

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

2024 ANNUAL REPORT

Project Title

Walleye Management in the Upper Colorado River Basin

Bureau of Reclamation Agreement Numbers and Grant Periods:

Utah Division of Wildlife Resources, R14AP0059 (10/01/2019-09/30/2024)

U.S. Fish and Wildlife Service R20PG00024 (10/01/2019-9/30/2024)

Colorado Parks and Wildlife, R23AP00309 (6/05/2023-9/30/2027)

Colorado State University, R19AP0058 (10/1/2018-9/30/2023)

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Abstract:

This annual report provides a summary of Walleye (*Sander vitreus*) removal conducted in the Upper Colorado River Basin in the year 2024. The United States Fish and Wildlife Service, Colorado Parks and Wildlife, Utah Division of Wildlife Resources, and the Colorado State University's Larval Fish Lab worked to control non-native walleye in the mainstem Colorado River, Green River, and tributaries by removing this invasive predator whenever they were captured. During the 2024 field season 289 walleye were removed from the basin during targeted and non-targeted projects 98a, 98b, 98c, 110, 123a, 123b, 123d, 125, 126, 128a, 131, 167, C-4bGVP, C-4bRED, FR-115, and UT- 3SP. This report recommends continued monitoring of populations and removal of walleye when captured.

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Study Schedule

2014-Ongoing

Relationship to RAP:

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

- III. Reduce negative impacts of nonnative fishes and sportfish management activities (nonnative and sportfish management).
- III.I. Reduce walleye numbers through all means practicable (including targeted removal) in riverine habitats throughout the Upper Colorado River (UCR) Basin.

GREEN RIVER ACTION PLAN: MAINSTEM

- III.A.4 Develop and implement control programs for nonnative fishes in river reaches occupied by the endangered fishes to identify required levels of control. Each control activity will be evaluated for effectiveness, and then continued as needed.
- III.A.4.d. Walleye in the middle and lower Green River

COLORADO RIVER ACTION PLAN: MAINSTEM

- III.A. Develop and implement control programs in reaches of the Colorado River occupied by endangered fishes.
- III.A.8. Walleye in the Colorado River.

Accomplishment of 2024 Tasks and Deliverables, Discussion of Findings and Shortcomings:

Colorado River Sub-Basin

Colorado River Mainstem

Researchers from the United States Fish and Wildlife Service Grand Junction Fish and Wildlife Conservation Office (FWS-GJ) and Colorado Parks and Wildlife (CPW) conducted sampling in the Colorado River mainstem in 2024. Removal occurred during both targeted and non-targeted projects 126, 131, and C-4bGVP from 16 April through 1 November in 2024. While crews sampled intermittently throughout the entire field season, the majority of removal efforts occurred later in the season (August-November) during Colorado River nonnative removal project 126- Colorado River Smallmouth Bass Management (a combination of historical projects 126a and 126b).

Colorado River stream flow and temperature for the sampled river section are measured at Cisco, UT, at USGS gauge # 09180500, river mile 96.7. During the 2024 sampling season, recorded water temperatures ranged from 8.7°C - 28°C. Water temperatures increased to greater than 10°C prior to spring sampling (4/16 – 6/21), with an average of 15°C, exceeding the temperature threshold generally required for successful walleye spawning (Barton, 1994). At the Cisco gauge the river reached peak flow on 10 June at 25,600 cubic feet per second (ft³/s) (Figure 1). During late-season efforts (8/1 – 11/1), the mainstem Colorado River recorded an average flow of 3,660 ft³/s. The 2024 summer monsoon season brought multiple substantial rainfall events to the Upper Colorado River Basin in July and 2024 Annual Report for “Walleye Management in the Upper Colorado River Basin”

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August, resulting in significant gauge height spikes and increased turbidity. Storm events that result in elevated mainstem turbidity have previously been associated with increased catch rates in this reach (Francis & Ryden, 2015). The majority of field sampling occurred during this monsoon period, storm and rain events that likely increased turbidity and may have impacted catch rates.

Sampling was conducted on the mainstem Colorado River from RM 242.9 (near Rifle, Colorado) downstream to RM 54 (near Potash, Utah). The river in this section flows from the urban and agricultural Rifle and Grand Valleys in western Colorado, moving downstream through deep canyon gorges into eastern Utah. It then meets the confluence with the Dolores River before transitioning into the rapids and riffles typical of the 'Moab Daily' recreational boating area, ultimately ending just downstream of Moab, Utah. Removal efforts were distributed throughout, and representative of the entire sampled river reach with the exception of RM 124.8 – RM 114, where rapids and hydrologic conditions in Westwater Canyon make sampling difficult. These efforts varied temporally and across different reaches, determined by the phenology of the most abundant and problematic target species in relation to annual hydrology and historical catch rate success.

During the 2024 field season, crews removed 149 walleye from the mainstem Colorado (Table 1). Shoreline electrofishing was the primary removal method (501.9 hours), accounting for all walleye removed, yielding an average of 0.3 walleye captures per hour, catch per unit of effort (CPUE). Additionally, two hours of trammel netting was conducted but yielded no walleye. All walleye captures occurred between Lower Westwater and Potash (RM 114 - RM 54) during 165 hours of fishing (0.9 fish/hour) (Figure 2). For the river section from Dewey Bridge to Takeout Beach (RM 94.5 - 74.2), 58 hours of effort produced 91 of the walleye collected resulting in a CPUE of 1.58 fish/hour (Table 2), the highest reach-wide catch rates in the basin in 2024.

Additional sample effort included The Grand Valley Water Users (GVWU) Fish Passage (project C4b-GVP). Located at RM 193.7 on the mainstem Colorado, the GVWU roller dam is used for agricultural irrigation in the Grand Valley and power generation. During the 2024 field season the fish passage was operated from 23 April through 25 July, and again from 23 through 26 September. No walleye were collected through these efforts.

Walleye in the upper Colorado River Basin are classified as juvenile fish at <300 mm total length (TL), adult fish at >300 mm TL, and a piscivore at >375 mm TL. All walleye captured in the Colorado River Sub-Basin were adults (n = 149), ranging from 344 mm to 664 mm with an average TL of 449 mm (Figure 3). A total of 144 fish were identified as piscivorous. Weights ranged from 387 – 2344 grams (g) with a mean of 785 g. Of total captures, 51% (n = 76) were female, 47% were male (n = 70), and 2% (n = 3) were undetermined. No ripe fish were collected. All walleye captured in the Colorado River Sub-Basin were scanned for Passive Integrated Transponder (PIT tags) and had their stomach contents analyzed in the field. PIT tags found in the stomach of invasive walleye are a clear indicator of piscivory; however, no PIT tags were detected during the 2024 season. Although many walleye were

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found to have non- native and unidentifiable fish in their stomach, only two native roundtail chub (*Gila robusta*) and one bluehead sucker (*Catostomus discobolus*) were identified.

The lower Westwater Canyon to Potash (RM 114 – 54) section of the mainstem Colorado continues to be a hot spot for walleye. Consistent with recent sample data (2021- present), all 2024 walleye captures occur in this section. Multiple factors may influence this pattern. First, this section features a meandering channel with a low-gradient planform, consisting of pool-drop rapids and riffles (Rosgen, 1994). The riverbed is made up of fine sands and coarse cobbles, which provide favorable conditions for adult walleye during various life cycle stages (Barton, 2011). Second, at the upstream end of this section is Westwater Canyon, a steep-walled narrow canyon with high gradient that most years likely discourages further upstream migration and acts as an impartial barrier for walleye. Following low walleye collections in 2023 (n = 40), total capture in 2024 was more similar to the 5-, 10- and 15-year averages (n = 218, 174, and 153, respectively) (Figure 4).

Gunnison River

In 2024, FWS-GJ researchers conducted sampling on the Gunnison River, a tributary of the Colorado River in western Colorado, during projects C-4bRED- Redlands Fish Passage and 126- Non-Native Fish Removal CO. The Redlands Fish Passage is located at RM 3.0 on the Gunnison River upstream of the confluence with the mainstem Colorado River. The Redlands Diversion Dam is a low head irrigation and power generating dam that has a fish passage and trap which is operated by FWS-GJ for native fish passage and non-native fish removal. From 19 April to 16 October in 2024, field crews removed zero walleye at the fish passage and trap from continual passive trap effort.

From 26 June through 7 October field crews sampled from RM 3 to RM 0.7 on eight occasions throughout the season. Electrofishing rafts sampled both right and left shorelines down the sample reach, resulting in 20.1 hours of effort. Zero walleye were captured during this sampling effort.

Off Channel Ponds

In 2024, researchers from FWS-GJ and CPW conducted non- targeted sampling for project 126 at Beswicks Pond, Butch Craig Pond, CDOT Pond and East Rifle Municipal Pond in western Colorado. Work was completed between 11 March and 1 November. A total of 4,856.8 hours of effort was completed during the 2024 field season, combining the use of electrofishing, trammel nets, and gill net gears. No walleye were removed from ponds during the field season.

Green River Sub-Basin

Green River Mainstem

Researchers from the United States Fish and Wildlife Service Vernal Fish and Wildlife Conservation Office (FWS-V), Utah Division of Wildlife Resources Vernal (UDWR-V), Utah Division of Wildlife Resources Moab (UDWR-M), and the Colorado State University Larval Fish Lab (CSU-LFL) conducted sampling in the Green River mainstem in 2024. Removal occurred during both targeted and non-targeted projects 123a, 123b, 123d, 128a, FR-115, and UT- 3SP from 13 March through 10 October in 2024.

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While crews sampled intermittently throughout the entire field season, the majority of non-targeted removal effort occurred from 8 April through 9 June during project 128a - Colorado Pikeminnow Population Estimate, Green River. All targeted removal effort occurred during project 123d from 3 March to 10 April in 2024.

Green River stream flow and temperature for the sampled river section are measured at Green River State Park (GRSP), in Green River, UT, at USGS gauge #09315000, river mile 120. During the sampling season, water temperatures were recorded from 6.8°C - 28.7°C. Water temperatures remained below the 10°C threshold for successful spawning from the beginning of spring sampling on 13 March until 20 March, with an average temperature of 8.4 °C. Average water temperature during spring sampling was 14.8 °C (3/13 – 6/21). At the GRSP gauge the river reached peak flow of 19,900 ft³/s on 11 June in 2024 (Figure 5). During project 128a (4/8 – 6/9), the mainstem Green River recorded a mean discharge of 9,762 ft³/s, increasing from 3,750 to 19,100 ft³/s during that time. The 2024 summer monsoon season brought multiple substantial rainfall events to the Upper Colorado River Basin in July and August, resulting in significant gauge height spikes and increased turbidity.

Sampling was conducted on the mainstem Green River from RM 381 downstream to the confluence with the Colorado River at RM 0. Starting in Lodore Canyon, the upstream most section of the sampled Green River, the Green River flows through a series of narrow, steep-walled canyons with high gradient. It then meanders through the Uinta Basin, characterized by low-velocity alluvial deposits and floodplain environments, before picking up gradient through Desolation and Gray Canyons. Finally, the river passes through the confined, steep-walled, low-velocity meandering Stillwater and Labyrinth Canyons, eventually reaching the confluence with the Colorado River. Although not continuous, non-targeted removal efforts were distributed throughout and representative of the entire sampled river section (RM 344.5 - RM 0). Targeted removal efforts were focused specifically from the Tusher Dam to GRSP (RM 128 – 120) in the Tusher Diversion reach where walleye spawning behaviors, ripe individuals, and environmental conditions favorable to spawning have been observed.

During the 2024 field season crews removed 139 walleye from the mainstem Green River (Table 3). Removal included electroshock fishing, trammel net, and fyke net gears. Of the total effort, boat-mounted electrofishing accounted for 1,204 hours and resulted in the removal of all 139 walleye, yielding an average of 0.12 walleye captures per hour. Trammel net and fyke net gears made up the remainder of effort (778.9) and produced no captures. Field crews captured walleye throughout the entire mainstem Greer River, however they were most abundant in the Tusher Diversion reach (RM 128.6 – 95.8) where 77 hours of fishing produced 62 walleye captures (0.81 fish/ hour) (Table 4, Figure 6). This trend is consistent with recent historic data (2017- present) for the sub-reach directly downstream of Tusher Diversion to GRSP (RM 128.7-120.0) where CPUE remains the highest in the Green River Sub-Basin at 1.28 fish/ hr. (Table 5). This section of the Green River supports walleye spawning activity but also acts as an upstream passage barrier. When springtime environmental conditions favor spawning, walleye migrate upstream from Lake Powell in search of suitable spawning and foraging habitat. The Tusher Diversion to GRSP section is the first section of river that satisfies

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these conditions on walleye's journey upstream. Additionally, the Tusher Diversion is a man-made irrigation diversion that forms an in-river high-gradient and velocity barrier for upstream walleye movement. The combination of these factors makes the Tusher Diversion to GRSP (RM 128.7- 120) section of the Tusher Diversion reach ideal walleye habitat, likely explaining the elevated catch rates consistently observed at this location.

On the mainstem Green River 17 juveniles were captured, TL 150 -272 mm (Figure 7). Of those fish four were weighed ranging from 49 - 210 grams (see 'Additional Observations' for more information). The remainder of fish collected were adults (n = 122) ranging from 719 - 350 mm with an average length of 501 mm (Figure 8). Of those fish, 86 were weighed ranging from 340 -3,610 g and an average weight of 1,217 g. Of total captures, 3.5% were female (n = 5), 13% were male (n = 19), and 83.5% were undetermined (n = 115). A total of one ripe female (TL 605 mm) and 10 ripe males (TL 410 – 556 mm) were collected between 13 March and 15 May. All ripe fish were captured between the Tusher Diversion at RM 127.4. to RM 98.3. Every walleye captured in the Green River mainstem was scanned for a PIT tag however no tags were detected during the 2024 season. Stomach contents were not analyzed for Green River walleye in 2024.

Yampa River

Researchers from FWS-V, CPW, and CSU-LFL conducted sampling in the Yampa River in 2024. Removal occurred during non-targeted projects 98a, 98b, 98c, 110, 125, and 128a from 2 April to 15 July. The Yampa River is a free-flowing river, sampling took place intermittently throughout the entire season of navigable flows for whitewater rafts.

Yampa River discharge and temperature for the sampled river section are measured at Maybell, CO, at USGS gauge #09251000. During the sampling season water temperatures were recorded from 3.6°C - 25.8°C. Water temperatures increased above the 10°C threshold for successful spawning on 5 May, prior to that date the mean temperature was 9°C and included significant daily fluctuation (Barton, 2011). At the Maybell gauge the river reached peak flow of 10,500 ft³/s on 7 June in 2024 and sampling concluded at 431 ft³/s (Figure 9)

Crews sampled from RM 194.1 to the confluence with the Green River at RM 0. Although sampling was distributed and representative of the entire section, not all the Yampa River was sampled due to geologic and hydrologic conditions making sampling difficult and ineffective. All removal effort on the Yampa River was non-targeted and included electroshock fishing (621.7 hrs.) and gill net gears (6,288 hrs.) (Table 6). During sampling one walleye was captured at RM 7 during project 110 on 6 June (Figure 10). The fish was an adult (TL = 548), was not ripe and sex was indeterminate. No PIT tag was detected and stomach contents were not analyzed.

White River Sub- Basin

Researchers from FWS-V, UDWR-V and CPW conducted non-targeted sampling in the White River sub-basin for project 167- White River Smallmouth Bass Removal. Work was completed between 8

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April and 17 October. A total of 325 hours of electrofishing effort was completed on the White River and Kenney Reservoir during the 2024 field season. No walleye were removed during the 2024 field season.

Additional noteworthy observations:

- Evaluating catch rates between the Green and Colorado Rivers warrants careful consideration, as trends are likely influenced by sampling variability that prevents a direct comparison. In 2024 most of the sampling on the mainstem Colorado River occurred during late-season non-native removal efforts. Conversely, the Green River was heavily sampled during early-season project 128a- pikeminnow population estimate effort. For example, a metric such as reproductive condition is difficult to evaluate between rivers; the reproductive cycle of walleye is influenced by seasonal hydrology so comparing this metric across seasons (early v. late-season sampling) may obscure annual and long-term trends. Comparing the Green River to the Colorado River is important for assessing basin-wide trends, however, these metrics do not necessarily directly correspond and should be exercised with caution.
- Below the confluence of the Green and Colorado Rivers, Lake Powell supports a robust walleye population. Researchers speculate that adult fish migrate upstream from Powell in search of spawning or foraging habitat. Both the lower Green and lower Colorado Rivers share a common geomorphic feature: a transition from steep-walled canyons with sandy substrates to meandering, braided, complex systems. These systems are characterized by pools and riffles with rocky, cobble substrates that create diverse habitat types which enhance productivity, supporting a more robust and diverse community of invertebrates and fish.

Ripe walleye are found at and below the Tusher Diversion on the Green River and at and below the terminus of lower Westwater Canyon on the Colorado. Both sections of river support suitable walleye spawning habitat (Barton, 2011). Furthermore, both sections of river are bracketed on the upstream end by geomorphic features (i.e. Tusher Diversion and Westwater Canyon) that likely discourage further upstream walleye migration (Barton, 2011). The analogous geomorphology of both the lower Green and Colorado Rivers likely functions similarly for walleye spawning behavior and migration barriers.

- High water levels in 2023 caused the temporary non-native screen blocking the spillway of Starvation Reservoir to partially fail (Hendrick and Oplinger, 2023). Starvation Reservoir drains into the Duchesne River, a tributary that meets the Green River at RM 248.7. This failure could partially be responsible for the 2024 walleye captures near this confluence; five (5) walleye were found within a 25 RM radius (RM 223.7-273.7) and 13 within a 50 mi radius (RM 198 – 298). Despite walleye captures in proximity to the Duchesne River, no walleye were observed post-treatment of Starvation Reservoir and it cannot be determined that this was a source of walleye in 2024 (Hendrick and Oplinger, 2023).

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- Juvenile walleye in the Upper Colorado River Basin warrant consideration as annual catch numbers could potentially indicate broader patterns. From 2010–2024, annual captures of juveniles have ranged between 0–6 except in 2022 (n=15) and 2024 (n=17) (Figure 7). Although zero walleye <300 mm were captured from 2019–2021 and 2023, captures from 2022 and 2024 represented a noteworthy increase over annual catch numbers from the past 15 years. With the exception of one outlier at RM 310.8, in 2024 all juvenile walleye (n=16) were captured between RM 222 and 107.5, from within the Lower Middle Green Reach to below the town of Green River in the Tusher Diversion Reach (Figure 11).

Recommendations:

- Continue targeted walleye removal in reaches that have historically produced the highest catch rates of walleye; Lower Green River in the Tusher Diversion reach; Colorado River between lower Westwater Canyon and Potash; and Lower Duchesne River, during spring peak flows when passage is possible.
- Continue walleye removal as a component of existing projects, especially those which utilize similar fishing techniques to those targeted towards walleye.
- Monitor environmental conditions that influence walleye spawning movements and behavior. Targeted removal efforts should be carried out from spring through early summer to align with spawning activity or during periods of significant catch rates, such as those associated with turbidity events (Francis & Ryden, 2015).
- Investigate potential sources of juvenile walleye within the Upper Colorado River basin, specifically in the Green River sub-basin where they have been encountered at elevated levels in recent years.
- Inter-annual, spatial, and temporal variance in sampling effort creates challenges for year-to-year encounter rate comparisons. Projects that operate on an ‘on year’ and ‘off year’ cycle dictate that field crews sample certain river sections more intensely some years, using differing sampling methods and gear types. Conversely, those same reaches are sparsely or not at all sampled in other years. Catch per unit of effort analyses attempt to correct for this discrepancy, however not all variables (fishing style, environmental conditions, field crew changes, etc.) can be accounted for by this metric. Consider developing an analytical metric for standardizing year-to-year comparisons of walleye encounters on a sub-basin, basin- wide, or project scale. This could involve defining comparable “monitoring reaches” for both the Colorado and Green Rivers. Standardizing analysis methods within these reaches could provide the benefit of monitoring walleye demographics over time and independent of effort, and potentially enable comparisons between rivers.

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Project Status

On track

Status of Data Submission

Data submitted 18 November 2024

References

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Francis, T. and Ryden, D. 2015. Removal of smallmouth bass in the upper Colorado river between Price-Stubb dam near palisade, Colorado, and Westwater, Utah. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Hendrick, T, and Oplinger, R. Operation, maintenance, and evaluation of fish escapement barriers and sportfish management actions in the Colorado River basin within Utah. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Rosgen, D. L. 1994. A classification of natural rivers. *CATENA* 22(3):169-199. ISSN 0341-8162, [https://doi.org/10.1016/0341-8162\(94\)90001-9](https://doi.org/10.1016/0341-8162(94)90001-9).

Signed

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12/20/2024

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Colorado River Figures:

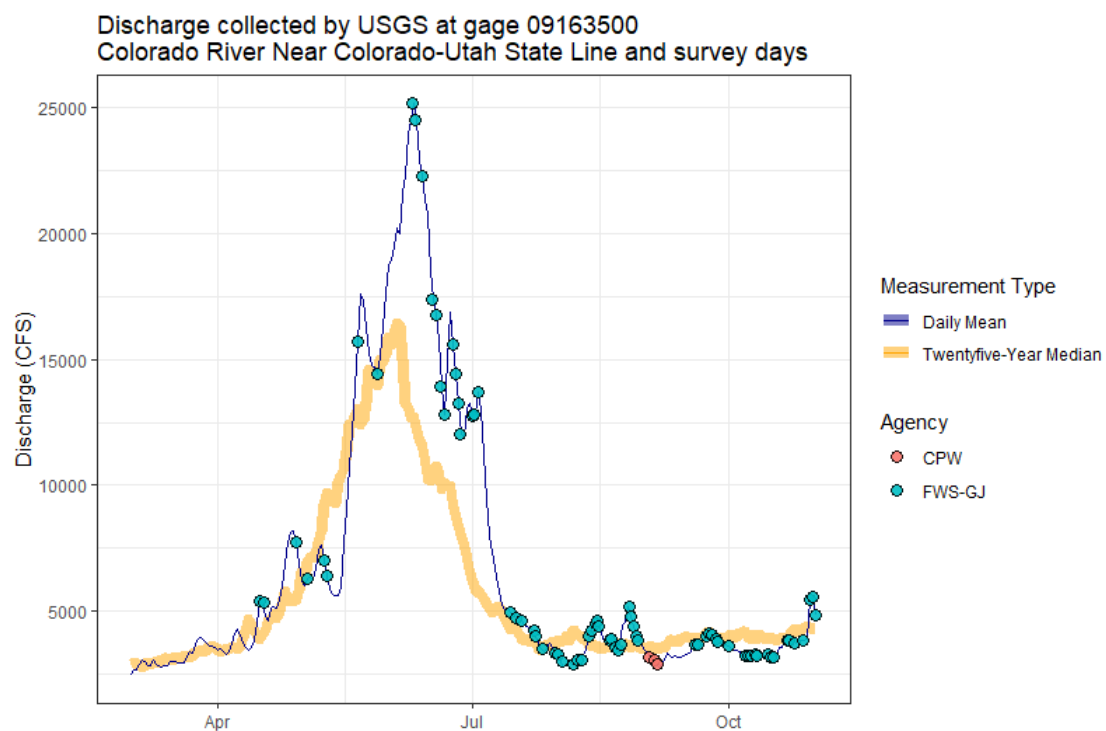


Figure 1. General Colorado River hydrologic conditions for the study period and sampling events.

Table 1. Effort overview in the Colorado river. Includes all gears used during the current year.

| Gear Code | Sampling Date Range | Sampling River Mile Range | Total Effort (hr.) | Number of Target Species Captured | Fish/Hour |
|-----------|---------------------|---------------------------|--------------------|-----------------------------------|-----------|
| EL | Apr 16 – Nov 01 | 54 - 242.9 | 501.9 | 149 | 0.3 |
| TR | May 09 – May 09 | 136 - 136 | 2.0 | 0 | 0.0 |

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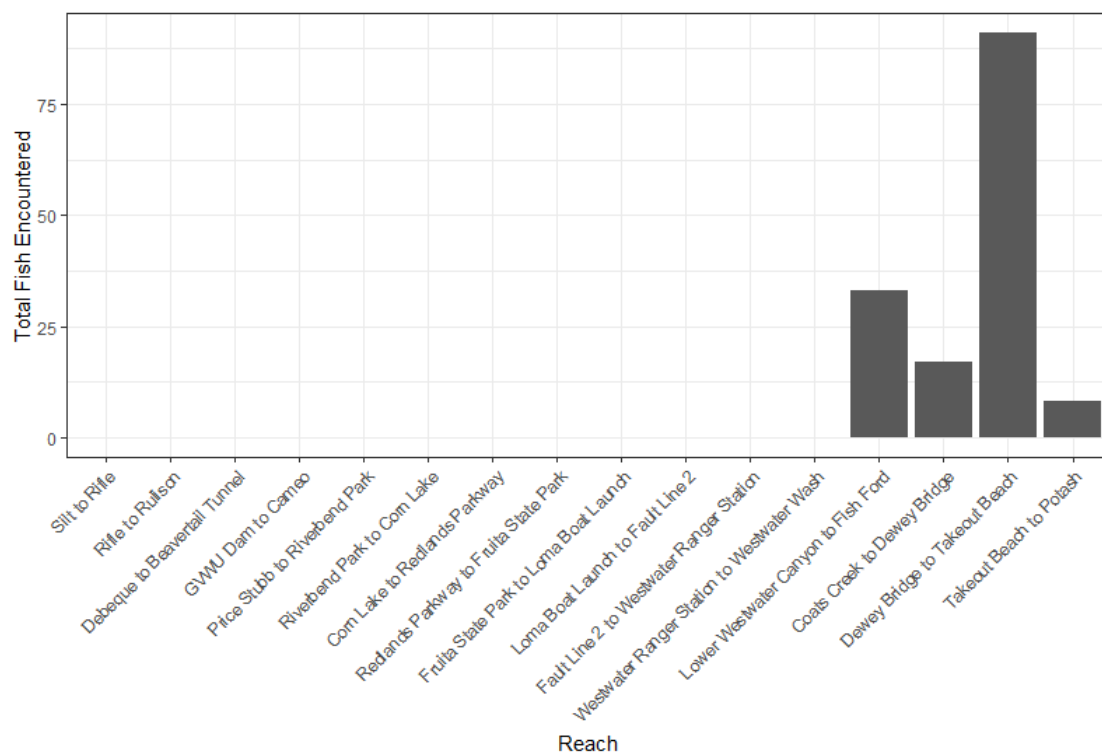


Figure 2. Colorado River total captures by removal reach (includes all effort).

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Table 2. Walleye CPUE by gear type and removal reach (includes only species effective gear types).

| Reach Name | Gear Code | Sampling Date Range | Sampling River Mile Range | Total Effort (hr) | Number of Target Species Encountered | Fish/Hour |
|--|-----------|---------------------|---------------------------|-------------------|--------------------------------------|-----------|
| Silt to Rifle | EL | Sep 03 - Sep 04 | 239.1 - 242.9 | 2 | 0 | 0.00 |
| Rifle to Rulison | EL | Sep 03 - Sep 04 | 237.7 - 239.1 | 3 | 0 | 0.00 |
| Debeque to Beavertail Tunnel | EL | Sep 05 - Sep 05 | 197.2 - 209.8 | 4 | 0 | 0.00 |
| GVWU Dam to Cameo | EL | Aug 08 - Aug 19 | 193.7 - 193.7 | 4 | 0 | 0.00 |
| Price Stubb to Riverbend Park | EL | Jun 21 - Jun 21 | 184.2 - 187.7 | 3 | 0 | 0.00 |
| Riverbend Park to Corn Lake | EL | Jul 01 - Sep 27 | 177.4 - 184.7 | 51 | 0 | 0.00 |
| Corn Lake to Redlands Parkway | EL | May 03 - Oct 25 | 166.7 - 177.4 | 57 | 0 | 0.00 |
| Redlands Parkway to Fruita State Park | EL | Jul 24 - Oct 10 | 157.1 - 166.8 | 122 | 0 | 0.00 |
| Fruita State Park to Loma Boat Launch | EL | Jun 24 - Oct 11 | 152.6 - 157.1 | 29 | 0 | 0.00 |
| Loma Boat Launch to Fault Line 2 | EL | Jun 10 - Aug 13 | 138.2 - 152.7 | 38 | 0 | 0.00 |
| Fault Line 2 to Westwater Ranger Station | EL | May 09 - Aug 14 | 127.3 - 139.6 | 22 | 0 | 0.00 |
| Westwater Ranger Station to Westwater Wash | EL | Jun 18 - Jun 18 | 125 - 128 | 2 | 0 | 0.00 |
| Lower Westwater Canyon to Fish Ford | EL | Apr 16 - Oct 30 | 104.3 - 114 | 56 | 33 | 0.59 |
| Coats Creek to Dewey Bridge | EL | Apr 17 - Oct 09 | 94.4 - 105.7 | 25 | 17 | 0.69 |
| Dewey Bridge to Takeout Beach | EL | Sep 24 - Nov 01 | 74.2 - 94.5 | 58 | 91 | 1.58 |
| Takeout Beach to Potash | EL | Oct 15 - Oct 17 | 54 - 74.3 | 26 | 8 | 0.31 |

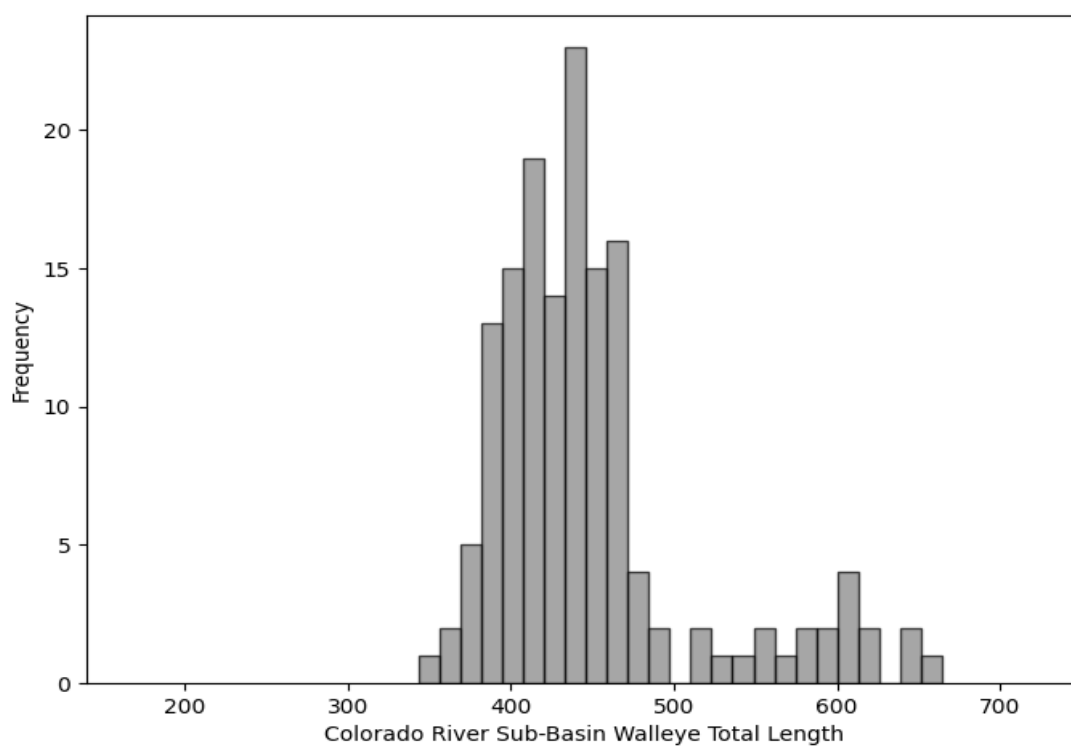


Figure 3. Length frequency of walleye captured in the Colorado River.

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General Figures:

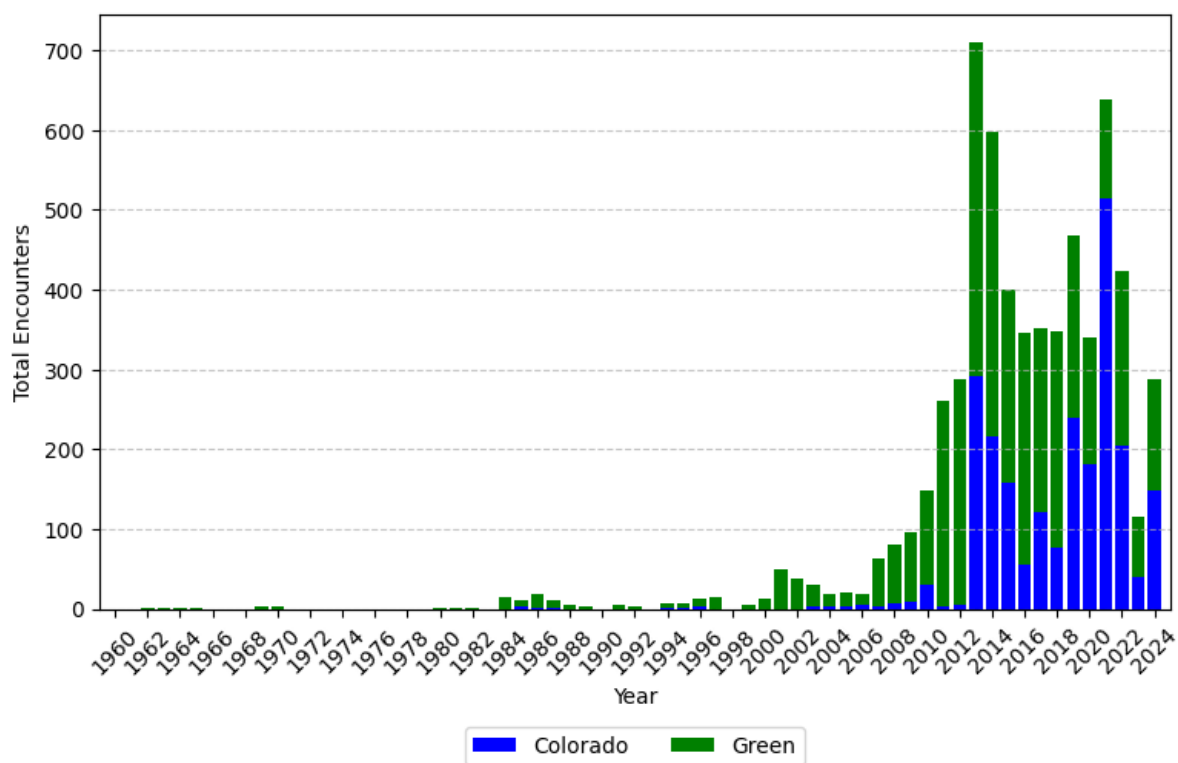


Figure 4. Historic UCB walleye encounter data 1960- present

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Green River Figures:

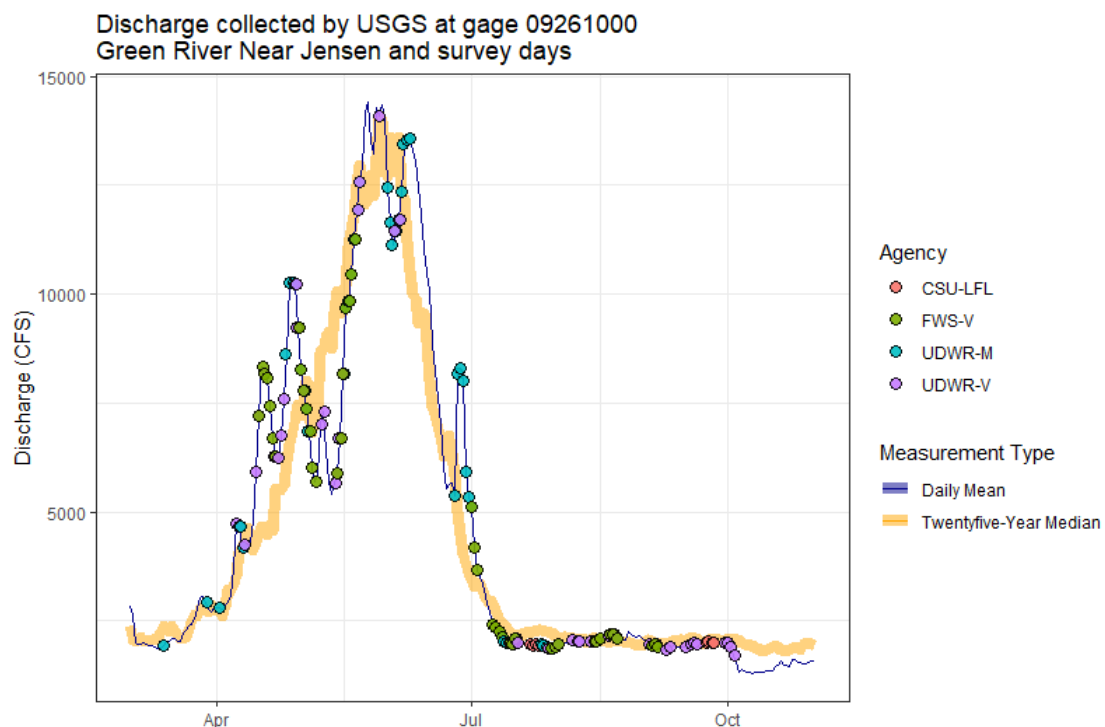


Figure 5. General Green River hydrologic conditions for the study period and sampling events.

Table 3. Effort overview in the Green River. Includes all gears used during the current year.

| Gear Code | Sampling Date Range | Sampling River Mile Range | Total Effort (hr) | Number of Target Species Captured | Fish/Hour |
|-----------|---------------------|---------------------------|-------------------|-----------------------------------|-----------|
| EL | Mar 13 – Oct 03 | 2.5 - 363.5 | 1,204.0 | 139 | 0.12 |
| FY | May 29 – May 29 | 298.8 - 304.5 | 72.0 | 0 | 0.00 |
| TR | May 23 – Oct 04 | 337.9 - 381 | 353.1 | 0 | 0.00 |

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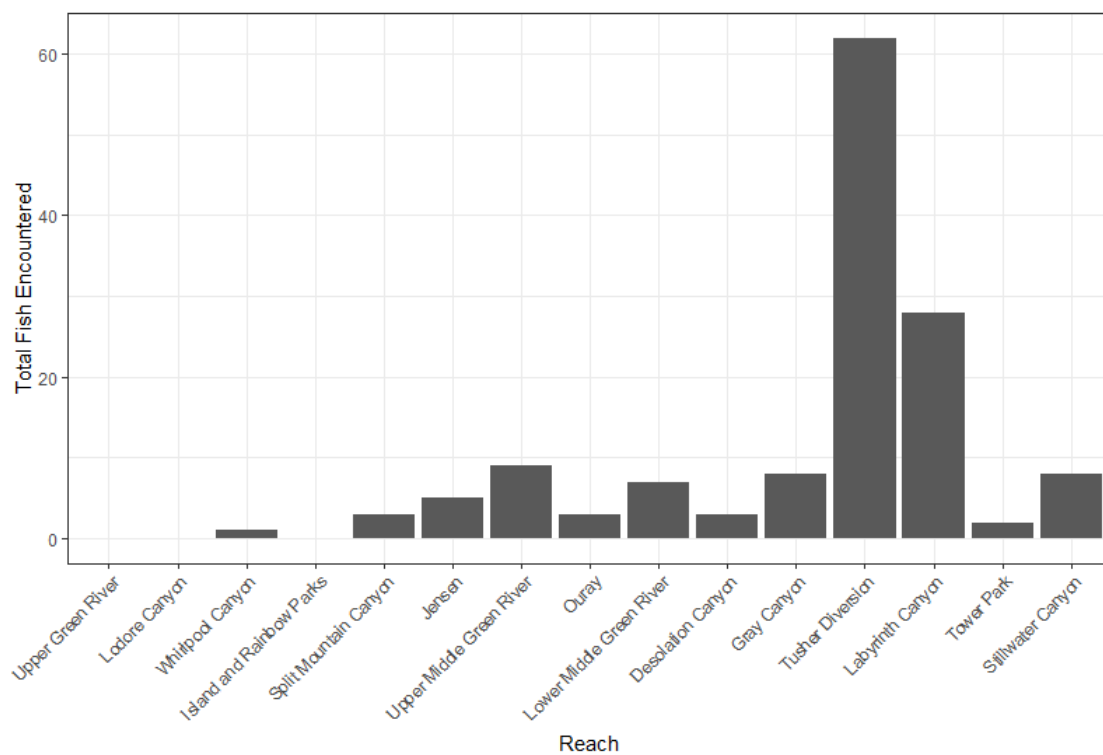


Figure 6. Green River total captures by removal reach (includes all efforts).

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Table 4. Walleye CPUE by gear type and removal reach (includes only species effective gear types)

| Reach Name | Gear Code | Sampling Date Range | Sampling River Mile Range | Total Effort (hr) | Number of Target Species Encountered | Fish/Hour |
|--------------------------|-----------|---------------------|---------------------------|-------------------|--------------------------------------|-----------|
| Lodore Canyon | EL | Jul 22 - Sep 25 | 346.3 - 363.5 | 25 | 0 | 0.00 |
| Whirlpool Canyon | EL | Jul 01 - Sep 26 | 333.6 - 346.5 | 106 | 1 | 0.01 |
| Island and Rainbow Parks | EL | Apr 15 - Sep 26 | 326.5 - 336.8 | 113 | 0 | 0.00 |
| Split Mountain Canyon | EL | Jul 03 - Sep 06 | 319.6 - 327.8 | 61 | 3 | 0.05 |
| Jensen | EL | Apr 08 - Oct 01 | 300.8 - 321.4 | 105 | 5 | 0.05 |
| Upper Middle Green River | EL | Apr 09 - Oct 03 | NA - 300.8 | 120 | 9 | 0.07 |
| Ouray | EL | Apr 16 - Sep 18 | 240.8 - 260.8 | 64 | 3 | 0.05 |
| Lower Middle Green River | EL | Apr 16 - Sep 20 | 185.5 - 240.8 | 148 | 7 | 0.05 |
| Desolation Canyon | EL | Apr 19 - Jun 29 | 157.2 - 190 | 65 | 3 | 0.05 |
| Gray Canyon | EL | Apr 20 - Jul 01 | 128.1 - 169.5 | 81 | 8 | 0.10 |
| Tusher Diversion | EL | Mar 13 - Jun 02 | 95.8 - 128.6 | 77 | 62 | 0.81 |
| Labyrinth Canyon | EL | Apr 28 - Jun 07 | 0 - 116.8 | 148 | 28 | 0.19 |
| Tower Park | EL | May 02 - Jun 08 | 21.2 - 35.2 | 37 | 2 | 0.05 |
| Stillwater Canyon | EL | May 03 - Jun 09 | 0 - 21.3 | 55 | 8 | 0.15 |

*Table 5. Walleye captures at Tusher Diversion (RM 120- 128.7).**

| Year | Number Captured | Total Effort (hr.) | CPUE |
|------|-----------------|--------------------|------|
| 2024 | 8 | 6.25 | 1.28 |
| 2023 | 3 | 5.34 | 0.56 |
| 2022 | 41 | 17.96 | 2.82 |
| 2021 | 101 | 31.35 | 3.22 |
| 2020 | 113 | 39.7 | 2.85 |
| 2019 | 151 | 43.4 | 3.48 |
| 2018 | 12 | 7.2 | 1.66 |

**Note that annual variation in targeted effort totals might be caused by crew and resource availability allocated toward project 128 some years and away from targeted sampling.*

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

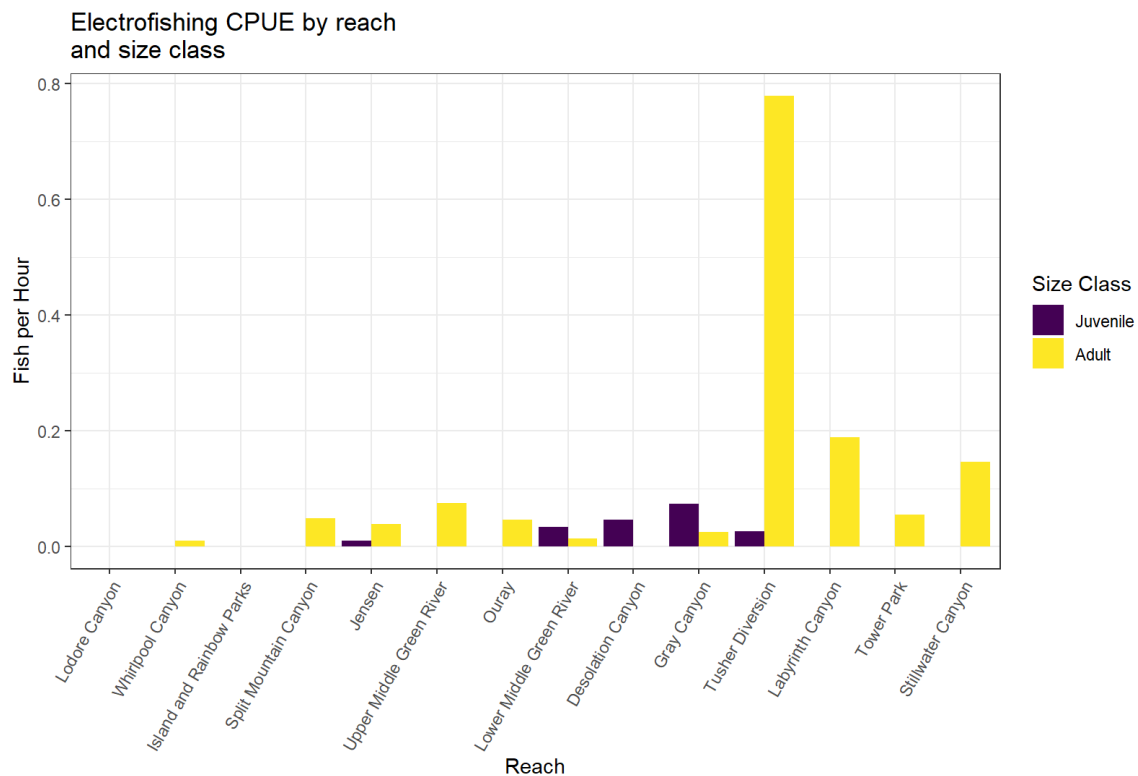
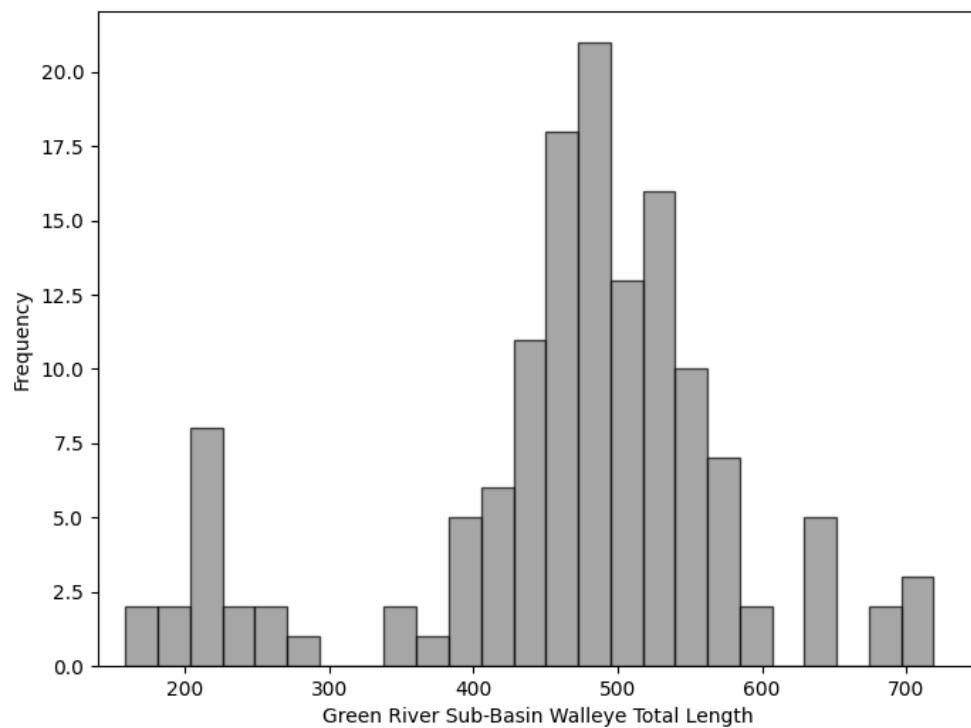


Figure 7. Green River juvenile and adult captures by reach (includes all efforts).



UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Figure 8. Length frequency of walleye in the Colorado River
Yampa River Figures:

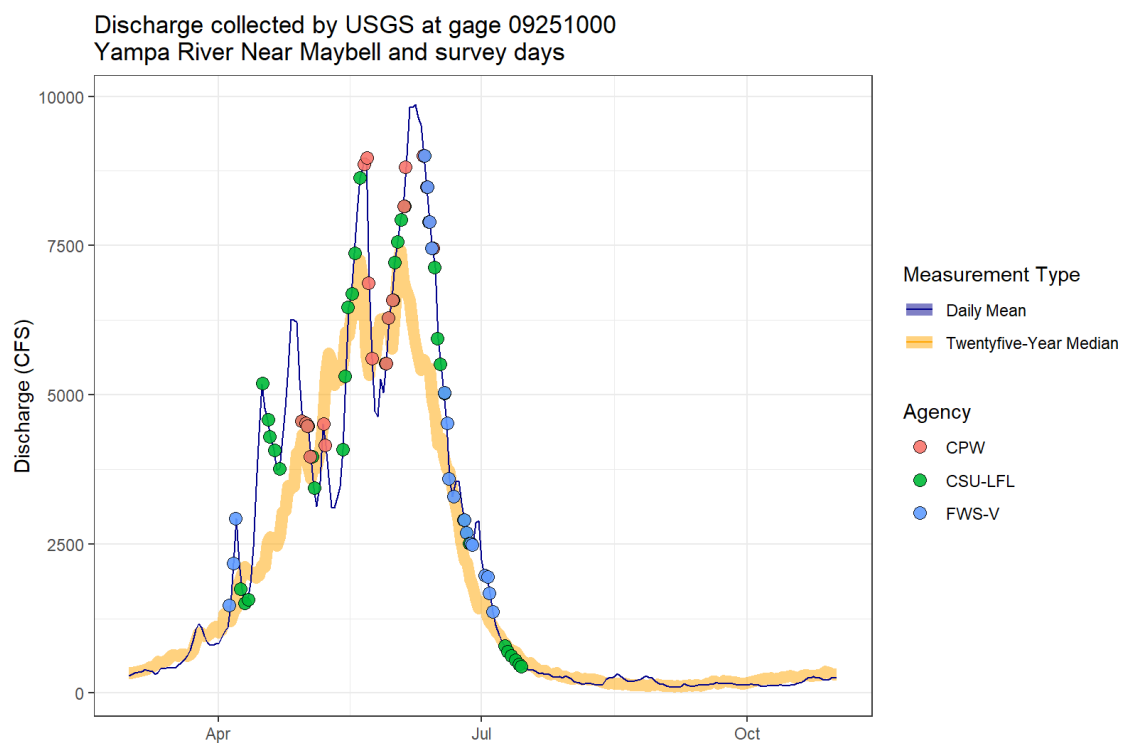


Figure 9. General Yampa River hydrologic conditions for the study period and sampling events.

Table 6. Effort overview in the Yampa River. Includes all gears used during the current year.

| Gear Code | Sampling Date Range | Sampling River Mile Range | Total Effort (hr.) | Number of Target Species Captured | Fish/Hour |
|-----------|---------------------|---------------------------|--------------------|-----------------------------------|-----------|
| EL | Apr 05 – Jul 15 | 0 - 189.3 | 621.7 | 1 | 0 |
| GN | Apr 02 – May 14 | 122.8 - 194.1 | 6,288.0 | 0 | 0 |

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

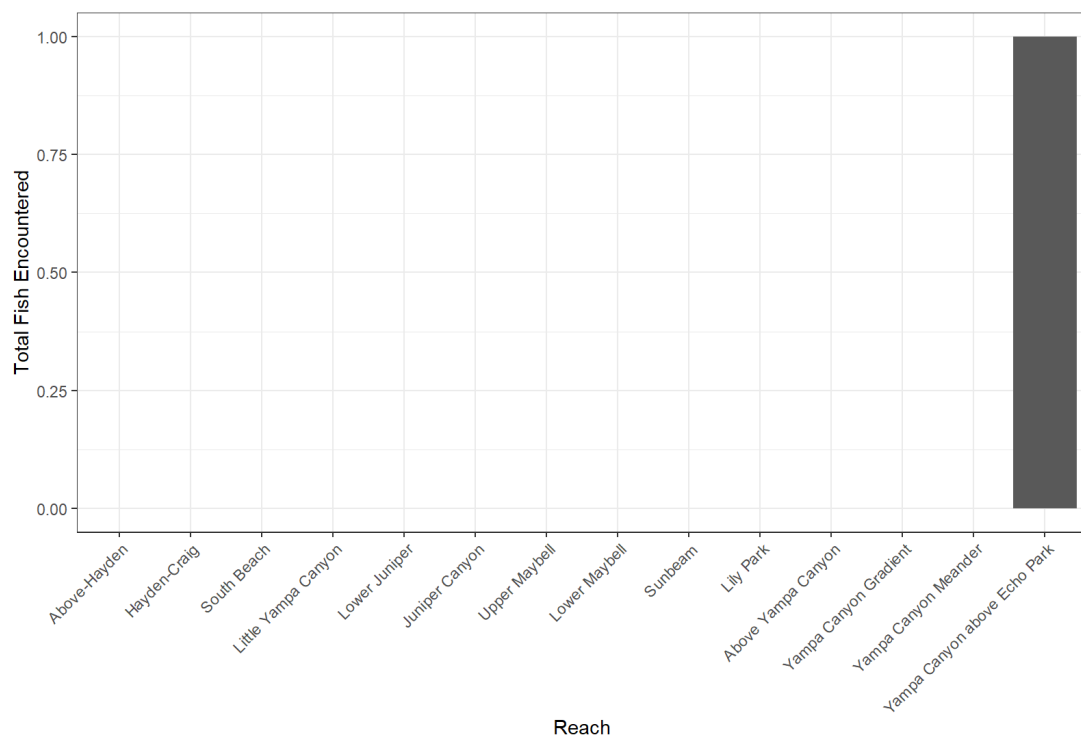


Figure 10. Yampa River total captures by removal reach (includes all effort).

Table 7. Juvenile capture totals for the entire UCB 2010- 2024

| Year | Number Juvenile Captured |
|------|--------------------------|
| 2009 | 17 |
| 2010 | 5 |
| 2011 | 1 |
| 2012 | 4 |
| 2013 | 4 |
| 2014 | 3 |
| 2015 | 1 |
| 2016 | 1 |
| 2017 | 4 |
| 2018 | 1 |
| 2019 | 0 |
| 2020 | 0 |
| 2021 | 0 |
| 2022 | 15 |
| 2023 | 0 |
| 2024 | 17 |

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

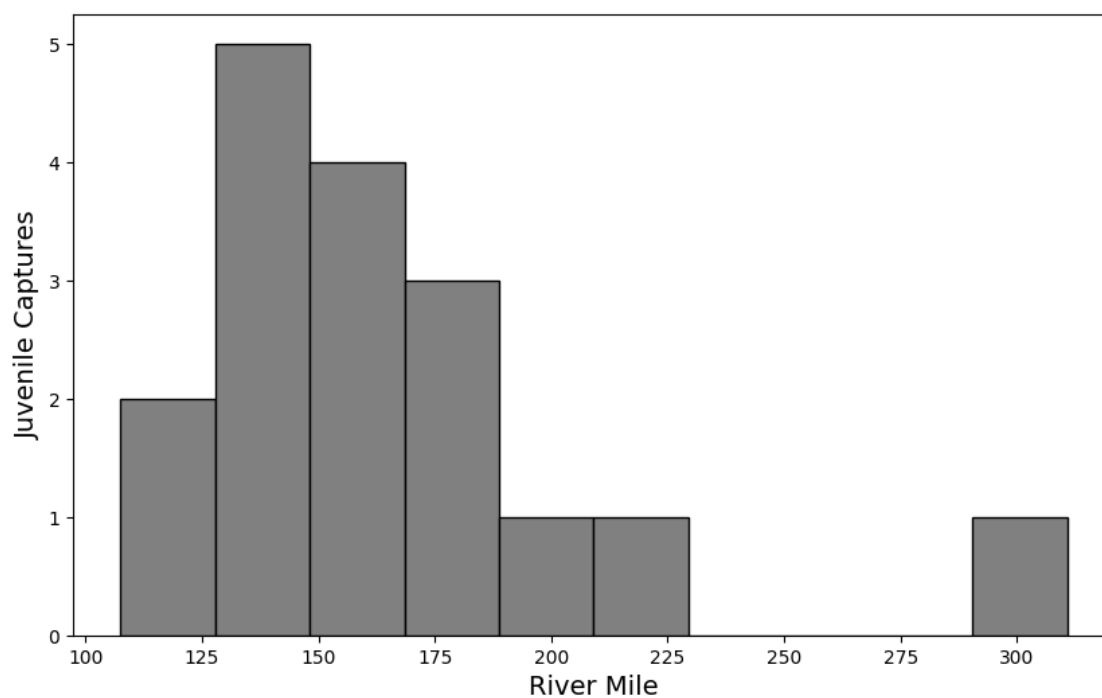


Figure 11. Spatial distribution of juvenile captures on the Green River by river mile.