smallmouth bass data were collated with CSU data and reported by CSU in the 2021 Annual Report for Project #125.

Study Methods/Approach

Early Spring Backwater Gill Netting

Northern pike can be exploited from early April to mid-May as fish seek backwater habitat for spawning (Hill 2005). Backwater areas in CPW Project #98a and CSU Project #98b sections (RMs 170.0-122.0) of the Yampa River, where CPW has obtained permission from landowners, are gill netted annually as the ice recedes and hydrological conditions allow. The goal of this effort is to remove northern pike from the backwater areas before fish have a chance to spawn and thus reduce the annual cohort contributed to the Yampa River northern pike population.

Early spring backwater gill netting was a collaborative effort between CPW and the USFWS. Eleven backwaters were sampled using gill nets with 1.5 inch mesh size, and ranging from 50 to 150 feet in length. Most backwaters were sampled using one gill net, although two of the largest backwaters (Weber and Lower Carpenter) were sampled using up to two gill nets to increase capture probability and to compensate for damage to the nets caused by rodents, drifting wood, and other debris.

Yampa River backwaters were accessed either by foot or by jon boat. Gill nets remained set overnight and were checked each day that they remained set. The nets were set and pulled depending on water conditions. A net was not set until the backwater was inundated, and was pulled when the backwater disconnected from the river or at the completion of the project. Four of the 11 backwaters were accessible and therefore sampled beginning April 6th. Nets from those four backwaters were removed on April 18th due to low water conditions. Hydrologic conditions improved by May 3rd, when crews reset the four previously sampled backwaters, as well as, an additional seven backwaters. Backwater gill

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netting concluded on May 14th. Catch-per-unit-effort (CPUE) was reported as northern pike per net-night and calculated for each backwater in addition to overall northern pike CPUE across all backwater locations.

All fish captured were measured for total length (tl) to the nearest millimeter (mm), and weighed to the nearest gram (g). Northern pike collected were scanned to determine the presence of passive integrated transponder (PIT) tags and examined for FLOY tags. Bluehead sucker, flannelmouth sucker, roundtail chub, and Colorado pikeminnow captured were scanned to determine the presence of PIT tags. PIT tag number was recorded and stored in the PIT tag reader for those fish encountered with PIT tags. Individuals without PIT tags were implanted with a new PIT tag following the appropriate protocol. Capture locations for these species were recorded to the nearest tenth of a river mile. Universal Transverse Mercator (UTM) coordinates associated with capture locations were also recorded, when possible. All native species captured were released alive, immediately. Any native fish captured that was visibly stressed was not processed, but rather returned to the location of capture within the river, immediately.

All nonnative fish collected, excluding salmonids and channel catfish, were lethally removed, and either provided to landowners and/or licensed anglers, or disposed of in a landfill. Nonnative species of unusual occurrence, i.e. walleye, burbot, grass carp, etc. that were collected had their otoliths extracted prior to disposal.

Mid-May through late-June: Mainstem Electrofishing and Backwater Block-and-Shock

Main channel electrofishing and block-and-shock techniques in backwaters to target northern pike and smallmouth bass were the focus of the sampling effort that began May 18th and continued through June 25th. During that time, crews completed from one to five electrofishing passes through each sampling reach. The South Beach reach was sampled five times (May 19th, May 26th, June 1st, June 10th, and June 16th). The Little Yampa Canyon reach was sampled four times (May 21st-24th, June 4th-7th, June 15th-18th, and June 23rd-25th). The Juniper reach was sampled three times (May 20th, May 27th, and June 3rd). The Upper Maybell reach was sampled three times (May 18th, June 2nd, and June 9th). The Lower Maybell reach was sampled three times (May 21st, May 28th, and June 4th). The Sunbeam reach was sampled once (May 25th). The Lily Park reach was sampled once (June 2nd-June 3rd).

Two electrofishing crews utilized jon boats with outboard jet units to perform sampling in the main channel. Each crew simultaneously sampled the left and right shorelines in a downstream direction using ETS electrofishing equipment. Island perimeters were also electrofished. No river segments were electrofished on consecutive days to allow for fish recovery and redistribution. Typically a third, chase boat, is operated by two additional crew members to process fish captured. In 2021, a chase boat was not used in order to reduce crew size due to COVID-19 concerns. Instead, fish collected were processed by the electrofishing boats. Electrofishing effort was recorded by reach sampled, habitat type (main channel or backwater), and by date. Water conductivity and temperature were recorded at the beginning of each sampling day.

Backwaters where CPW obtained permission to sample were also included within this sampling effort, when feasible. Crews sampled backwater areas along both sides of the river. A gill net was used with a block-and-shock technique. Backwater habitats were sampled until the river receded and habitats were no longer accessible. Output power within backwaters was adjusted based upon changes in river

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conductivity. Additionally, output power was reduced during the boat approach to the blocked mouth. Both processes minimized the potential for electrofishing injuries to fish.

All fish captured, with the exception of white sucker, were measured for tl, to the nearest mm, and weighed to the nearest g. Not all white sucker captured were measured in order to reduce the amount of time spent processing fish and to maximize the amount of time spent electrofishing since a chase boat was not used in 2021. Bluehead sucker, flannelmouth sucker, roundtail chub, and Colorado pikeminnow captured were also scanned to determine the presence of PIT tags. PIT tag number was recorded and stored in the PIT tag reader for those fish encountered with PIT tags. Individuals without PIT tags were implanted with a new PIT tag following the appropriate protocol. Capture locations for these species were recorded to the nearest tenth of a river mile. UTM coordinates associated with capture locations were also recorded, when possible. All native species captured were released alive, immediately. Any native fish captured that was visibly stressed was not processed, but rather returned to the location of capture within the river, immediately.

All nonnative fish collected, excluding salmonids and channel catfish, were lethally removed, and either provided to landowners and/or licensed anglers, or euthanized and disposed of in a landfill. Northern pike collected were scanned to determine the presence of PIT tags and examined for FLOY tags. Smallmouth bass collected were examined for the presence of FLOY tags and fin clips. PIT tag number, FLOY tag number and color, and any fin clips observed were recorded. Nonnative species of unusual occurrence, i.e. walleye, burbot, grass carp, etc. that were collected had their otoliths extracted prior to disposal.

CPUE was reported in terms of the number of northern pike captured per electrofishing hour for the entire study area. In addition to overall CPUE, catch effort was reported for all seven river reaches within the study area. For these reaches, CPUE was split into four categories and reported for each pass. The four categories for which CPUE was reported included northern pike: (1) < 300mm tl, (2) 300-449mm tl, (3) \geq 450mm tl, and (4) total number.

Results and Discussion

Early Spring Backwater Gill Netting

In total, 275 fish were captured during early spring backwater gill netting efforts (Table 1). No native fish were captured during spring backwater gill netting. Forty five percent (n=123) of fish captured were northern pike. Of the 123 northern pike captured, 120 fish were measured and three fish were partially scavenged and not measurable. The majority of measurable northern pike were adult fish exceeding 300 mm tl (117 of 120) (Figure 1). One hundred and sixteen of the 120 measurable northern pike were identified by sex. Sixty three of the 116 (54%) northern pike were identified as mature females. Of the mature female northern pike handled, 25% (n=16) were captured in pre-spawning conditions (not ripe). Sixty eight percent (n=43) of mature female northern pike collected were in spawning conditions (ripe with eggs), and ready to spawn. Only 3% (n=2) of mature female northern pike handled had spawned prior to capture by gill nets. An additional two female northern pike were captured, identified as females, but spawning condition was not recorded.

Northern pike catch rate was variable depending on the backwater sampled (Figure 2). The highest observed catch rate was 3.64 northern pike per net-night at the Eagles Nest backwater. No northern pike

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were captured in the Gravel Pit and BLM backwaters. On average, 0.96 northern pike were captured per net-night during the spring backwater gill netting project in 2021, a slight increase compared to 2019 (0.82 northern pike per net-night), the last year in which the spring backwater gill netting project took place (Eyre 2019). In 2018, 0.66 northern pike on average were captured per net-night (Eyre 2018). The increased catch rate in 2021 compared to 2019 is not surprising considering that spring backwater gill netting did not occur in 2020 and a greatly reduced electrofishing effort was completed in 2020 due to COVID-19 agency restrictions.

General Overview - Mainstem Electrofishing and Backwater Block-and-Shock

A total of 18 different fish species were captured by CPW during mainstem electrofishing (Table 2). From May 18th through June 25th, 226.3 hours were expended by CPW and CSU electrofishing the study area (Table 3). Electrofishing effort in 2021 (226.3 hours) increased compared to 2020 when crews expended 170.0 hours (Eyre 2020). The greatest amount of effort was completed by CSU in the largest sampling reach area of Little Yampa Canyon (96.32 hours or 4 passes). The least amount of effort was expended in the Sunbeam reach (10.47 hours or 1 pass) because crews focused effort on other reaches with higher densities of northern pike and smallmouth bass.

Northern Pike Population Overview and Size Structure

Overall, CPW and CSU captured 100 individual northern pike during electrofishing operations in 2021 (Table 2). Crews captured less northern pike in 2021 when compared to individual northern pike captured in 2020 (n=117) (Eyre 2020). The majority (n=99 of 100 or 99%) of northern pike captured in 2021 were adult fish (≥ 300 mm tl) (Table 3, Figure 3). Of the 99 adult northern pike captured, 82 (83%) were classified as piscivores (≥ 450 mm tl). Only one (1%) northern pike captured was classified as a juvenile (<300 mm tl).

The low number of juvenile northern pike captures might be explained by the low water conditions experienced in 2021. The low magnitude of runoff may have resulted in fewer inundated backwaters less flooded, vegetated habitat that is utilized by northern pike to spawn. Crews may have failed to capture many juvenile fish because few were produced in 2021. Additionally, the short duration of runoff restricted electrofishing access, causing mainstem electrofishing to cease by June 25th, much sooner than 2020 (July 12th) and 2019 (August 12th) (Eyre 2020, Eyre 2019). Juvenile northern pike captures may have increased if crews were able to continue electrofishing later into the summer. During that time, water clarity increases, making smaller fish more visible. Also, since northern pike continue to grow throughout the year, juvenile fish become larger and more susceptible to electrofishing late in the season. Since electrofishing did not occur in July or August, it is unknown whether juvenile northern pike captures would have increased during that time.

Northern Pike Catch-Per-Unit-Effort (CPUE)

CPW and CSU combined electrofishing CPUE for northern pike across all river reaches in 2021 was 0.44 northern pike/hour (Figure 4). Combined electrofishing CPUE decreased from 2020 to 2021, although comparison between the two years is likely not reliable since total electrofishing effort was greatly decreased in 2020 and not all sampling reaches in the study area were sampled in 2020. Regardless of the reliability of combined 2020 CPUE, fewer northern pike were caught per hour of electrofishing in 2021 than in any other year in the history of this project (2004-2021) except for 2017

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and 2018 (Figure 4). Additionally, northern pike CPUE in 2021 continues a downward trend of annual northern pike CPUE since 2019.

A recent mark-recapture northern pike abundance estimate conducted in 2019 in the Project #98b study area immediately upstream of the Project #98a study reach suggested that decreased northern pike electrofishing CPUE is likely a result of decreased northern pike abundance (Bestgen et al. 2020). This could imply that the CPUE of 0.44 northern pike per hour in 2021 is also reflective of the low abundance of northern pike estimated in the Project #98a study reach compared to abundance estimates for the same area in 2020 and 2019.

CPUE is not uniform across sampling reaches nor is it uniform between passes of the same sampling reach. In 2021, three reaches from highest to lowest (Lily Park, Upper Maybell and South Beach) had notably higher northern pike CPUE compared to the remaining four reaches from highest to lowest (Sunbeam, Juniper, Lower Maybell, and Little Yampa Canyon) (Table 3). CPUE is typically high in the South Beach reach and the Upper Maybell reach compared to the remaining reaches but it is unusual for Lily Park to have the highest CPUE of all the reaches (Table 3, Eyre 2020, and Eyre 2019). In 2021, crews captured 2.16 northern pike per hour of electrofishing in Lily Park, which is almost twice as many northern pike captured per hour of electrofishing in the Upper Maybell reach (1.17 northern pike per hour), where CPUE was the second highest of all reaches. It is important to note, however, that more northern pike were caught in the Upper Maybell reach (n=35) than the Lily Park reach (n=23), that electrofishing effort was nearly 33% less in the Lily Park reach compared to the Upper Maybell reach, and that only one pass was completed in the Lily Park reach, all of which may have inflated CPUE compared to other reaches where multiple passes and more electrofishing effort were completed.

Colorado Pikeminnow

Colorado pikeminnow were not captured by CPW in 2021. The last year in which a Colorado pikeminnow was captured by CPW was in 2016, when two Colorado pikeminnow were captured.

Roundtail Chub

Four roundtail chub were captured by CPW in 2021. All roundtail chub captured were juvenile fish ranging from 124mm tl to 131mm tl. No adult roundtail chub were captured in 2021.

Significant Work Outside of Scope of Work: 5th Annual Elkhead Reservoir Fishing Classic

The management goal of CPW within Elkhead Reservoir is to reduce populations of smallmouth bass and northern pike, and replace these species with those that are compatible (largemouth bass, black crappie, and bluegill) with native fish conservation and recovery efforts downstream. Reducing smallmouth bass and northern pike from Elkhead Reservoir will minimize escapement risk and mitigate potential impacts on native fishes downstream. One tool used by CPW to disadvantage these two species is incentivized angler harvest.

Various methods can be used to incentivize harvest of a species; in the case of Elkhead Reservoir, and for the sixth year in a row, CPW has offered a free fishing tournament with valuable prizes awarded to anglers who harvest smallmouth bass and northern pike. The 2021 tournament was held from June 19th through June 27th, which included nine days and two weekends. Across the tournament, 219 anglers removed 668 smallmouth bass and 708 northern pike from the reservoir (Table 4).

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In order to evaluate smallmouth bass harvest success as a result of the tournament, CPW conducted a mark-recapture population estimate for adult smallmouth bass, utilizing Chapman's modification of the Lincoln-Petersen estimator. The first Elkhead Reservoir Fishing Classic was held in 2016, but population estimates were not generated until 2017. To generate a population estimate, biologists capture, mark, and release smallmouth bass prior to the tournament (recapture event), and anglers' catch of marked fish factors into the recapture portion of the estimate. Anglers have assisted in reducing the adult smallmouth bass ($\geq 200\text{mm}$ tl) population in Elkhead Reservoir from an estimated 1,917 \pm 415 (95% confidence interval) fish prior to the 2017 tournament to an estimated 647 \pm 266 (95% confidence interval) fish after the 2021 tournament (Figure 5).

In order to evaluate northern pike harvest success as a result of the tournament, CPW conducted a mark-recapture population estimate for adult northern pike, as well. CPW was not able to capture and mark enough northern pike in 2017, 2018, and 2020 to conduct a population estimate. A population estimate was calculated in 2021 and compared to the last mark-recapture population estimate which occurred in 2019. In 2021, the adult northern pike ($> 300\text{mm}$ tl) population was estimated at 3,109 \pm 968 (95% confidence interval) which is a slight decrease when compared to the 2019 post-tournament population estimate (Figure 6).

Cash awards, fishing gear, and other prizes were provided as part of a program with the Colorado Water Conservation Board. Biologists implanted internal PIT tags into one smallmouth bass and one northern pike in advance of the tournament with a plan to award cash prizes to anglers who caught those PIT tagged fish. Anglers did not catch the 2021 PIT tagged smallmouth bass nor the northern pike during the tournament and those cash prizes were instead awarded during a drawing at the conclusion of the tournament. Three anglers did receive prizes for harvesting two smallmouth bass and one northern pike with PIT tags that were associated with the 2020 fishing tournament. Cash awards were also provided to anglers who caught the most smallmouth bass and the most northern pike over the duration of the tournament. Fishing gear and other prizes were awarded to anglers daily for six categories, including the most smallmouth bass and northern pike harvested, and the smallest and largest smallmouth bass and northern pike harvested. Overall, the tournament was well-received by anglers and continues to serve as a mechanism to remove smallmouth bass and northern pike within Elkhead Reservoir while offering anglers an opportunity to participate in fisheries management of the reservoir.

Additional Noteworthy Observations:

In addition to the northern pike captured and removed during early spring backwater gill netting and mainstem electrofishing (discussed above), CSU captured an additional five northern pike in Little Yampa Canyon during electric seine netting efforts, one northern pike in Little Yampa Canyon during backpack electrofishing efforts, two northern pike in Upper Maybell by angling, and one northern pike in Little Yampa Canyon by angling.

Recommendations:

Continue to prioritize backwater gill netting over mainstem electrofishing for northern pike removal. More northern pike were captured during spring backwater gill netting ($n=123$) compared to electrofishing ($n=100$). Drought years such as 2021 present a challenge for crews to complete the number of removal days described in project Scopes of Work, but spring backwater gill netting continues to be the most effective method of capturing northern pike in April and May.

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Project Status:

This project is considered on track, with minor revisions to be considered. Additional evaluation of project commitments and efforts will be made internally by CPW in 2021. Additional refinement of the techniques used in the study is appropriate and will serve to further increase the efficiency of removal effort.

FY 2021 Budget Status

Funds Provided: \$135,490 for all projects (including 98a and 126b/167b)

Funds Expended: \$92,367 for all projects (including 98a and 126b/167b)

Difference: \$43,123 Funds expended include expenditures through September 30th, 2021. Additional expenditures may have occurred during this time period, but have not posted as of this reporting date. Those expenditures will be reported in the FY 2022 budget status report.

Percent of the FY 2021 work completed, and projected costs to complete: Approximately 78%

Recovery Program funds spent for publication charges: -\$0-

Status of Data Submission

Data will be uploaded into STReaMS by the end of March, 2022.

Signed:

Tory Eyre

Principal Investigator

11/16/2021

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Table #1.

A summary of the total number of individuals captured during spring backwater gill netting in the middle Yampa River in 2021. Nonnative fish that were lethally removed included northern pike, white sucker, and smallmouth bass.

Species	Number of Individuals Captured
Northern Pike	123
White Sucker	133
Brown Trout	10
Rainbow Trout	8
Smallmouth Bass	1
Total Number of Individuals Captured	275

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Table #2.

A summary of the total number of individuals captured during electrofishing in the middle Yampa River in 2021. Nonnative fish that were lethally removed included northern pike, black bullhead, brook stickleback, creek chub, fathead minnow, green sunfish, sand shiner, smallmouth bass, white sucker, and white sucker hybrids.

Species	Number of Individuals Captured
Northern Pike	100 (CSU 32 + CPW 68)
Black Bullhead	3
Bluehead Sucker	56
Brook Stickleback	18
Brown Trout	12
Creek Chub	65
Fathead Minnow	18
Flannelmouth Sucker	9
Green Sunfish	22
Mountain Whitefish	10
Rainbow Trout	9
Roundtail Chub	4
Sand Shiner	395
Speckled Dace	44
Smallmouth Bass	1,742
White Sucker	1,222
White Sucker x Bluehead Sucker Hybrid	6
White Sucker x Flannelmouth Sucker Hybrid	5
Total Number of Individual Fish Processed	3,740

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Table #3.

The number of northern pike (NPK) captured during electrofishing for each river reach in the middle Yampa River study area along with total electrofishing effort (hour) and catch-per-unit-effort (CPUE) in 2021. Each parameter by river reach is split further to show number of NPK captured in three separate size categories by millimeters (mm) in total length (tl) and total CPUE of all size classes in each river reach by pass. NA=Not applicable

	South Beach	Little Yampa Canyon	Juniper	Upper Maybell	Lower Maybell	Sunbeam	Lily Park	Total: All Reaches
# of NPK Captured	24	8	4	35	4	2	23	100
< 300mm tl	0	0	0	1	0	0	0	1
300-449mm tl	4	3	1	8	0	0	1	17
≥ 450mm tl	20	5	3	26	4	2	22	82
Effort (hr.)	26.68	96.32	25.04	30.00	27.14	10.47	10.65	226.3
NPK CPUE	0.90	0.08	0.16	1.17	0.15	0.19	2.16	
< 300mm tl	0.00	0.00	0.00	0.03	0.00	0.00	0.00	
300-449mm tl	0.15	0.03	0.04	0.27	0.00	0.00	0.09	
≥ 450mm tl	0.75	0.05	0.12	0.87	0.15	0.19	2.07	
Pass 1 NPK CPUE	0.10	0.25	0.00	0.98	0.00	0.19	2.16	
Pass 2 NPK CPUE	2.02	0.04	0.31	1.26	0.10	NA	NA	
Pass 3 NPK CPUE	0.65	0.00	0.13	1.26	0.33	NA	NA	
Pass 4 NPK CPUE	4.96	0.00	NA	NA	NA	NA	NA	
Pass 5 NPK CPUE	0.41	NA	NA	NA	NA	NA	NA	

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Table #4.

The number of northern pike (NPK) and smallmouth bass (SMB) harvested by anglers during each Elkhead Reservoir Fishing Classic tournament (2016-2021). Each parameter is split further to show number of fish caught in three separate size categories by millimeters (mm) in total length (tl).

	2021	2020	2019	2018	2017	2016
NPK	708	606	419	319	395	53
NPK < 300mm tl	167	133	135	117	32	0
NPK 300-449mm tl	354	329	186	93	87	15
NPK ≥ 450mm tl	187	144	98	109	276	38
SMB	668	525	492	540	961	529
SMB < 200mm tl	317	219	251	291	419	261
SMB 200-324mm tl	294	258	206	213	453	224
SMB ≥ 325mm tl	57	48	35	36	89	44
Total # Fish	1,376	1,131	911	859	1,356	582

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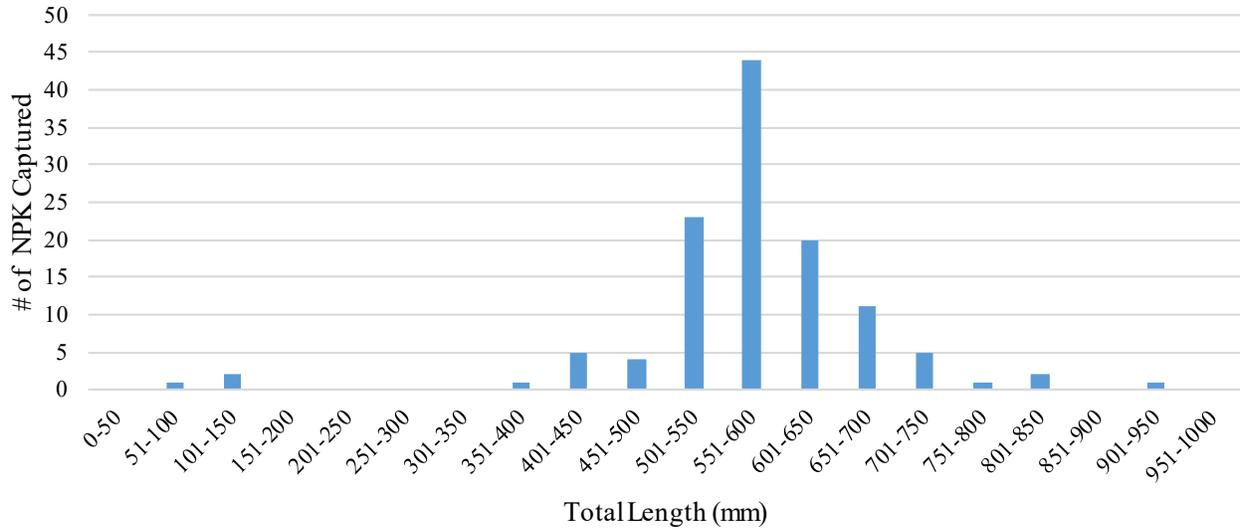


Figure #1. Northern pike (NPK) spring 2021 backwater gill netting total length frequency distribution in millimeters (mm) in the middle Yampa River.

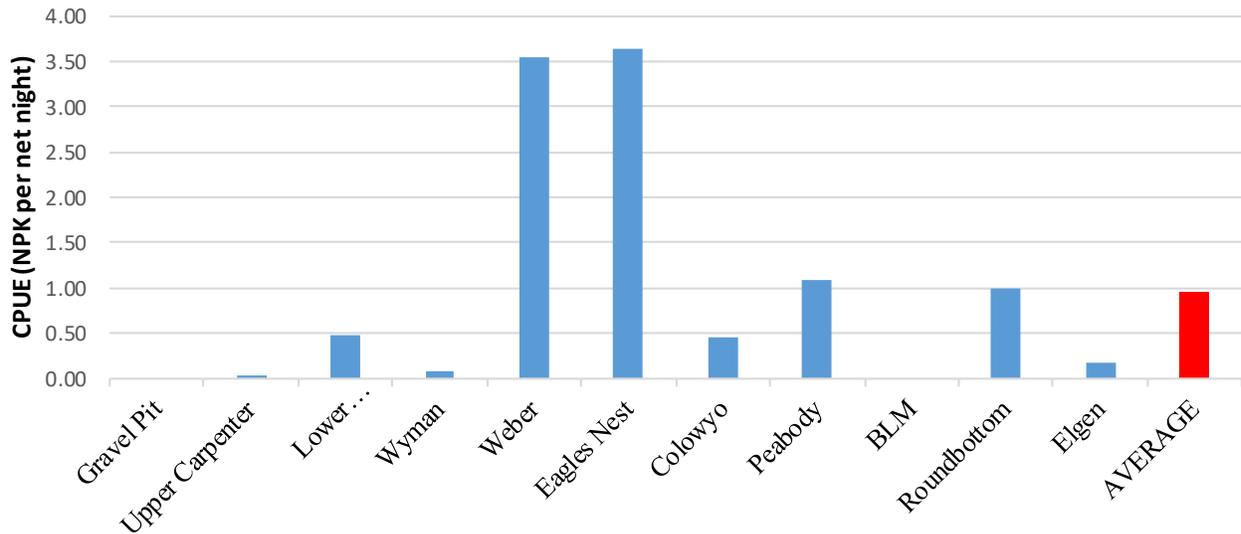


Figure #2. Northern pike (NPK) catch-per-unit-effort (CPUE) by backwater (upstream to downstream) and the average CPUE across all backwaters during spring 2021 backwater gill netting in the middle Yampa River .

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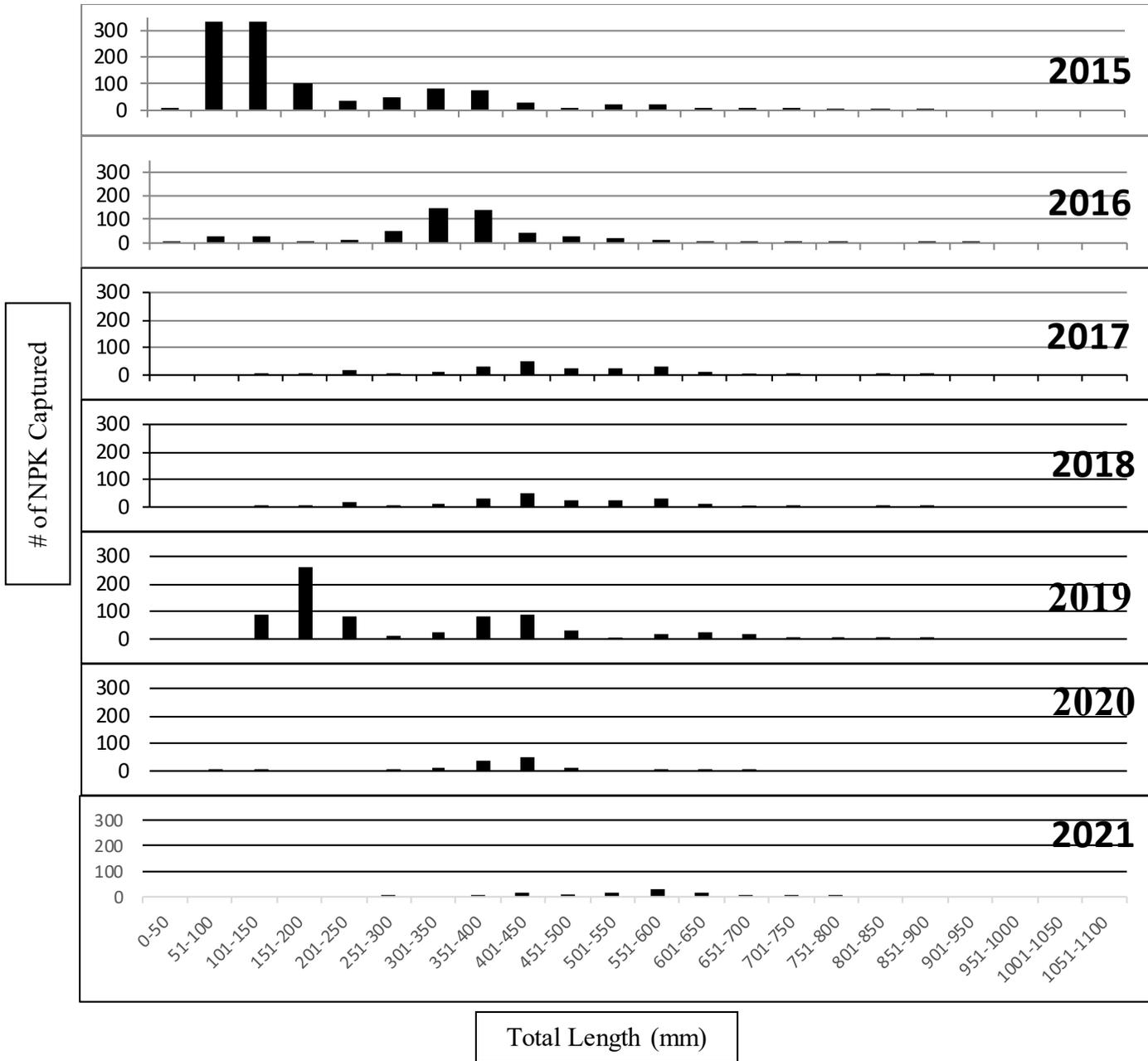


Figure #3. Northern pike (NPK) electrofishing total length frequency distributions in millimeters (mm), in the middle Yampa River from 2015-2021.

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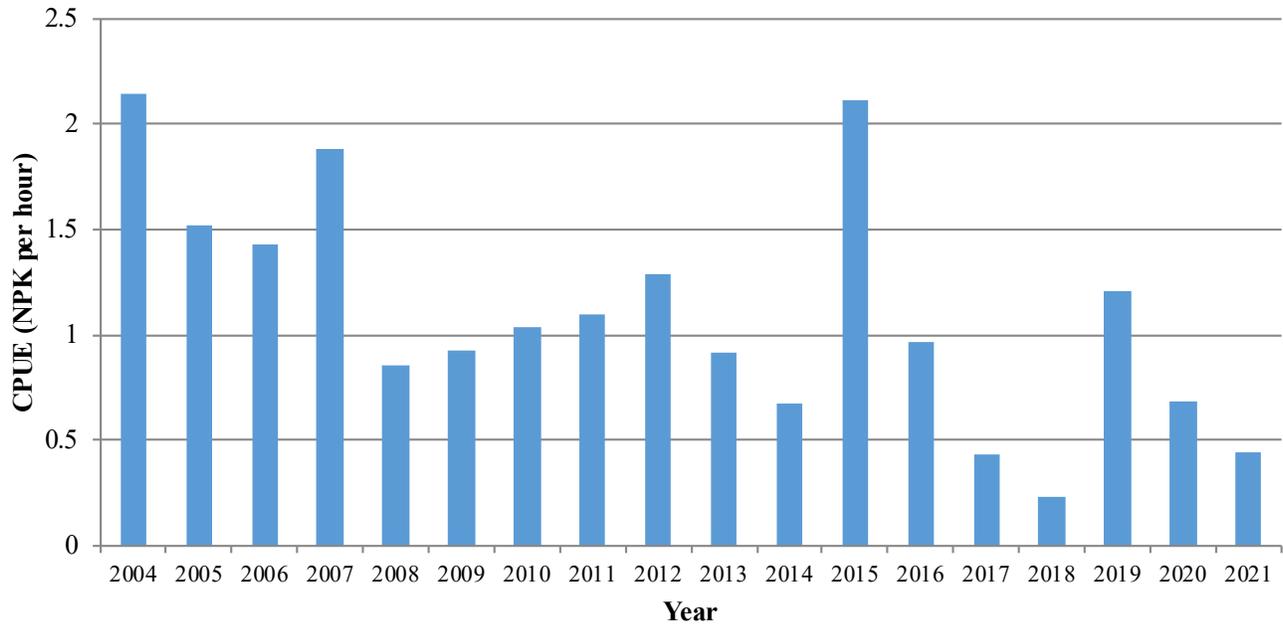


Figure #4.

Northern pike (NPK) electrofishing catch-per-unit-effort (CPUE) (NPK/hour) across all passes in the study area of the middle Yampa River sampled by Colorado Parks and Wildlife and Colorado State University, from 2004 through 2021. Note: 2020 effort was greatly reduced and therefore not comparable to previous years.

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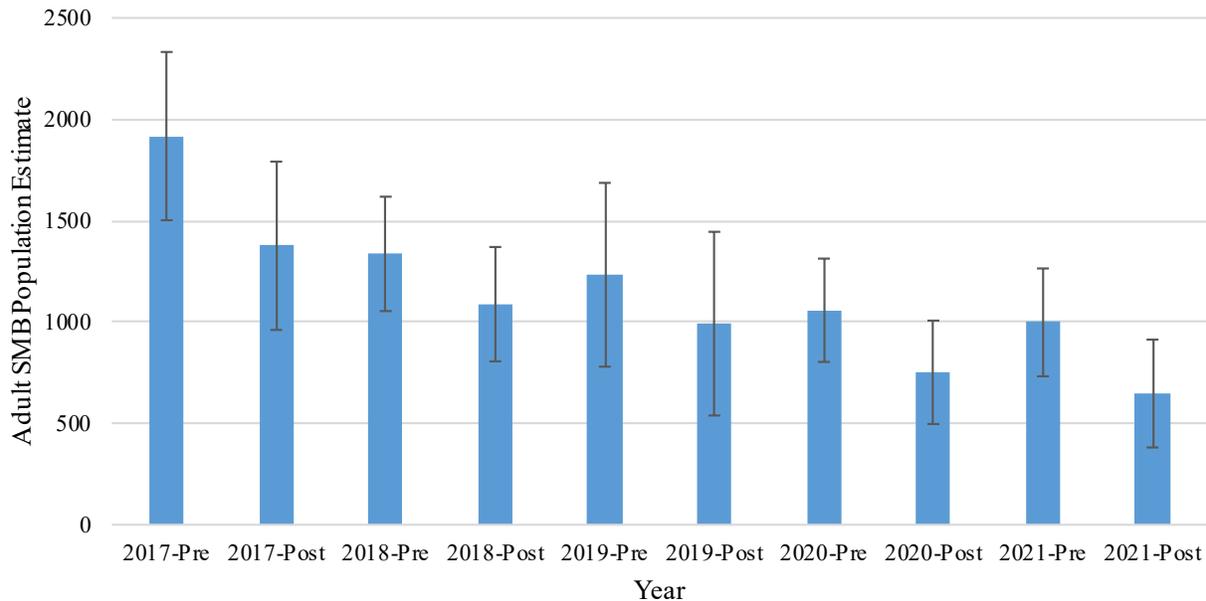


Figure #5.

Adult smallmouth bass (≥ 200 millimeters in total length) (SMB) population estimates and 95% confidence intervals (represented by the black lines) generated for Elkhead Reservoir prior to (“Pre”) and after (“Post”) the Elkhead Reservoir Fishing Classic from 2017-2021. Population estimates after the fishing tournament account for smallmouth bass that anglers harvested during the tournament.

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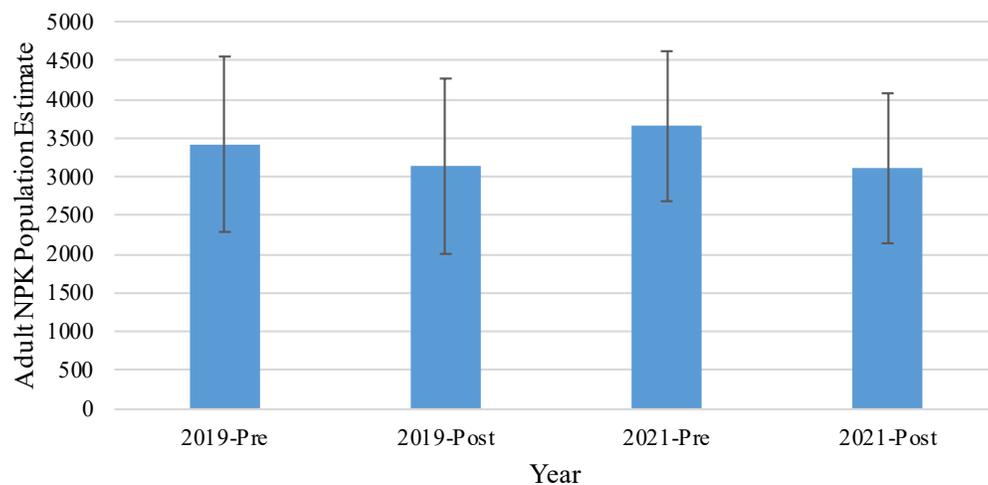


Figure #6.

Adult northern pike (≥ 300 millimeters in total length) (NPK) population estimates and 95% confidence intervals (represented by the black lines) generated for Elkhead Reservoir prior to (“Pre”) and after (“Post”) the Elkhead Reservoir Fishing Classic for 2019 and 2021. Population estimates after the fishing tournament account for northern pike that anglers harvested during the tournament.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

ANNUAL PERFORMANCE PROGRESS REPORT (PPR)

BUREAU OF RECLAMATION AGREEMENT NUMBER: R17AP00301

UPPER COLORADO RIVER RECOVERY PROGRAM PROJECT NUMBER: 98a

Project Title:

Middle Yampa River nonnative fish management

Bureau of Reclamation Agreement Number:

R17AP00301

Project/Grant Period:

Start date: 09/22/2017

End date: 09/30/2022

Reporting period end date: 11/19/2021

Is this the final report? Yes No

Performance:

This project is one of several designed to facilitate the removal of nonnative northern pike and smallmouth bass within the Yampa River Basin, with an evaluation of the efficiency of such efforts. The study area consisted of the middle Yampa River miles (RM) 170.0-122.0 (spring backwater gill netting) and 134.2 to 50.5 (mainstem electrofishing) which were sampled to capture and remove smallmouth bass and northern pike. Colorado Parks and Wildlife (CPW) and the U.S. Fish and Wildlife Service (USFWS) removed 123 northern pike during spring (April 6th – May 14th) backwater gill netting efforts. CPW and Colorado State University (CSU) removed 100 northern pike during electrofishing efforts which began May 19th and continued through June 25th. The northern pike electrofishing catch rate was 0.44 fish/hour, which is a decrease in catch rate compared to 2020. Please see CSU's 2021 Annual Report for Project #125 for a detailed analysis of smallmouth bass data collected in the study area.