

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

FY 2022 ANNUAL REPORT

PROJECT: 167

Project Title

Smallmouth Bass Removal in the White River, Utah/Colorado (Project 167 with bass removal additions from 128, and CO-3Sp)

Bureau of Reclamation Agreement Number:

R19AP00059 (UDWR)

R20PG00024 (USFWS)

R17AP00301 (CPW)

Project/Grant Period:

Start date: 10/1/2019

End date: 9/30/2024

Reporting period end date: 9/30/2022

Is this the final report? Yes __ No X

Principal Investigators:

Katherine Lawry, Fish Biologist

Christian Smith, Supervisory Fish Biologist

U.S. Fish and Wildlife Service, Utah FAC Complex

Green River Basin Fish and Wildlife Conservation Office

1380 S. 2350 W.

Vernal, UT 84078

Phone: (435) 789-0351

Email: katherine_lawry@fws.gov; christian_t_smith@fws.gov

Matthew J. Breen, Native Aquatics Project Leader

Utah Division of Wildlife Resources

Northeast Regional Office

318 North Vernal Avenue

Vernal, UT 84078

Phone: (435) 781-9453

Email: mattbreen@utah.gov

Jenn Logan, Assistant Native Aquatic Species Coordinator

Colorado Parks and Wildlife

0088 Wildlife Way

Glenwood Springs, CO 81601

Phone: (970) 947-2923

Email: jenn.logan@state.co.us

Abstract:

U.S. Fish and Wildlife Service, Utah Division of Wildlife Resources, and Colorado Parks and Wildlife work collaboratively to control an established population of Smallmouth Bass (*Micropterus dolomieu*) in the White River. Three electrofishing-based projects are conducted in the White River between Taylor Draw Dam (river mile [RM] 104.3) and the Green River confluence (RM 0): (1) Project 128 -

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Colorado Pikeminnow population abundance estimate, (2) Colorado 3 - Species monitoring, and (3) Project 167 - dedicated bass removal. Although these projects overlap spatially and temporally, electrofishing techniques vary in terms of bass removal efficacy. Project 167 is the only project in the sub-basin strictly dedicated to Smallmouth Bass removal. The other two projects (128 and CO-3SP) focus on monitoring native fish populations and Smallmouth Bass are removed opportunistically as bycatch. Comparisons with the native species monitoring projects 128 and CO-3SP highlight the effectiveness of targeted bass removal for project 167. This report presents combined removal efforts from all three projects in the White River while focusing on 167 results for historical comparisons. Previously separated data for Colorado and Utah are combined for a broader perspective. Catch rates for project 167 decreased dramatically in 2022. The upper White River immediately downstream of Taylor Draw Dam continues to be the most productive area for bass removal.

Study Schedule:

2012-Ongoing

Relationship to RIPRAP:

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

- III. Reduce negative impacts of nonnative fishes and sportfish management activities.
- III.A. Reduce negative interactions between nonnative and endangered fishes.
- III.A.2. Identify and implement viable active control measures.

GREEN RIVER ACTION PLAN: WHITE RIVER

- III. Reduce negative impacts of nonnative fishes and sportfish management activities.
- III.A. Reduce negative interactions between nonnative and endangered fishes.
- III.B.2. Preclude new nonnative species introductions, translocations or invasions to preserve native species dominance within critical habitat.

Accomplishment of FY 2022 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Data analyses within this report are inclusive of combined efforts by U.S. Fish and Wildlife Service Green River Basin Fish and Wildlife Conservation Office (GRB FWCO), Colorado Parks and Wildlife (CPW) and Utah Division of Wildlife Resources Vernal (UDWR V). Annual Performance Progress Reports by CPW and UDWR are attached.

Smallmouth Bass Removal from Taylor Draw Dam to the Green River Confluence

U.S. Fish and Wildlife Service GRB FWCO, CPW, and UDWR V removed Smallmouth Bass (*Micropterus dolomieu*) via raft electrofishing during three overlapping projects: (1) Project 128 - Colorado Pikeminnow population abundance estimate, (2) Colorado 3 - Species monitoring, and (3) Project 167 - dedicated bass removal. We removed Smallmouth Bass from the Taylor Draw Dam (river mile [RM] 104.3) to the Green River confluence (RM 0) between April 27th and June 30th, 2022 (Table 1).

We electrofished on 43 days in 2022. On some dates, multiple crews worked in separate reaches. Crews completed the equivalent of 51 days of electrofishing and expended a combined total of 406.6 hours of electrofishing effort among all projects (Table 2). We removed a combined total of 1,517 Smallmouth

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Bass (482 adults \geq 200 mm total length [TL], 974 sub-adults 100-199 mm TL, and 61 juveniles $<$ 100 mm TL). Total combined catch-per-unit-effort (CPUE) for 2022 was 3.7 fish per hour (Table 2). Catch-per-unit-effort by size class was 1.2 fish per hour for adults, 2.4 fish per hour for sub-adults, and 0.14 fish per hour for juveniles. A total of 157 adult bass were expressing gametes, and more ripe males were caught than females ($n = 93$ and 64 , respectively).

Project 167 is strictly dedicated to Smallmouth Bass removal. The other two projects (128 and CO-3SP) focus on monitoring native fish populations, with Smallmouth Bass being removed opportunistically as bycatch. Although the three projects overlap in time and space, they utilized different electrofishing techniques. The effectiveness of each of these projects for bass removal varies accordingly. Project 167 focuses on shallow shoreline habitat where bass are more likely to occur, whereas the other projects (128 and CO-3SP) focus on deeper main-channel habitat where native species are more likely to occur. Project 167 accounted for the removal of 1,412 Smallmouth Bass (93% of the total) in 210.0 hours of electrofishing ($<$ 52 % of the combined total effort). Catch-per-unit-effort for Project 167 was 6.7 fish per hour in 2022 (Table 3). Higher total catch tallies and CPUE highlight the effectiveness of dedicated bass removal efforts (project 167) compared to native species monitoring (projects 128 and CO-3SP), despite their spatial and temporal overlap (Table 3).

Project 167 is the most effective for bass removal, and it also provides the best data for temporal comparisons of bass removal trends in the White River. Previous authors of this report divided 167 data by state (Colorado vs. Utah; Breen et al. 2012, Webber et al. 2013, 2014, Smith et al. 2015, 2016, 2017, 2018, 2019, 2020, 2021). We present data in a combined format, as there are no differences in management practices between states and fish swim freely across state lines.

Total number of Smallmouth Bass removed in project 167 and the associated CPUE decreased in 2022, despite a comparable amount of electrofishing effort in 2021 (Smith et al. 2021). We exerted 16% less effort this year during project 167 and removed 79% fewer bass. Our 2021 crews expended 251.5 hours of electrofishing effort and removed 6,816 Smallmouth Bass (CPUE = 27.1 fish per hour). We removed 1,412 bass in 210.0 hours of electrofishing in 2022. Our CPUE decreased from 27.1 fish per hour in 2021 to 6.71 fish per hour in 2022. This is the steepest decrease in CPUE on record for a decade of project 167 data (Figure 1).

Previous authors of the 167 report noted that adult catch rates were typically highest in upstream sections of the White River (Breen et al. 2012, Webber et al. 2013, 2014, Smith et al. 2015-2021), with the highest adult catch rates observed between Taylor Draw Dam (RM 104.3) and Douglas Creek (RM 97.1). The 15-mile reach immediately downstream of Taylor Draw Dam continued to be the most productive area for Smallmouth Bass removal in 2022 (64% of total removed), with catch tallies declining downstream (Figure 2). Furthermore, 81% of adult bass were removed from this reach. Catch-per-unit-effort for all size classes was higher in the upper White River across all projects (Table 4).

Targeted Smallmouth Bass removal from the Big Trujillo boat launch (RM 87.5) to the Utah state line (RM 71.6) was not conducted from 2013 to 2016 due to lower observed bass densities compared to reaches upstream during project 128 passes (Bestgen et al. 2017). However, increased Smallmouth Bass CPUE during project 128 passes in 2017 prompted GRB FWCO to expand project 167 efforts in this reach. Loss of vehicular access to the state line in 2019 forced the reallocation of removal resources

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

through multiple iterations (Smith et al. 2019, 2020, 2021). Starting in 2021, GRB FWCO and UDWR V combined efforts to conduct bass removal throughout this difficult-to-access stretch. We continued to conduct bass removal in this reach in 2022, and although less productive than the uppermost reach, it was more productive than reaches farther downstream (Figure 2).

We removed fewer bass between April 27th and May 31st than between June 1st and June 30th (Table 5). Overall CPUE was also lower for the early spring period (1.4 bass per hour between April 27th and May 31st vs. 5.4 bass per hour between June 1st and June 30th; Table 5). Catch-per-unit-effort for each size class was also lower for the earlier time-period (Figure 3; Table 6). Most of this variability can likely be explained by differences in electrofishing techniques between projects. Project 167 focuses on shallow shoreline habitat where bass are more likely to occur, whereas the other projects (128 and CO-3SP) focus on deeper main-channel habitat where native species are more likely to occur. Variability in catch rates between projects may also be due to variable hydrologic conditions (Figure 4) and differences in temperature (Figure 5) between the early part of the season and the later part of the season. Raft electrofishing passes for Project 128 and CO-3SP were conducted earlier in the season (late April through early June) than passes for Project 167 (late May through late June). Caution should be used when interpreting apparent temporal effects, as they are confounded by differences in sampling techniques between projects.

The majority of Smallmouth Bass captured this year were sub-adults ranging from 100-199 mm TL. The length distribution of Smallmouth Bass removed in 2022 is bimodal with a mode for sub-adult fish at approximately 125 mm TL and another for sub-adult fish at approximately 180-200 mm TL (Figure 6). The sub-adult size class may be comprised of fish from two different cohorts, but it is unclear whether these fish hatched in the same year or in two different years. The ridgeline plot shows size structures observed over the last four years (Figure 7). Smallmouth Bass caught in 2021 revealed a dominance of individuals around 100 mm TL (juveniles and smaller sub-adults), which likely corresponds with fish that hatched in 2020 after a successful spawn that year (Figure 7). The size structure in 2022 appears to reflect part of that same 2020 cohort (now with a mode of 180-200 mm TL) and a younger cohort with a mode of 125 mm TL (Figure 7).

Shortcomings

Effective electrofishing requires the river to be navigable by small watercraft, which requires specific hydrologic conditions. Our electrofishing rafts are unable to fish when discharge drops below 400 cubic feet per second (cfs). Significant time constraints are introduced when flows drop below approximately 500 cfs (i.e., decreased discharge increases the amount of time it takes to get downriver). We made every effort to maximize our effort while the discharge at the Watson gauge exceeded 500 cfs (Figure 4). However, staffing shortages and other project needs/priorities ultimately dictated GRB FWCO project scheduling. By relying heavily on volunteers, we were able to complete 22 of 23 budgeted days for 167 electrofishing. UDWR-V completed 11 of 11 budgeted days and CPW completed 6 of 6 budgeted days for 167 electrofishing.

Additional Noteworthy Observations

We observed eight native species (Table 7) and 14 nonnative species (Table 8) across all projects in the White River in 2022. An abundance of White Sucker (*Catostomus commersonii*) and White Sucker hybrids continue to be concerning for native catostomids due to detrimental interactions (i.e.,

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

competition for resources and hybridization). Black Crappie (*Pomoxis nigromaculatus*) total catch was substantially greater than any previous year of removal efforts in the White River. Both the hydropower tunnel and the bypass channel were closed for repairs for the duration of spring runoff which resulted in increased discharge over Taylor Draw Dam and likely increased escapement of Black Crappie from Kenney Reservoir during spring runoff. Walleye (*Sander vitreus*) and Northern Pike (*Esox lucius*) were not encountered in the White River this year.

Elevated CPUE represented by an abundance of age-1 fish, has indicated successful recruitment and overwinter survival of Smallmouth Bass cohorts during most years (Breen et al. 2012; Webber et al. 2013, 2014; Smith et al. 2015-2021). However, results from 2022 removal efforts represented the largest annual decrease of CPUE on record for project 167 (Figure 1). Hydrologic conditions in 2021 included several flash flood-induced high flow events due to monsoonal activity (Figure 4). Large fluctuations in discharge occurred in late July, early August, and early and late September (USGS gage #09306500 near Watson, UT). Each discharge event occurred after the completion of project 167 tasks in 2021 and likely coincided with the presence of highly susceptible age-0 fish (i.e., before much growth was achieved; see Bestgen 2018). This was especially true during the late July and early August high discharge events. These disturbances throughout the growing season may have limited survival of this cohort leading to significantly lower CPUE in 2022 compared to our highest CPUE to date in 2021 (Smith et al. 2021).

In addition to natural flow disturbance events, the Taylor Draw Dam's hydroelectric facility was closed for maintenance during the Spring and early Summer in 2021 and 2022. These closures directed most of the reservoir's outflow through the center and right channels immediately downstream of the dam. The resulting increased velocity in these channels likely limited Smallmouth Bass occupation and spawning in what is optimal habitat and could have contributed to the reduced CPUE recorded in 2022.

Recommendations

1. Continue dedicated Smallmouth Bass removal efforts. Project 167 is the only effort in the White River that is explicitly dedicated to Smallmouth Bass removal, and it is the most effective for this purpose. Dedicated Smallmouth Bass removal in the White River should continue whenever navigable flows are available. Opportunistic removal of Smallmouth Bass as bycatch during native fish monitoring efforts (Projects 128 and CO-3SP) should complement, but not replace dedicated bass removal efforts.
2. We recommend that the Recovery Program Director's Office coordinates with Rio Blanco Water Conservancy District and the Town of Rangely, CO for future opportunities to manipulate discharge below the Taylor Draw Dam hydroelectric tunnel to provide short duration high flow events in the White River during low flow years. The closure of the hydroelectric facility in 2021 resulted in high flows in the right and middle channels near the dam. These high flows may have precluded occupation by spawning Smallmouth Bass in this area that typically produces high catch rates. Therefore, an investigation of whether closing the hydroelectric tunnel for varying durations can produce sufficient flows to disrupt, limit or preclude Smallmouth Bass spawning is warranted.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

3. Consider angling as a viable option for bass removal when electrofishing is not possible, especially in the area immediately below Taylor Draw Dam. Timing of low flows and cessation of project 167 electrofishing passes often corresponds with timing of adult bass moving upstream to spawn in the area immediately below Taylor Draw Dam. Two days of hook-and-line angling effort by GRB FWCO in 2020 demonstrated that these fish are extremely vulnerable to exploitation (90 bass were removed, including 57 adults). Angling should not be overlooked when considering alternative options to continue bass removal below Taylor Draw Dam once flows drop below 500 cfs.
4. Continue to support public fishing tournaments and harvest incentives that encourage angler take of nonnative fishes within the Rio Blanco Water Conservancy District boundaries.

Project Status:

Ongoing.

FY 2022 Budget Status

Funds Provided: \$90,817¹

Funds Expended: \$90,817

Difference: \$0

Percent of the FY 2022 work completed, and projected costs to complete: 81.3%²

Recovery Program funds spent for publication charges: \$0

Status of Data Submission

On track and ongoing.

Science / Technical Reviewers:

Andrew Schultz

US Fish and Wildlife Service

Andrew_Schultz@fws.gov

Harry Crockett, Native Aquatic Species Coordinator

Colorado Parks and Wildlife

Harry.Crockett@state.co.us

Ben Felt, NW Region Senior Aquatic Biologist

Colorado Parks and Wildlife

Benjamin.Felt@state.co.us

Sarah Seegart, Assistant Aquatic Section Chief – Native Species

Utah Division of Wildlife Resources

sseegert@utah.gov

¹ GRB FWCO and UDWR V annual funding only; CPW will report funding information related to Project 167 in the Project 98a Annual Report.

² GRB FWCO and UDWR V percent work completed only. UDWR V completed 11 of 11 days and GRB FWCO completed 22 of 23 days, thanks to help of many volunteers.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Signed:

Katherine Lawry
Principal Investigator
November 29, 2022

Chris Smith
Principal Investigator
November 30, 2022

Jenn Logan
Principal Investigator
December XX, 2022

Matthew J. Breen
Principal Investigator
December 6, 2022

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

References

Bestgen, K.R. 2018. Evaluate effects of flow spikes to disrupt reproduction of smallmouth bass in the Green River downstream of Flaming Gorge Dam. Final report to the Upper Colorado River Endangered Fish Recovery Program. Denver, Colorado. Department of Fish, Wildlife, and Conservation Biology, Colorado State University, Fort Collins. Larval Fish Laboratory Contribution 214.

Bestgen, K.R., J.A. Hawkins, G.C. White, C.D. Walford, M.J. Breen, M.T. Jones, K. Creighton. 2017. Abundance Estimates for Colorado pikeminnow in the Green River Basin, Utah and Colorado. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Breen, M.J., J.A. Skorupski Jr., A. Webber, and T. Jones. 2012. Smallmouth bass control in the White River. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Smith, C., T. Jones, M.J. Breen, R.C. Schelly, and J. Logan. 2015. Smallmouth bass control in the White River. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Smith, C., T. Jones, M.J. Breen, R.C. Schelly, and J. Logan. 2016. Smallmouth bass control in the White River. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Smith, C., T. Jones, M.J. Breen, R. Staffeldt, and J. Logan. 2017. Smallmouth bass control in the White River. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Smith, C., T. Jones, M.J. Breen, and J. Logan. 2018. Smallmouth bass control in the White River. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Smith, C., T. Jones, M.J. Breen, M.S. Partlow, and J. Logan. 2019. Smallmouth bass control in the White River. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Smith, C., T. Jones, M.J. Breen, M.S. Partlow, and J. Logan. 2020. Smallmouth bass control in the White River. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Smith, C., T. Jones, M.J. Breen, M.S. Partlow, and J. Logan. 2021. Smallmouth bass control in the White River. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Webber, A., M.J. Breen, and J.A. Skorupski Jr. 2013. Smallmouth bass control in the White River. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Webber, A., M.T. Jones, M.J. Breen, and R.C. Schelly. 2014. Smallmouth bass control in the White River. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Table 1. Smallmouth Bass removed from the White River during boat electrofishing passes for all projects in 2022. Non-Standard table produced by Katherine Lawry.

Project	Pass	Agency	Start Date	End Date	Days	River Mile	Bass Removed
CO-3SP	1	CPW-GS	4/27/2022	4/27/2022	1	93 - 90.9	7
CO-3SP	2	CPW-GS	4/28/2022	4/28/2022	1	93 - 90.9	3
<i>Colorado 3 Species Project Totals</i>					2	93 - 90.9	10
128	1	FWS-V	5/3/2022	5/13/2022	8	104.3 - 0	37
128	2	FWS-V	5/17/2022	5/26/2022	7	104.3 - 0	28
128	3	FWS-V	5/31/2022	6/3/2022	4	104.3 - 0	30
<i>Project 128 Pikeminnow Estimate Totals</i>					19	104.3 - 0	95
167	1	CPW-GS	5/26/2022	5/26/2022	2**	103.6 - 87.6	150
167	2	UDWR-V	6/2/2022	6/4/2022	3	89.5 - 59.5	124
167	3	CPW-GS	6/7/2022	6/8/2022	2	103.6 - 87.6	98
167	4	UDWR-V	6/7/2022	6/11/2022	5	89.5 - 24.0	130
167	5	CPW-GS	6/9/2022	6/10/2022	2	103.6 - 87.6	98
167	6	FWS-V	6/13/2022	6/15/2022	3	104.3 - 87.6	139
167	7	UDWR-V	6/15/2022	6/17/2022	3	59.5 - 24.0	58
167	8	FWS-V	6/16/2022	6/17/2022	2	104.3 - 87.6	61
167	9	FWS-V	6/21/2022	6/24/2022	4	104.3 - 87.6	254
167	10	FWS-V	6/27/2022	6/30/2022	4	104.3 - 87.6	300
<i>Project 167 Dedicated Bass Removal Totals</i>					30	104.3 - 24.0	1,412
Grand Total (all projects combined)					51	104.3 - 0	1,517

* Note that electrofishing procedures and goals differ between projects and they are not directly comparable (e.g. main-channel shocking for Pikeminnow in project 128 inherently results in fewer bass captures than shoreline shocking conducted during dedicated bass removal in project 167). Smallmouth Bass captured during the Colorado 3-species sampling project and Project 128 Pikeminnow abundance estimate are ancillary captures, whereas bass are the target species in Project 167.

**Two separate CPW crews completed a full pass in a single day effort. Typically, 2 days are required to complete a full pass.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Table 2. Overall data summary for the White River in 2022 (all projects combined). Standard table produced by Chris Michaud.

Sampling Date Range	Sampling River Mile Range	Total Sampling Days	Total Effort (hr)	Number of Target Species Encountered	CPUE of Target Species
Apr 27 - Jun 30	104.3 - 0	51	406.6	1,517	3.73

Table 3. Data summary by project for the White River in 2022. Standard table produced by Chris Michaud.

Study Code	Sampling Date Range	Sampling River Mile Range	Total Sampling Days	Total Effort (hr)	Number of Target Species Encountered	CPUE of Target Species
CO-3SP	Apr 27 - Apr 28	93 - 90.9	2	5.8	10	1.72
128a	May 03 - Jun 03	104.3 - 0	19	190.7	95	0.50
167	May 26 - Jun 30	104.3 - 24	30	210.0	1,412	6.72

Table 4. Catch-per-unit-effort and Smallmouth Bass removal totals by analysis unit, 2022. Each spatial analysis unit is further broken down by project to avoid confounding effects of different project-specific electrofishing techniques. Non-Standard table produced by Katherine Lawry.

Analysis Unit	Project	Effort (El Hrs)	Total Bass Removed	CPUE (all sizes)	Adults Removed	Adult % of Total	Adult CPUE
Upper White River (RM 104.3 - 69.0)	167	138.3	1,215	8.8	416	34.24%	3.0
	128	69.0	47	0.7	27	57.45%	0.4
	CO-3SP	5.8	10	1.7	3	30.00%	0.5
Lower White River (RM 69.0 - 0)	167	71.7	197	2.7	19	9.64%	0.3
	128	121.7	48	0.4	17	35.42%	0.1

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Table 5. Data summary by time-period for the White River in 2022 (all projects combined).

Standard table produced by Chris Michaud.

Season	Sampling Date Range	Sampling River Mile Range	Total Sampling Days	Total Effort (hr)	Number of Target Species Encountered	CPUE of Target Species
Spring	Apr 27 - May 31	104.3 - 0	19	169.7	241	1.42
Early Summer	Jun 01 - Jun 30	104.3 - 0.1	32	236.8	1,275	5.38

*Caution should be used when interpreting this table, as temporal differences in removal totals and CPUE are likely artifacts of different electrofishing techniques being used by different projects. Projects 128 and CO-3SP occurred earlier in the season than project 167 (see Table 3).

Table 6. Smallmouth Bass encounters by size class and time-period (all projects combined).

Standard table produced by Chris Michaud.

Season	Juveniles	Sub-adults	Adults	Juveniles/hour	Sub-adults/hour	Adults/hour
Spring (April – May)	16	105	120	0.09	0.62	0.71
Early Summer (June)	44	869	362	0.19	3.67	1.53

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Table 7. Targeted and ancillary captures of native species on the White River (all projects combined*). Standard table produced by Chris Michaud.

Common Name	Number of Fish	Median Length	Length Range
Flannemouth Sucker	412	472.5	193 - 570
Razorback Sucker	185	461.0	344 - 532
Bluehead Sucker	122	382.5	169 - 447
Colorado Pikeminnow	34	537.0	405 - 740
Roundtail Chub	32	400.0	67 - 447
Bluehead Sucker x Flannemouth Sucker	10	438.5	221 - 493
Flannemouth Sucker x Razorback Sucker	4	538.0	480 - 555
Bonytail	2	343.0	340 - 346

* CO-3SP (CPW) reporting only includes native fish if they are PIT tagged. Un-tagged fish are not included in reporting for this project. No Colorado pikeminnow, bonytail, or razorback sucker were encountered during this study in 2022.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Table 8. Targeted and ancillary captures of nonnative species on the White River (all projects combined*). Standard table produced by Chris Michaud.

Common Name	Number of Fish	Median Length	Length Range
Smallmouth Bass	1,517	174.0	75 - 406
Black Crappie	450	98.0	22 - 304
White Sucker	383	163.0	90 - 457
Green Sunfish	118	102.0	47 - 205
Flannelmouth Sucker x White Sucker	92	342.5	102 - 495
Bluehead Sucker x White Sucker	59	257.0	99 - 474
Black Bullhead	37	163.0	105 - 251
Sand Shiner	26	62.0	53 - 71
Fathead Minnow	10	73.5	57 - 81
Channel Catfish	5	485.0	417 - 519
Red Shiner	5	63.0	48 - 66
Brown Trout	1	265.0	265 - 265
Brook Stickleback	1	70.0	70 - 70
Rainbow Trout	1	400.0	400 - 400

* CO-3SP (CPW) reporting only includes fish species that are removed during surveys. Channel catfish, common carp and salmonid species are released alive and not reported in this table.

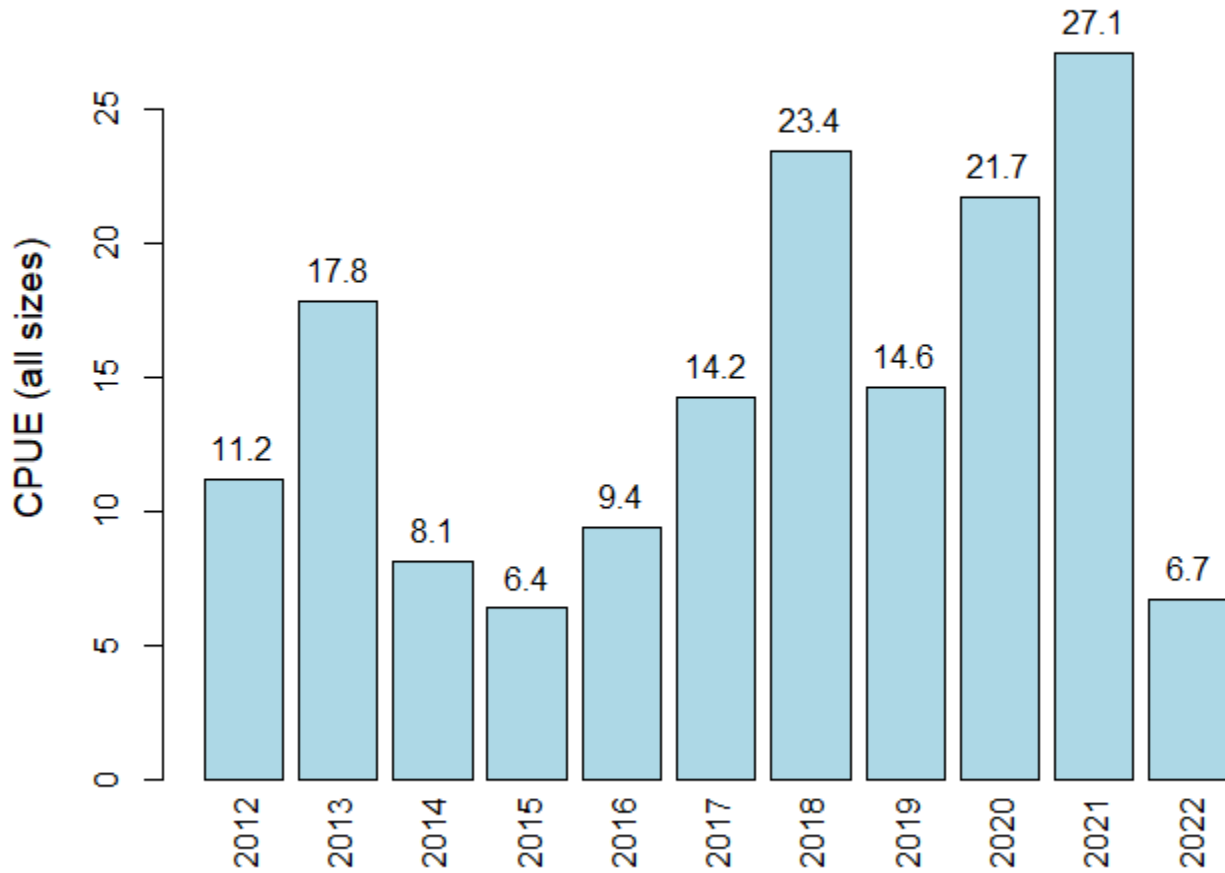


Figure 1. A decade of catch-per-unit-effort (CPUE) for Smallmouth Bass of all size classes captured in the White River sub-basin during Project 167 electrofishing only. Non-standard figure by Katherine Lawry.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

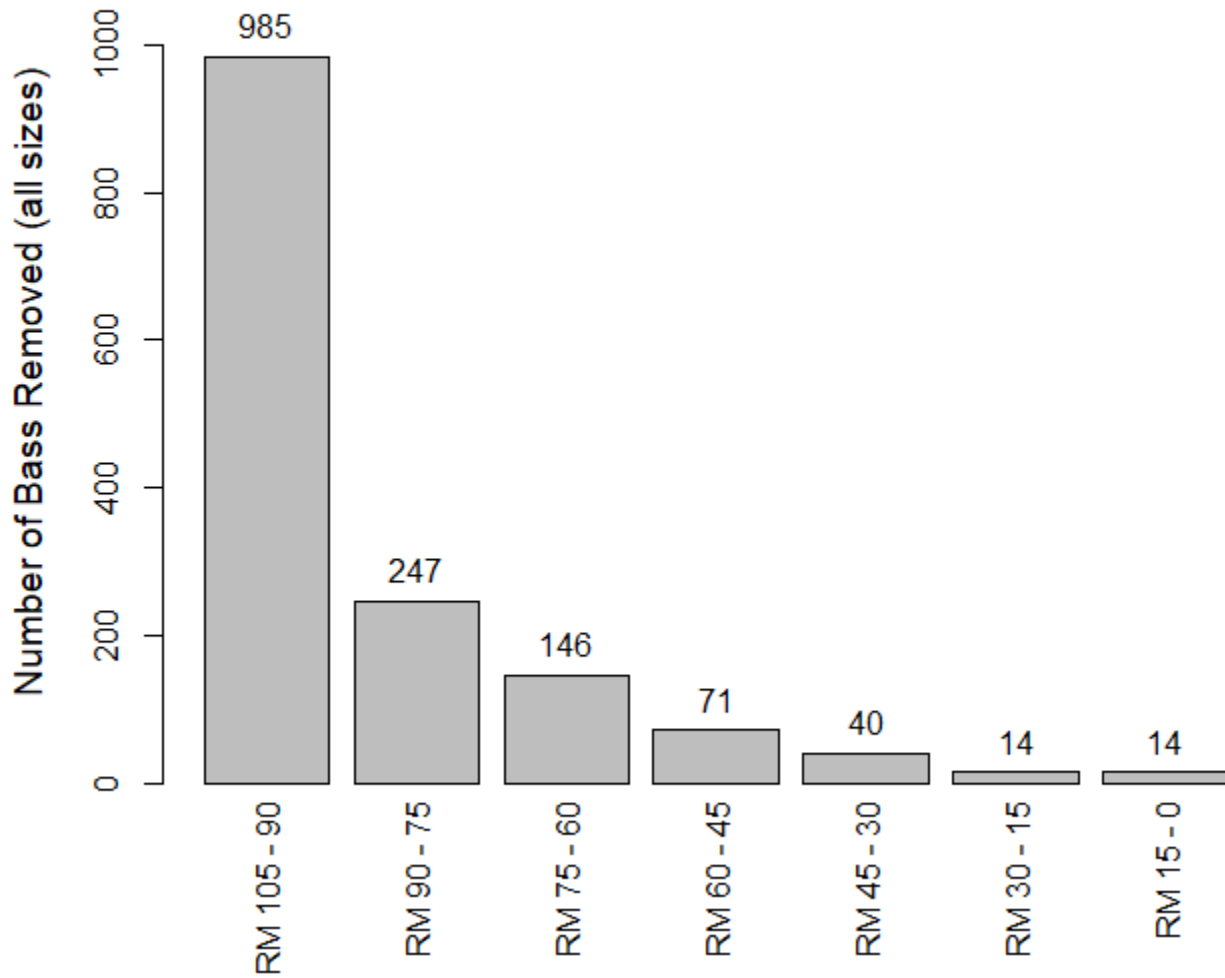


Figure 2. Total catch by 15-mile river segments from Taylor Draw Dam (river mile [RM] 104.5) to the Green River confluence (RM 0). Non-standard figure by Katherine Lawry.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

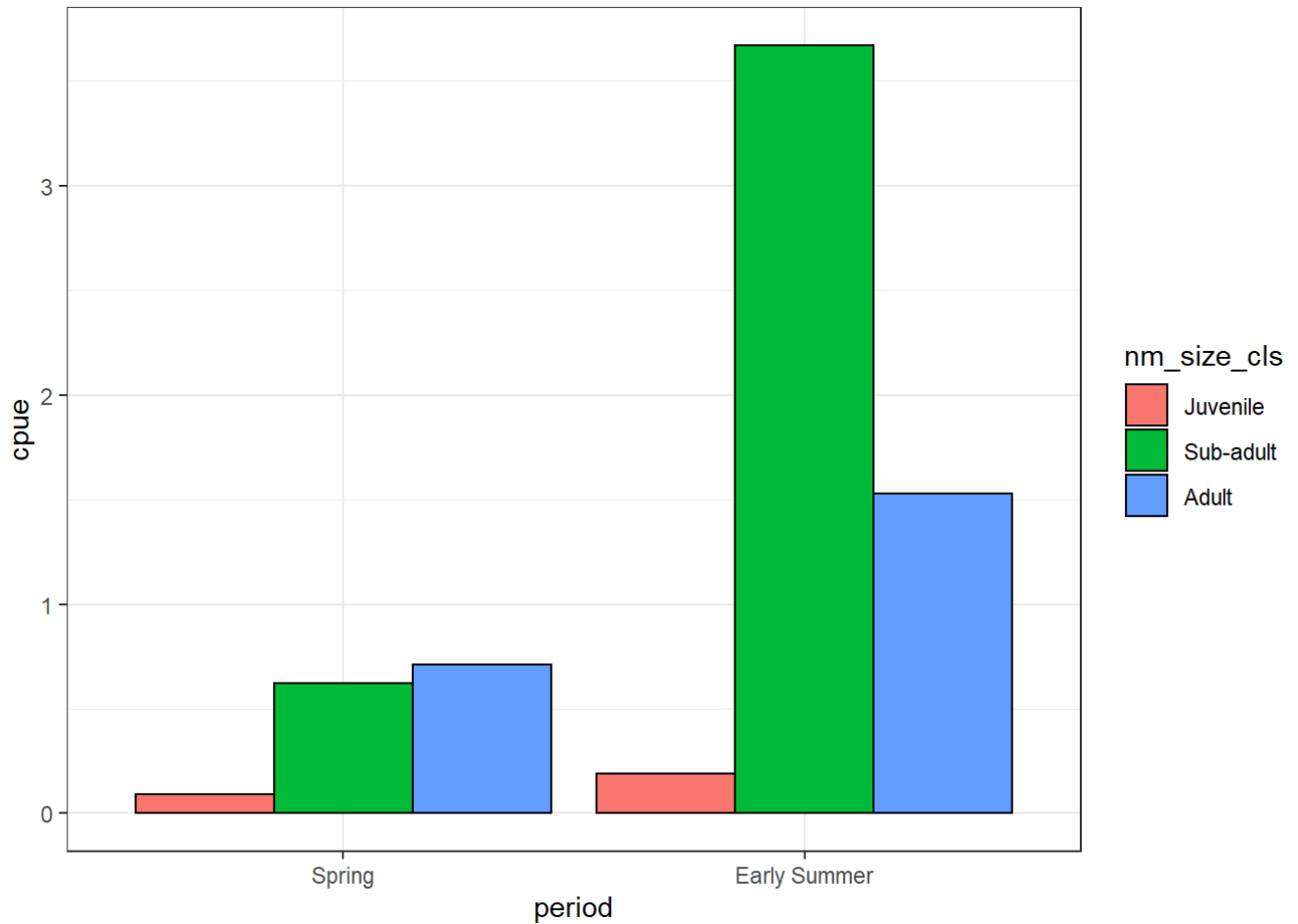


Figure 3. Catch-per-unit-effort (CPUE in fish per hour) for all Smallmouth Bass captured in the White River in 2022. Standard figure by Chris Michaud. Caution should be used when interpreting this figure, as temporal differences in removal totals and CPUE are likely artifacts of project-specific electrofishing techniques. Projects 128 and CO-3SP occurred earlier in the season than project 167 (see Table 3). Spring represents sampling dates occurring in April and May. Early summer represents June sampling dates.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

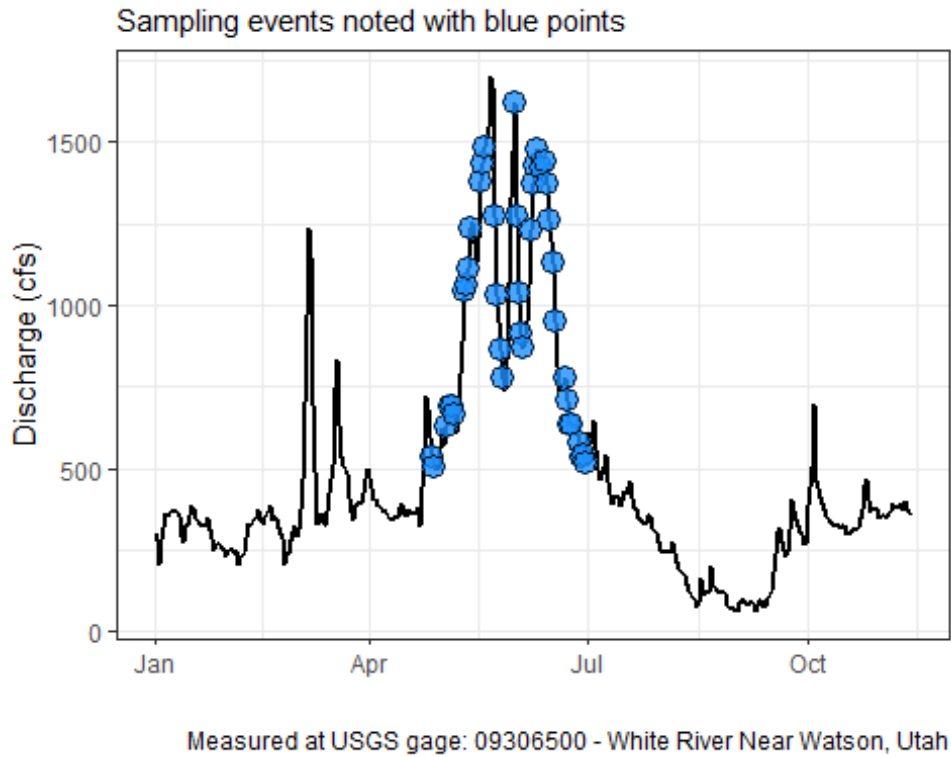


Figure 4. Electrofishing events with respect to discharge on the White River throughout the 2022 field season. Standard figure by Chris Michaud.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

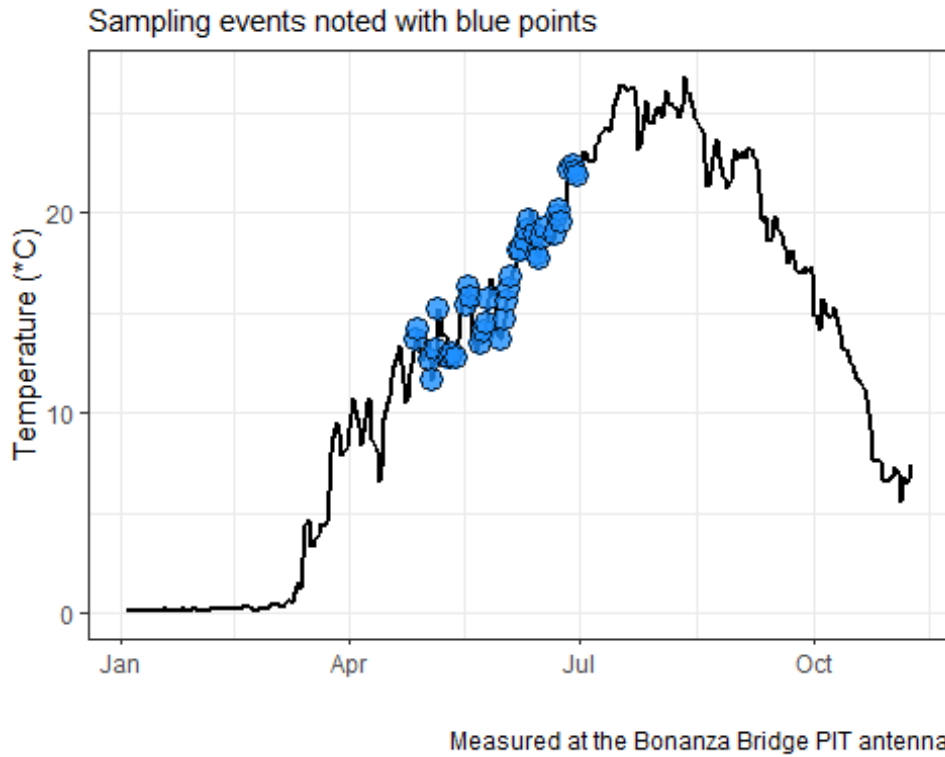


Figure 5. Electrofishing events with respect to temperature on White River throughout the 2022 field season. Standard figure by Chris Michaud.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

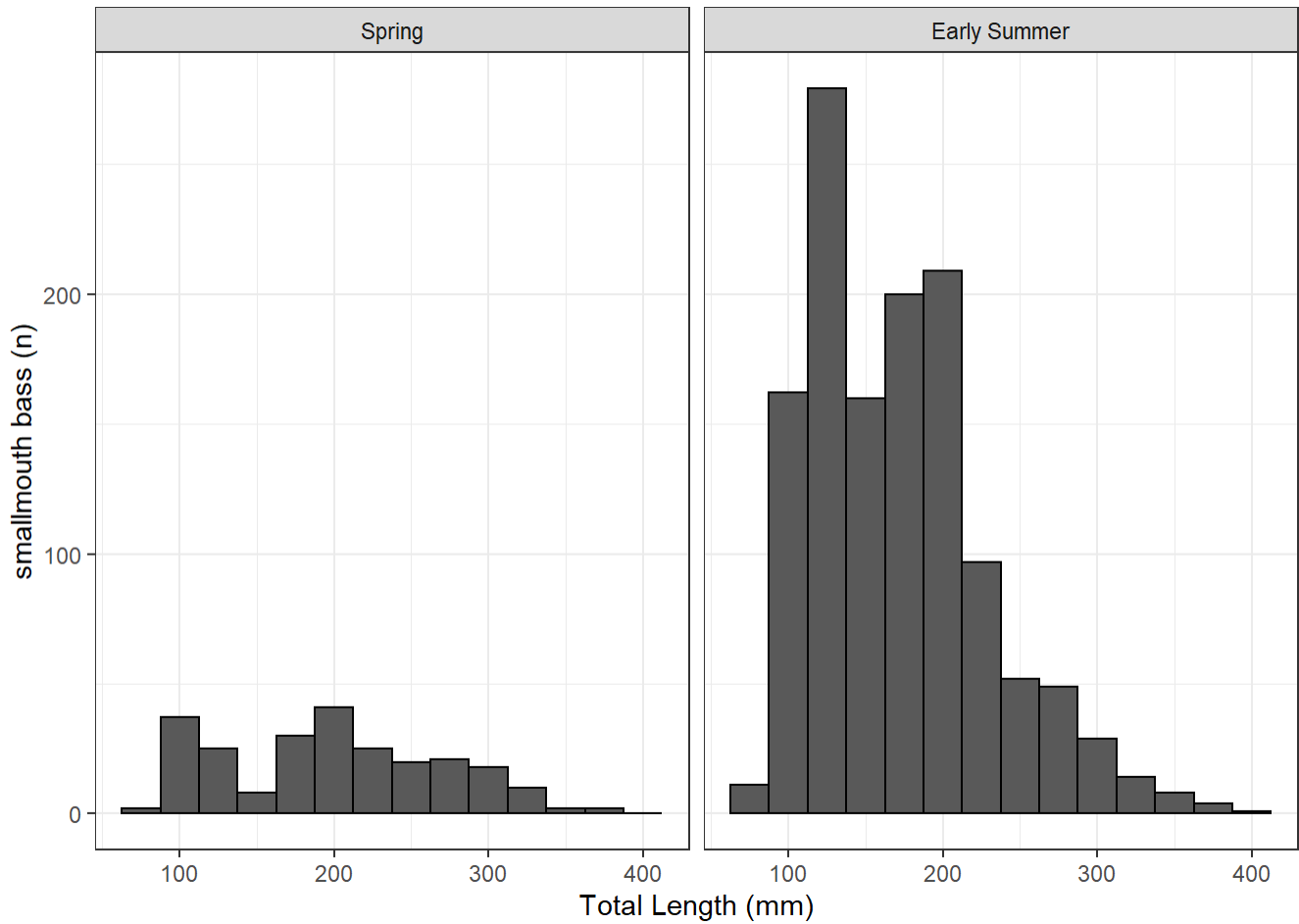


Figure 6. Length-frequency of Smallmouth Bass removed from the White River by time-period in 2022. Spring represents sampling dates occurring in April and May. Early Summer represents sampling dates in June. Standard figure by Chris Michaud.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

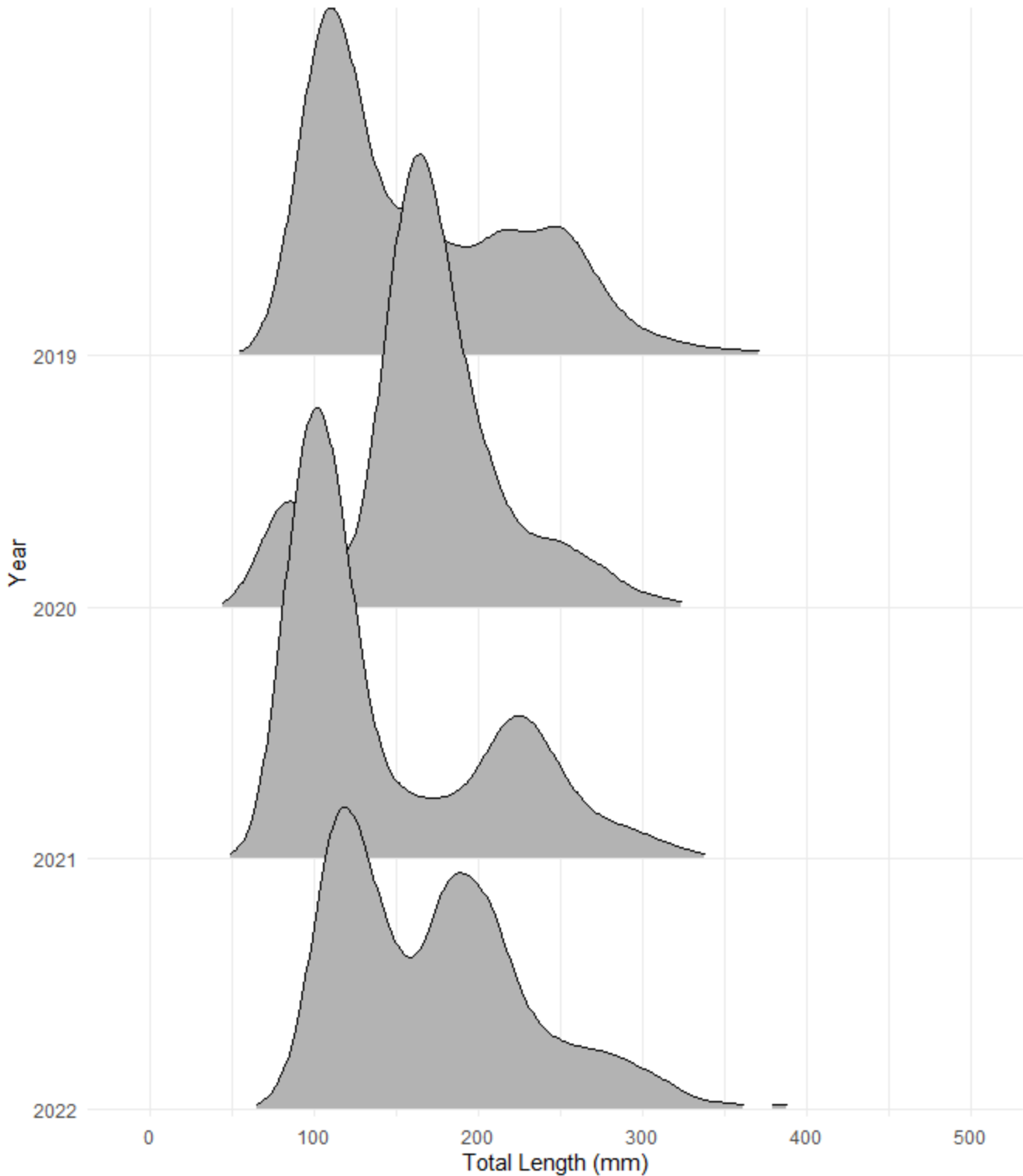


Figure 7. Length-frequency of all Smallmouth Bass removed from the White River from 2019-2022. Each curve is a smoothed histogram, with the Y-axis for each year expressed as a kernel density. Non-standard figure by Katherine Lawry.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

ANNUAL PERFORMANCE PROGRESS REPORT (PPR)

BUREAU OF RECLAMATION AGREEMENT NUMBER: R19AP00059

UPPER COLORADO RIVER RECOVERY PROGRAM PROJECT NUMBER: 167

Project Title:

Smallmouth Bass control in the White River

Bureau of Reclamation Agreement Number:

R19AP00059

Project/Grant Period:

Start date: 08/12/2019

End date: 09/30/2023

Reporting period end date: 09/30/2022

Is this the final report? Yes _____ No X

Principal Investigator

Matthew J. Breen, Native Aquatics Project Leader

Utah Division of Wildlife Resources, Northeast Regional Office

318 North Vernal Avenue

Vernal, UT 84078

Phone: (435) 781-9453

Email: mattbreen@utah.gov

Performance:

Tasks 2–3 were accomplished as outlined in the scope of work for this project. From 02-17 June 2022 we completed nine days of cataraft electrofishing in both Colorado and Utah from river mile 87.5–24.0. Smallmouth Bass catch rates in the lower White River have decreased substantially from 2021 levels. A collective total of 1,412 Smallmouth Bass were removed from the White River in 2022. Annual reporting is complete under task 3 and data has been submitted to Recovery Program personnel prior to submission of this report.

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: 167b

Project Title:

Smallmouth Bass control in the White River

Bureau of Reclamation Agreement Number:

#R17AP00301

Project/Grant Period:

Start date: 09/22/2017

End date: 09/30/2022

Reporting period end date: 11/22/2022

Is this the final report? Yes ___ No X

Principal Investigator

Jenn Logan, Assistant Native Aquatic Species Coordinator

Colorado Parks and Wildlife

0088 Wildlife Way

Glenwood Springs, CO 81601

Phone: (970) 947-2923

Email: Jenn.Logan@state.co.us

Performance:

Task 1: Plan logistics, hire and train personnel, order and maintain equipment, and prepare for sampling-Complete

Task 5: Sample White River study area to capture and remove smallmouth bass- 100% complete

Colorado Parks and Wildlife completed the equivalent of six days of Smallmouth Bass removal between river mile (RM) 104.3 (Taylor Draw Dam) and RM 87.6 (Big Trujillo Wash) between May 26 – June 8, 2022. Two, 16-foot rafts equipped with ETS units electrofished opposite shorelines and all accessible backwater and slackwater habitats. Fish captured were measured in length to the nearest millimeter and weighed to the nearest gram. Centrarchid species, Northern Pike, Black Bullhead, non-native sucker species, and non-native sucker hybrids were targeted by electrofishing crews for removal. While not specifically targeted, some incidental captures of non-native cyprinid species also resulted in lethal removal. No Colorado Pikeminnow were captured in 2022 by CPW crews. Other native non-listed species, salmonid species, Channel Catfish, and most non-native cyprinid species were not netted or handled.

Three passes were completed from Taylor Draw Dam (RM 104.3) to Douglas Creek (RM 97.1). One pass was completed between Douglas Creek (RM 97.1) and RM 93.1 and two passes completed between

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

RM 93.1 and Big Trujillo Wash (RM 87.6). Additional passes in the White River downstream of Taylor Draw Dam were conducted by crews from the U.S. Fish and Wildlife Service- Green River Basin FWCO and Utah Division of Wildlife Resources. Data for all projects are compiled and included in the 2022 Annual Report for Project 167.

Task 6: Organize and validate Project 167b data and submit to the USFWS-Complete

- All data submitted to USFWS (Green River Basin- FWCO) for data analysis November 2022.
- All data submitted to STreaMs database November 2022.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Project Title

Kenney Reservoir Removal of Northern Pike (in Scope of Work for CPW Projects 126b and 167b)

Bureau of Reclamation Agreement Number:

R17AP00301

Project/Grant Period:

Start date: 09/22/2017 (NOTE: this particular project under the BOR grant agreement number above did not receive BOR funds until the FFY 20: October 1, 2019 through September 30, 2020)

End date: 09/30/2022

Reporting period end date: 09/30/2022

Is this the final report? Yes _____ No X

Principal Investigator:

Tory Eyre

Colorado Parks and Wildlife

73485 Highway 64

Meeker, CO, 81641

Phone: (970) 878-6074

Fax: (970) 878-6077

tory.eyre@state.co.us

Abstract:

Kenney Reservoir is an on-channel reservoir located in the White River, upstream of Taylor Draw dam at river mile (RM) 104.3. Colorado Parks and Wildlife (CPW) confirmed the presence of northern pike within Kenney Reservoir in the fall of 2018. In 2019, CPW captured multiple size classes of adult northern pike, ≥ 300 mm total length (tl), indicating that reproduction could be occurring in the reservoir. The 2018 and spring 2019 sampling efforts were completed with CPW funds. In 2020, crews spent two days and one night sampling for northern pike and no northern pike were captured. In 2021, crews completed eight days of northern pike removal effort and no northern pike were captured. In 2022, crews sampled Kenney Reservoir across six days, completing 413.3 hours of gill netting effort and 3.74 hours of electrofishing effort from April 5th-8th and September 26th-27th. One adult northern pike was captured in 2022.

Study Schedule:

2019-Ongoing

Relationship to RIPRAP:

This report will only describe northern pike removal efforts from Kenney Reservoir. Project information is detailed in the scope of work for CPW Projects 126b and 167b under Task 7. Annual reporting is submitted as an addendum to Project 167- Smallmouth Bass control in the White River.

General Recovery Program Action Plan

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

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

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

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Green River Action Plan: White River

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

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

III.B.2. Preclude new nonnative species introductions, translocations or invasions to preserve native species dominance within critical habitat.

III.B.2.a. Determine and implement an adequate level of mechanical removal to reduce smallmouth bass.

Accomplishment of FY 2022 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task 1. Plan logistics, hire and train personnel, order and maintain equipment, and prepare for sampling (Project #126b and #167b)

Schedule: January-Mid March

Deliverable: Task completed

Task 2-6: Tasks 2-6 are discussed in the 2022 Annual Report for Projects 126 and 167.

Task 7. Sample Kenney Reservoir to capture and remove northern pike.

Schedule: Late March/April-May; September/October

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

Northern pike removal efforts at Kenney Reservoir occurred in April and September of 2022. Spring (April) sampling occurred during the northern pike spawning season and began once the ice melted and the reservoir was accessible by boat. In 2022, Kenney Reservoir was free of ice by April 5th. Spring sampling efforts lasted from April 5th to April 8th. During spring sampling efforts, crews sampled the reservoir for a total of four days using gill nets. Five to 15 gill nets were set around the reservoir during each sampling event. The gill nets were checked approximately every two hours throughout the day to reduce mortality of native fish bycatch. A subset of the gill nets were often left in the reservoir at known northern pike concentration areas overnight and checked again the following morning. Most of the gill nets used for this effort measured 150' long and were comprised of 1.5" standard mesh size. Using gill nets with 1.5" standard mesh size appears to be effective at capturing northern pike while also reducing the amount of bycatch from other species (e.g. small bodied fishes). In some cases, 150' gill nets with experimental mesh sizes were used to ensure that juvenile northern pike were not missed when using 1.5" standard mesh size. Fall (September) sampling occurred from September 26-27th. During fall sampling efforts, crews sampled the reservoir for a total of two days using gill nets and boat mounted electrofishing units. The gill nets were checked approximately every two hours throughout the day to reduce mortality of native fish bycatch. A subset of the gill nets were often left in the reservoir at known northern pike concentration areas overnight and checked again the following morning. All gill nets used during fall sampling measured 150' long and were comprised of 1.5" standard mesh size. Fall electrofishing efforts occurred using two boats equipped with ETS electrofishing units and two netters per boat. Each boat navigated along the reservoir's shoreline and operated independently of the other boat in order to increase the distance covered. Electrofishing began at dusk and continued until the boats had navigated the perimeter of Kenney Reservoir's main body.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

During spring sampling efforts (April 5th-8th), crews completed 259.5 hours of gill net effort. During fall sampling efforts (September 26th – 27th), crews completed 153.7 hours of gill net effort and 3.74 hours of electrofishing effort. In total, 413.2 net hours and 3.74 electrofishing hours of northern pike removal effort was completed in 2022.

Fourteen different fish species, including sucker hybrids, were handled during removal efforts at Kenney Reservoir in 2022 (Table 1, Table 2). One northern pike was captured via gill net on April 7th. The one northern pike encountered was an adult female with a total length of 890 mm. It was captured in pre-spawn condition. Prior to 2022, the last northern pike captured in Kenney Reservoir was found in 2019 (Figure 1). The northern pike encountered in 2022 was a large, mature fish (890 mm tl), that has likely resided in the reservoir for multiple years but managed to evade capture. It is possible that the northern pike captured in 2022 had migrated from upstream of the reservoir, although sampling efforts in the White River upstream of Kenney Reservoir occur annually and northern pike have not been found in any reaches of the White River upstream of Kenney Reservoir to date. Also, it is possible that the northern pike found in 2022 was recently and illicitly stocked into the reservoir from another waterbody. Ultimately, it is unknown why a northern pike was captured in Kenney Reservoir after two years of sampling effort without northern pike encounters but it is important that Kenney Reservoir northern pike removal efforts continue in future years as it appears likely that some northern pike may still reside in the reservoir.

Task 8. Data entry, data analysis, and preparation of final report. Present findings during the Annual Nonnative Fish Control Workshop (if convened), and at the Annual Recovery Program Researchers Meeting.

Schedule: October-January

Deliverable: Data entry, data analysis, and final report are completed. Findings will be discussed during the Nonnative Fish Control Coordination Calls in lieu of the Nonnative Fish Control Workshop.

Additional noteworthy observations:

In addition to northern pike removal efforts conducted by CPW within Kenney Reservoir, CPW has coordinated with the reservoir owner, the Rio Blanco Water Conservancy District (RBWCD), to sponsor a northern pike angler harvest incentive. This year marks the fourth year in which the harvest incentive occurred. Any licensed angler that caught and turned in a northern pike from within the RBWCD boundary (Kenney Reservoir and portions of the White River upstream and downstream of Kenney Reservoir) was awarded \$20 per northern pike caught. Funds for this incentive were provided by the Colorado Water Conservation Board and distributed by the RBWCD. The angler harvest incentive began June 4th and continued through November 30th, 2022. Anglers did not submit any northern pike as part of this incentive program in 2022. In 2021, anglers also did not submit any northern pike during the incentive program. Nine and 19 northern pike were paid for through the harvest incentive fund in 2020 and 2019, respectively.

Recommendations:

It is recommended that a minimum of six days of field work be completed across spring and fall of 2023, based on 2022 sampling results, and as identified in the FY 2022-2023 SOW.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Project Status:

This project is considered on track, with revisions to be considered. Additional evaluation of project commitments and efforts will be made internally by CPW in 2023. Additional refinement of the techniques used in the study is appropriate and will serve to further increase the efficiency of removal effort.

FY 2022 Budget Status

Funds Provided: \$170,821 for all projects (including 98a and 126b/167b)

Funds Expended: \$103, 254 for all projects (including 98a and 126b/167b, does not include \$90,485 spent on purchase and installation of new Highline Lake spillway net)

Difference: \$67,567 Funds expended includes expenditures through September 30th, 2022. 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 2022 work completed, and projected costs to complete: 100% (6 days of the minimum 6 days outlined in the SOW were completed)

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

Status of Data Submission

Kenney Reservoir sampling data was uploaded into STReAMS database.

Signed:

Tory Eyre

Principal Investigator

12/09/2022

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Table #1.

Targeted and ancillary captures of native species measured in millimeters total length during 2022 northern pike removal efforts in Kenney Reservoir.

Common Name	Number of Fish	Median Length	Length Range
flannelmouth sucker	287	361.0	157 - 475
roundtail chub	10	369.5	302 - 412
mountain whitefish	4	388.0	335 - 392
bluehead sucker x flannelmouth sucker	3	323.0	316 - 340
bluehead sucker	1	296.0	296 - 296

Table #2.

Targeted and ancillary captures of nonnative species measured in millimeters total length during 2022 northern pike removal efforts in Kenney Reservoir.

Common Name	Number of Fish	Median Length	Length Range
green sunfish	687	88.0	11 - 184
black crappie	239	231.0	73 - 323
black bullhead	126	246.0	108 - 293
common carp	42	249.5	132 - 634
bluehead sucker x white sucker	19	360.0	324 - 377
flannelmouth sucker x white sucker	3	366.0	366 - 369
channel catfish	2	636.5	620 - 653
brown trout	1	391.0	391 - 391
northern pike	1	890.0	890 - 890

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

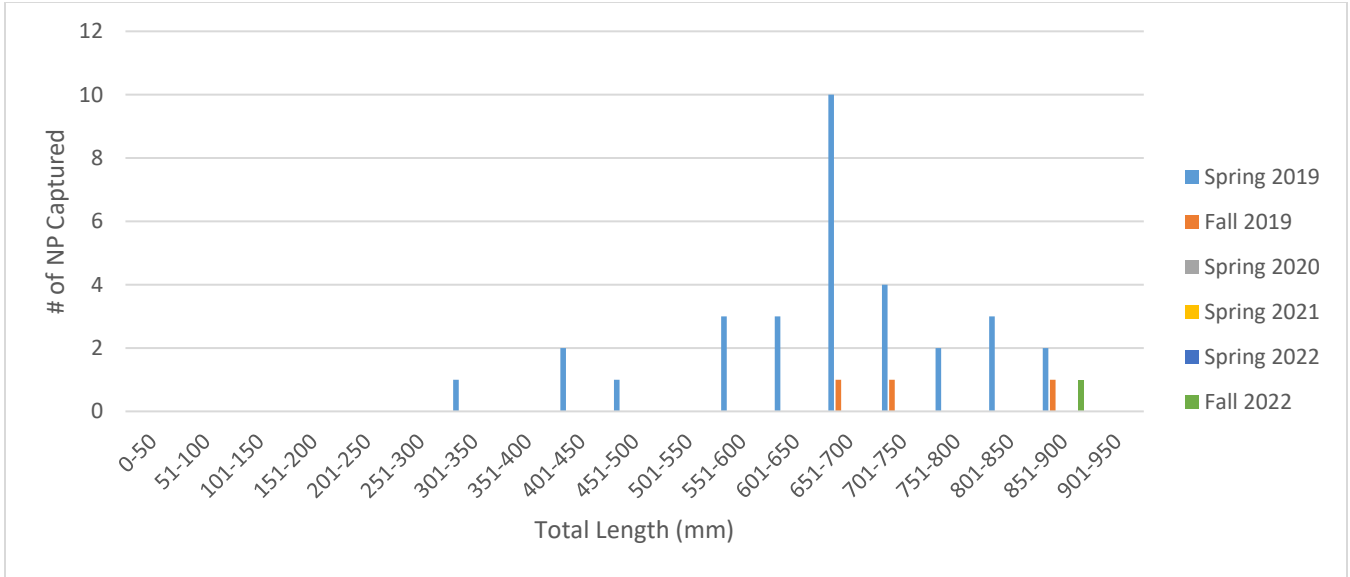


Figure 1. Northern pike (NP) length frequency distribution in millimeters (mm) for spring and fall removal efforts from 2019-2022 at Kenney Reservoir.

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: 167b (in Scope of Work for CPW Projects 126b and 167b)

Project Title:

Kenney Reservoir Removal of Northern Pike

Bureau of Reclamation Agreement Number:

R17AP00301

Project/Grant Period:

Start date: 09/22/2017 (NOTE: this particular project under the BOR grant agreement number above did not receive BOR funds until the FFY 20: October 1, 2019 through September 30, 2020)

End date: 09/30/2022

Reporting period end date: 09/30/2022

Is this the final report? Yes _____ No X

Performance:

Kenney Reservoir is an on-channel reservoir located in the White River, upstream of Taylor Draw dam at river mile (RM) 104.3. Colorado Parks and Wildlife (CPW) confirmed the presence of northern pike within Kenney Reservoir in the fall of 2018. In 2019, CPW captured multiple size classes of adult northern pike, ≥ 300 mm total length (tl), indicating that reproduction could be occurring in the reservoir. The 2018 and spring 2019 sampling efforts were completed with CPW funds. In 2020, crews spent two days and one night sampling for northern pike due and no northern pike were captured. In 2021, crews completed eight days of northern pike removal effort and no northern pike were captured. In 2022, crews sampled Kenney Reservoir across six days, completing 413.3 hours of gill netting effort and 3.74 hours of electrofishing effort from April 5th-8th and September 26th-27th. One adult northern pike was captured in 2022.