

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

2024 ANNUAL REPORT

Project Title

Annual fall monitoring of young-of-year Colorado Pikeminnow and small-bodied native fishes

Bureau of Reclamation Agreement Numbers and Grant Periods:

R14AP00059 (10/01/2018-09/30/2024)

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Abstract:

Monitoring of young-of-year (YOY) Colorado Pikeminnow (*Ptychocheilus lucius*) is an ongoing project initiated in 1986 in the upper Colorado River basin as part of the Interagency Standardized Monitoring Program (USFWS 1987) to evaluate recruitment success of age-0 endangered fishes. In 2024, we encountered 47 YOY Colorado Pikeminnow on the lower Colorado River (Reach 1), 12 on the middle Green River (Reach 4), and 74 on the lower Green River (Reach 3). We collected an additional 136 YOY Colorado Pikeminnow from the lower Colorado River for broodstock development. We will continue to monitor the annual abundance of post-larval Colorado Pikeminnow in the middle and lower Green River and the lower Colorado River to assess long-term trends in annual fall recruitment.

Study Schedule:

1986-Ongoing

Relationship to RAP:

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

- V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).
- V.A. Measure and document population and habitat parameters to determine status and biological response to recovery actions.
- V.B.2. Conduct appropriate studies to provide needed life history information.

GREEN RIVER ACTION PLAN: MAINSTEM

- V.C.3. Monitor age-0 Colorado Pikeminnow in backwaters

COLORADO RIVER ACTION PLAN: MAINSTEM

- V.D.1. Monitor age-0 Colorado Pikeminnow in backwaters

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

Task 1. Seine zero to low velocity habitats on the lower Green and Colorado Rivers to collect fish and habitat data.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Middle Green River (Reach 4):

Annual monitoring for young-of-year (YOY) Colorado Pikeminnow (*Ptychocheilus lucius*) by the Utah Division of Wildlife Resources Vernal began in Reach 4 on September 23, 2024 and concluded on October 1, 2024. Beginning at Split Mountain boat ramp (river mile [RM] 319.3) and concluding at Sand Wash (RM 215.3), crews sampled 104 river miles in accordance with Interagency Standardized Monitoring Program (ISMP; USFWS 1987) protocols. Altogether, we sampled 30 backwater habitats (19 primary and 11 secondary) that met ISMP criteria, yielding a total sampling area of 4,978.1 m².

Discharge on the middle Green River is measured at USGS gage #09261000 at Jensen, Utah (Figure 1). At this location, the Green River peaked at 14,700 cubic feet per second (cfs) on May 30, 2024. The river reached base flows ($\leq 3,000$ cfs; see Bestgen and Hill 2016) on July 6, 2024. During ISMP sampling in 2024, flows averaged 1,999 cfs. Main channel temperatures, measured during sampling, averaged 18.2 °C (range = 14.2 – 20.6 °C), while habitat temperatures averaged 18.8 °C (range = 14.8 – 24.7 °C) in 2024. Mean main channel Secchi depth (cm visibility) was 170 mm, while mean habitat Secchi depth was 161 mm.

We encountered 12 Colorado Pikeminnow in Reach 4 during ISMP sampling in 2024. Mean total length (TL) of Colorado Pikeminnow in the middle Green River was 46 mm (range = 31 – 52 mm). Native and nonnative fish encounters for 2024 are listed in Tables 1 and 2. Note that Table 1 accounts for all effort in primary and secondary backwaters, whereas Table 2 summarizes nonnative fish collected from first seine hauls conducted in primary backwaters only. Figure 2 summarizes YOY Colorado Pikeminnow catch and seining effort over time.

Lower Green River (Reach 3):

Utah Division of Wildlife Resources Moab (UDWR Moab) began ISMP sampling on the lower Green River (Reach 3) on September 17, 2024 and concluded September 20, 2024. Field crews sampled 120 river miles following ISMP protocol from Green River State Park (RM 120) to the confluence with the Colorado River (RM 0). Altogether, UDWR Moab sampled 26 habitats (18 primary and 8 secondary) on the lower Green River. Total area sampled in 2024 was 2,278 m². Discharge on the lower Green River is measured at USGS gage #09315000 at Green River, Utah, the upstream-most location on Reach 3 (RM 120) (Figure 3). At this location, the Green River peaked at 19,900 cfs on June 11, 2024. The river reached recommended base flow (1,770- 3,800 cfs; see Bestgen and Hill 2016) to benefit YOY Colorado Pikeminnow on July 9, 2024. Discharge remained within this threshold up until and through ISMP sampling (July 9 to Sept 17) with an average flow of 2,970 cfs.

During 2024 sampling, field crews documented that average main channel temperature was 19.6 °C (range = 18 - 21 °C), while average habitat temperature was 20.3 °C (range = 16.5 - 30 °C). Main channel visibility depth, collected with a Secchi disk as a proxy for turbidity, averaged 136 mm and sampled habitat Secchi depth averaged 187 mm.

Field crews encountered and recorded 74 YOY Colorado Pikeminnow in Reach 3 during 2024 ISMP sampling (Table 3). Colorado Pikeminnow CPUE was 3.25 fish/100m² of total habitat sampled. This figure is fewer than the 39-year data set average CPUE for the lower Green River (11.67 fish/100m²). It is slightly more than the 5-year average (3.1 fish/100m²) and fewer than the 10-year

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

and 15-year averages (7.42 fish/100m², and 5.83 fish/100m², respectively; Figure 4). Field crews encountered Colorado Pikeminnow in 50% of the 26 habitats sampled in 2024, totaling 13 distinct backwaters. Colorado Pikeminnow mean total length for Reach 3 was 35 mm (range= 18-50 mm). Additional native and nonnative fish encounters for 2024 are listed in Tables 3 and 4. Note that Table 3 displays total numbers for primary and secondary backwaters sampled, whereas Table 4 summarizes nonnative fish enumerated in the first seine hauls conducted in primary backwaters only.

Lower Colorado River (Reach 1):

Utah Division of Wildlife Resources Moab (UDWR Moab) began sampling on the lower Colorado River (Reach 1) on September 24 and ended September 27. Field crews sampled 110.5 river miles in accordance with the ISMP protocol, from Cisco Boat Ramp (RM 110.5) to the Colorado River and Green River confluence (RM 0). In total, field crews sampled 23 habitats (18 primary and 5 secondary) that met ISMP criteria, consisting of 2,538 m² total area sampled.

Discharge on the lower Colorado River is measured at USGS gage #09180500 near Cisco, UT (Figure 5). At this location the Colorado River peaked at 25,600 cfs on June 10, 2024. On the descending limb of the hydrograph the river reached recommended base flow threshold (3,000-6,400 cfs; see Miller 2018) to benefit YOY Colorado Pikeminnow on July 10, 2024. From that date until the beginning of ISMP sampling (July 10 - Sept. 24), flows largely remained within this range with the exception of 5 days < 3,000 cfs. The mean discharge during the base flow period was 3,920 cfs.

Field crews recorded 18°C as average main channel temperature during sampling (range = 18 - 21 °C). The average habitat temperature was recorded as 21°C, however the range of temperatures was wider (range = 14 - 25 °C). Main channel visibility depth, collected with a Secchi disk as a proxy for turbidity, averaged 179 mm. Average sampled habitat Secchi depth was 215 mm.

On the lower Colorado River, crews encountered and recorded 47 YOY Colorado Pikeminnow in 2024 (Table 5). Colorado Pikeminnow CPUE was 1.85 fish/100m³, a figure which is lower than the 39-year average value of 6.68 fish/100 m² for this reach. CPUE for Reach 1 was also lower in 2024 than for 5-, 10-, and 15- year medians (respectively 4.1, 14.55, and 10.28 fish/100m³; Figure 6). Young of year Pikeminnow mean TL for 2024 was 37.36 mm (range 34 - 45 mm). This is similar to the 39-year mean TL average of 38 mm. Crews identified Pikeminnow in 13 out of the 23 habitats sampled in Reach 1, comprising 56.5% of total sample area. Additional native and nonnative encounters for 2024 are listed in Tables 5 and 6. Note that Table 5 displays total numbers for primary and secondary backwaters sampled, whereas Table 6 summarizes nonnative fish enumerated in the first seine hauls conducted in primary backwaters only.

Task 2. Seine zero to low velocity habitats on the lower Green and Colorado Rivers to collect young pikeminnow for genetic refuge and broodstock, as needed.

This task is a collaborative effort between Utah Division of Wildlife Resources Moab, in cooperation with American Southwest Ichthyological Researchers (Albuquerque, NM) and Southwestern Native Aquatic Resource and Recovery Center (SNARRC, Dexter, NM). The purpose of this effort is the capture and transport of wild YOY Colorado Pikeminnow to Southwestern ARRC. This captive stock

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

augmentation project is aimed at increasing the genetic diversity of the existing broodstock. Crews optimized capture effort and fish health, limiting data collection and, more importantly, fish handling. The 2024 broodstock collection effort began October 1 and concluded on October 10. All sampling occurred on the lower Colorado River between RM 110.5 and RM 25. No broodstock collection occurred on the lower Green River due to the recent identification of Zebra Mussels in the Colorado River, limiting researchers' ability to transport boats between drainages. Similar to previous years, data gathered from Project 160 and ISMP sampling was utilized to target key locations where YOY Pikeminnow were encountered earlier in the season, however, upon initiation of broodstock efforts it was quickly recognized that many of these key locations no longer harbored YOY Pikeminnow. A modified strategy was adopted, focusing on the interface zones of these zero velocity habitats with the main channel, along with main channel shoreline seining in areas peripheral to zero-velocity habitats. This strategy seemed more productive, but still, few habitats produced YOY Pikeminnow in the double digits. Crews collected 143 YOY Pikeminnow that met the minimum size requirement of 50 mm with an additional 86 captured and released that did not meet the minimum size requirement. Seven of the collected YOY Pikeminnow were found deceased prior to hand-off with the hatchery truck reducing the total number of YOY Pikeminnow transported to SNAARC to 136.

Additional noteworthy observations:

- Discharge on both the lower Green and Colorado Rivers was low for 2024 sampling. Many potential backwater habitats were not available for sampling; habitats were often completely dry or did not meet ISMP protocols for depth and area required to sample. Therefore, crews were limited in habitat availability for sampling.
- The 2024 monsoon season brought several significant rainfall events to the lower Green and Colorado River basins. In July and August, several gauge height spikes occurred as reflected at the Cisco and Green River USGS water gauges for the Colorado and Green Rivers, respectively. The next downstream gauge below the confluence of the rivers is at Gypsum Canyon (RM -19.5), representing discharge for both rivers. At Gypsum Canyon between August 13 and 24 the river spiked over 5,000 cfs in a 24-hour period on three separate occasions. While flooding impacted backwater habitats in both reaches, the Green River experienced particularly severe effects. In Reach 3, the debris outflow from tributary flash flooding was significant, specifically from below Hell Roaring Canyon (RM 55.3) to the confluence (RM 0). Backwater habitat throughout this stretch was highly disturbed and largely sedimented in post-flooding. Backwater habitat that supports YOY Pikeminnow for both the lower Green and Colorado Rivers was significantly impacted prior to sampling in 2024, possibly impacting findings for that year.
- In 2024, Utah Division of Wildlife Resources encountered Colorado Pikeminnow during Upper Colorado River Endangered Fish Recovery Program (UCREFRP) Project 160 (Razorback Sucker monitoring). This sampling occurred during the middle of July and again during the end of August, and was completed four weeks prior to 138 sampling. Similar to ISMP, crews seined zero to low velocity backwaters on the lower Green River and the lower Colorado River. During Project 160 seining crews encountered 166 Pikeminnow on the lower Green River (CPUE 2.71 fish/100m²) and 85 Pikeminnow on the lower Colorado River (CPUE 1.07 fish/100m²) (Altier and Hansen, 2024).

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Recommendations:

Continue to monitor annual relative abundance of post-larval Colorado Pikeminnow in the middle and lower Green River and the lower Colorado River to assess long-term trends in annual fall recruitment.

Project Status:

On track, ongoing.

Status of Data Submission

Data will be submitted to the recovery program database coordinator by January 2025

Signed:

Michael S. Partlow and Anna R. Amidon

Principal Investigators

11/14/2024

Table 1. Native fish captures on the middle Green River during ISMP sampling, fall 2024.

Species	Number	Density (fish/100 m ²)
Bluehead Sucker	2	0.04
Colorado Pikeminnow	12	0.24
Flannelmouth Sucker	2	0.04

Table 2. Nonnative fish captures on the middle Green River during ISMP sampling, fall 2024.

Nonnative fish are enumerated only during the first seine haul within primary habitats.

Species	Number	Density (fish/100 m ²)
Black Crappie	2	0.10
Common Carp	3	0.16
Fathead Minnow	522	27.34
Green Sunfish	6	0.31
Red Shiner	1675	87.73
Smallmouth Bass	9	0.47
Sand Shiner	1664	87.15
unidentified nonnative cyprinid	749	39.23
White Sucker	18	0.94

Table 3. Native fish captures on the lower Green River (Reach 3) during ISMP sampling, fall 2024.

Species	Number	Density (fish/100m ²)
Colorado Pikeminnow	74	3.25
Bluehead Sucker	1	0.04

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Table 4. Nonnative fish captures on the lower Green River (Reach 3) during ISMP sampling, fall 2024. Nonnative fish are enumerated only during the first seine haul within primary habitats.

Species	Number	Density (fish/100m ²)
Black Bullhead	11	0.48
Bluegill	34	1.49
Channel Catfish	6	0.26
Common Carp	3	0.13
Fathead Minnow	287	12.60
Green Sunfish	3	0.13
Red Shiner	2256	99.03
Sand Shiner	1127	49.47
Smallmouth Bass	1	0.04

Table 5. Native fish captures on the lower Colorado River (Reach 1) during ISMP sampling, fall 2024.

Species	Number	Density (fish/100m ²)
Colorado Pikeminnow	47	1.85

Table 6. Nonnative fish captures on the lower Colorado River (Reach 1) during ISMP sampling, fall 2024. Nonnative fish are enumerated only during the first seine haul within primary habitats.

Species	Number	Density (fish/100m ²)
Bluegill	13	0.51
Channel Catfish	3	0.12
Fathead	1653	65.13
Gambusia	24	0.95
Gizzard Chad	7	0.28
Red Shiner	2160	85.11
Sand Shiner	2210	87.08
Smallmouth Bass	3	0.12

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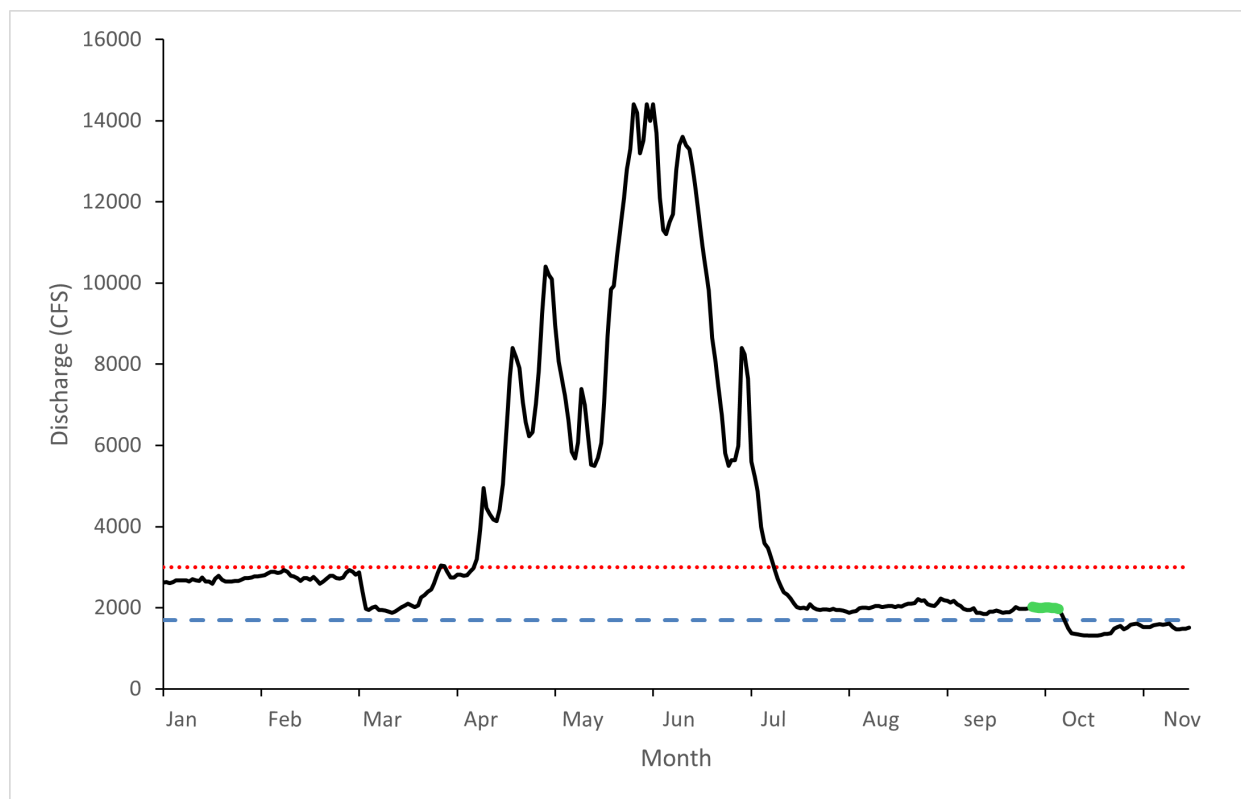


Figure 1. Discharge recorded in 2024 at USGS gage #09261000 at Jensen, UT. Red (dotted) and blue (dashed) lines represent recommended base flow ranges for the middle Green River (1,700-3,000 cfs) identified in Bestgen and Hill (2016). Green highlight denotes sampling period.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

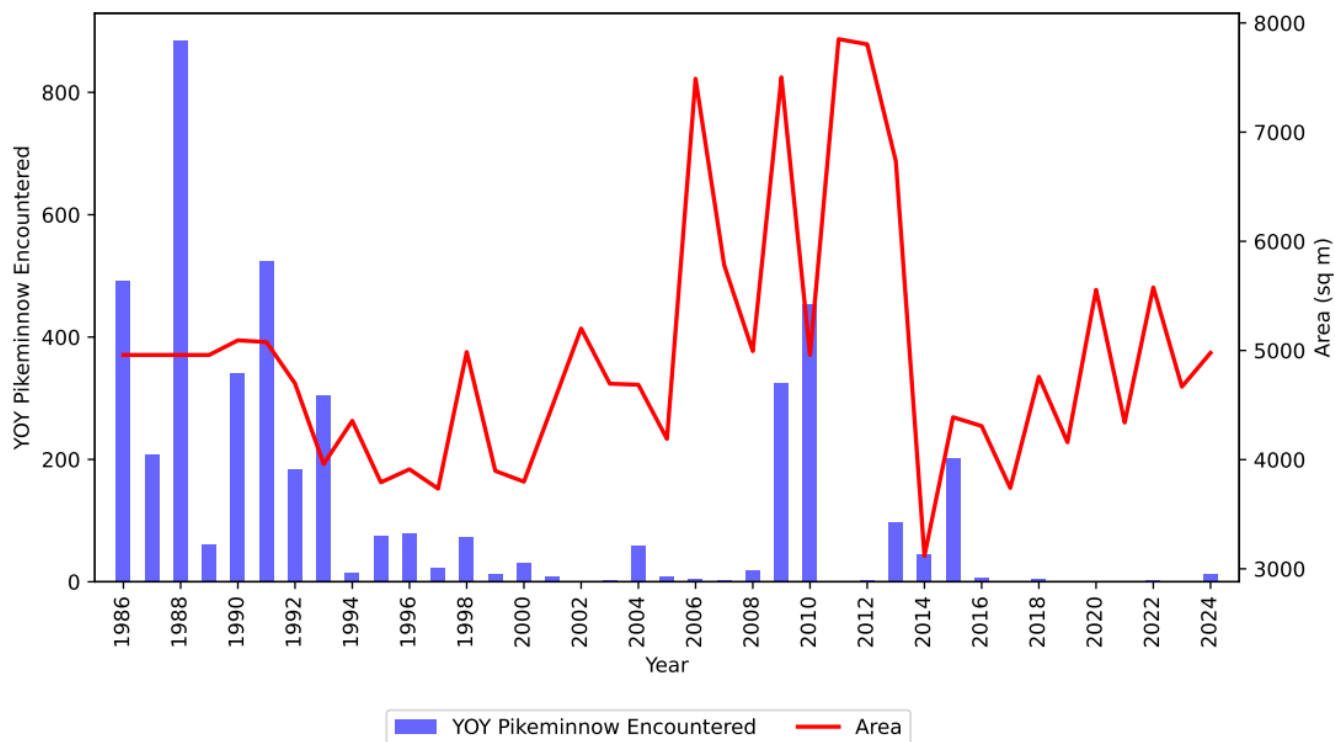


Figure 2. Annual ISMP sampling Catch Per Unit Effort (CPUE) for the middle Green River from 1986- 2024. Here CPUE is displayed as two distinct data sets, total number of Colorado Pikeminnow encountered and total area of habitat sampled per year.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

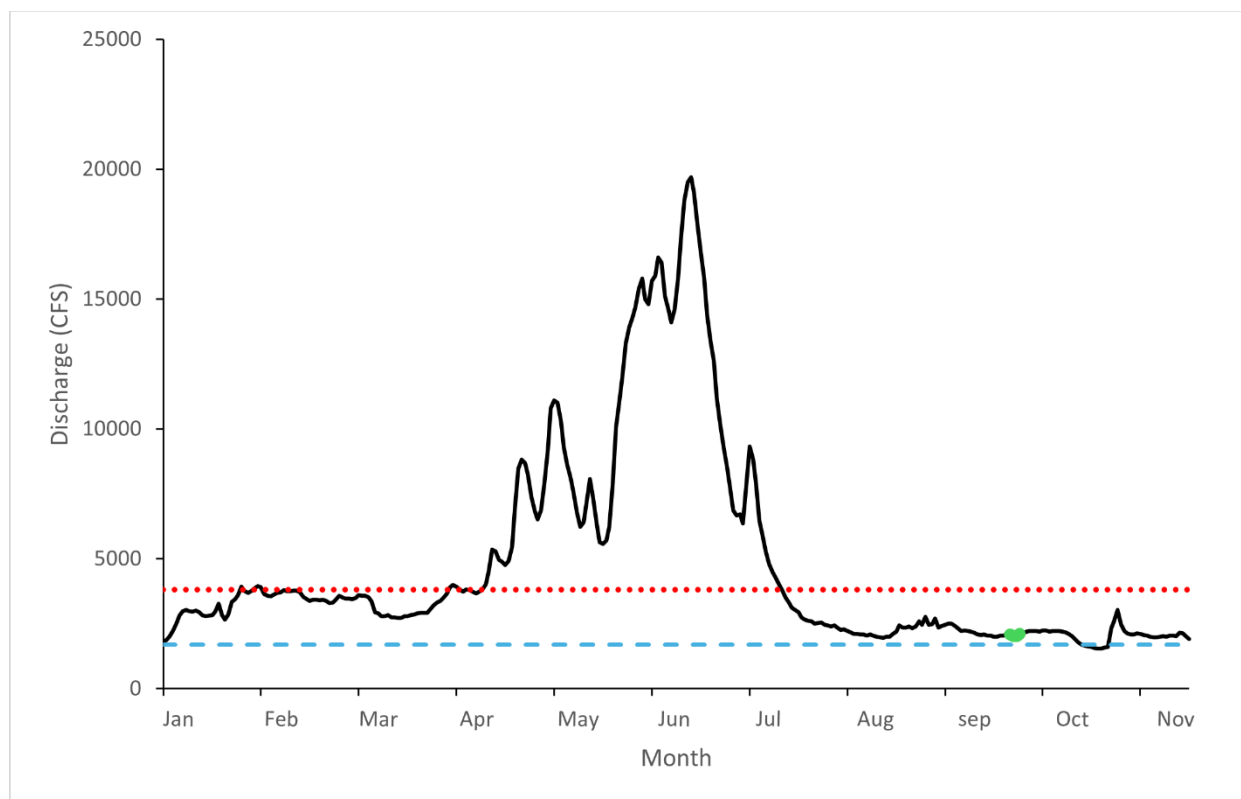


Figure 3. Discharge recorded in 2024 at USGS gage #09315000, Green River, UT. Red (dotted) and blue (dashed) lines represent recommended base flow ranges for the lower Green River (1,700-3,800 cfs) identified in Bestgen and Hill (2016). Green highlighted area denotes sampling events.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

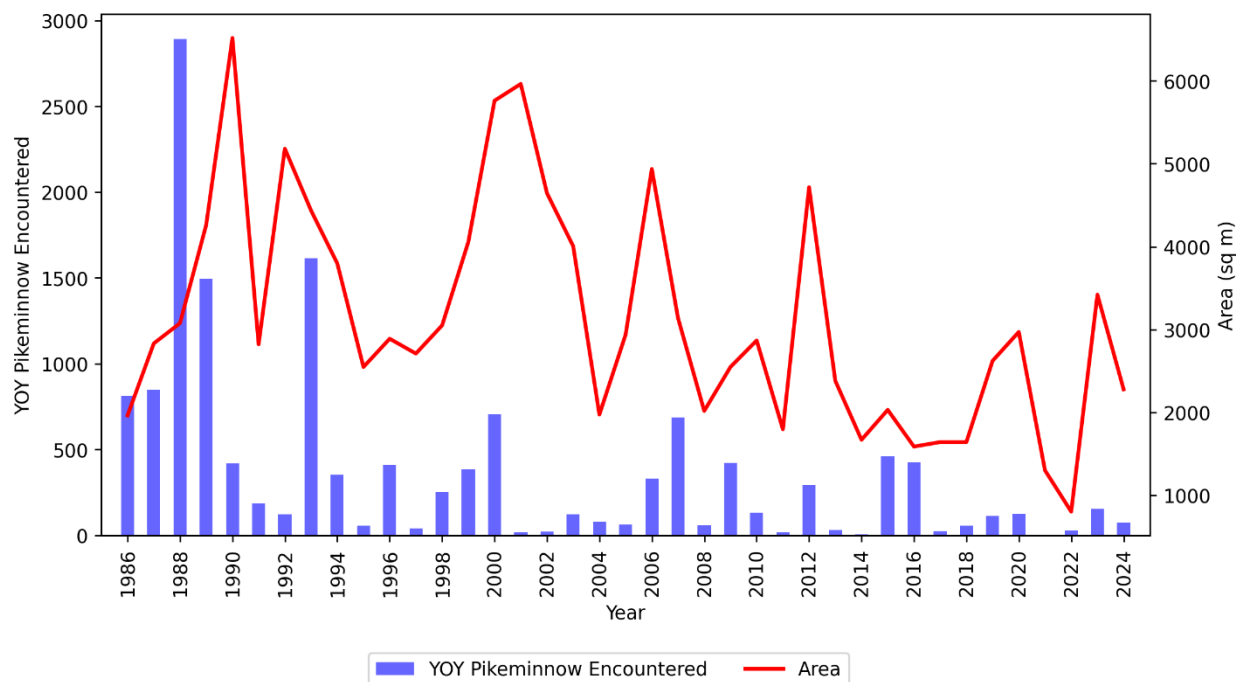


Figure 4. Annual ISMP sampling Catch Per Unit Effort (CPUE) for the lower Green River from 1986- 2024. Here CPUE is displayed as two distinct data sets, total number of Colorado Pikeminnow encountered and total area of habitat sampled per year.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

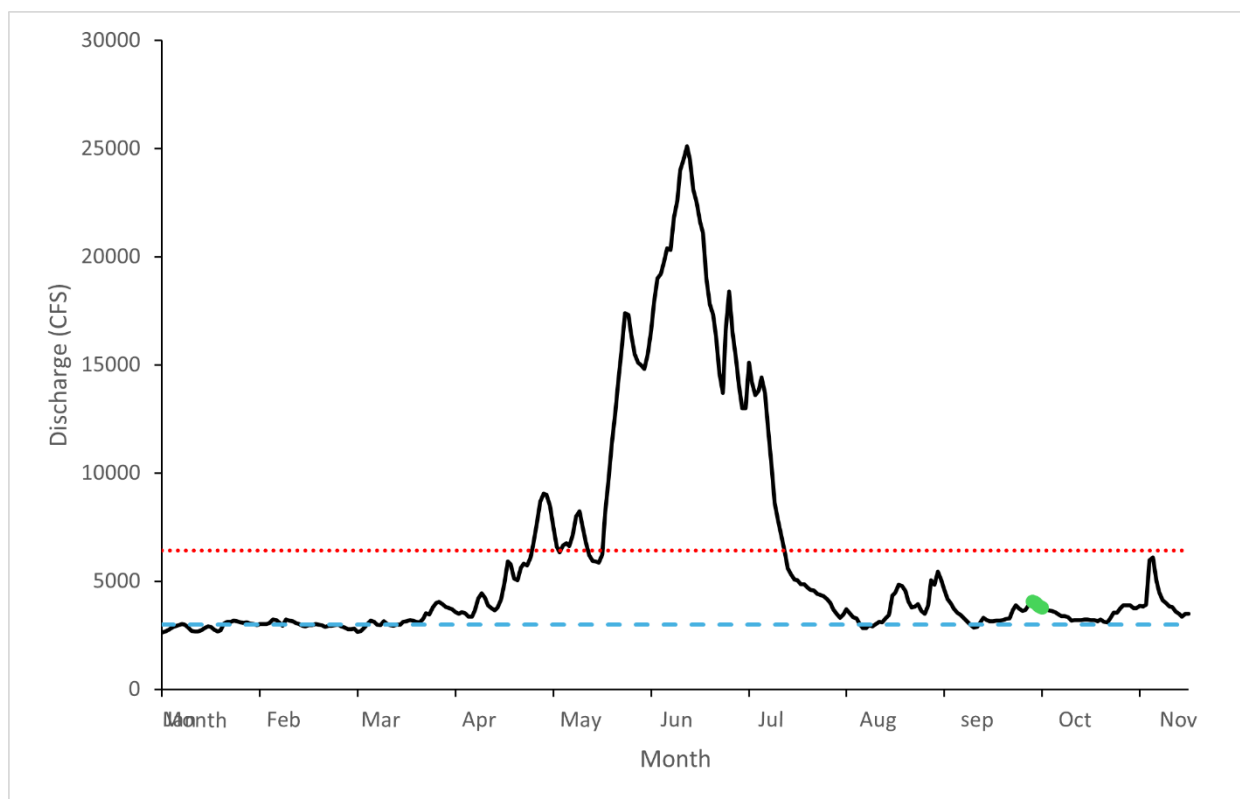


Figure 5. Discharge recorded in 2024 at USGS gage #09180500, near Cisco, UT. Red (dotted) and blue (dashed) lines represent recommended base flow ranges for the lower Colorado River (3,000-6,400 cfs) identified in Miller (2018). Green highlight denotes sampling events.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

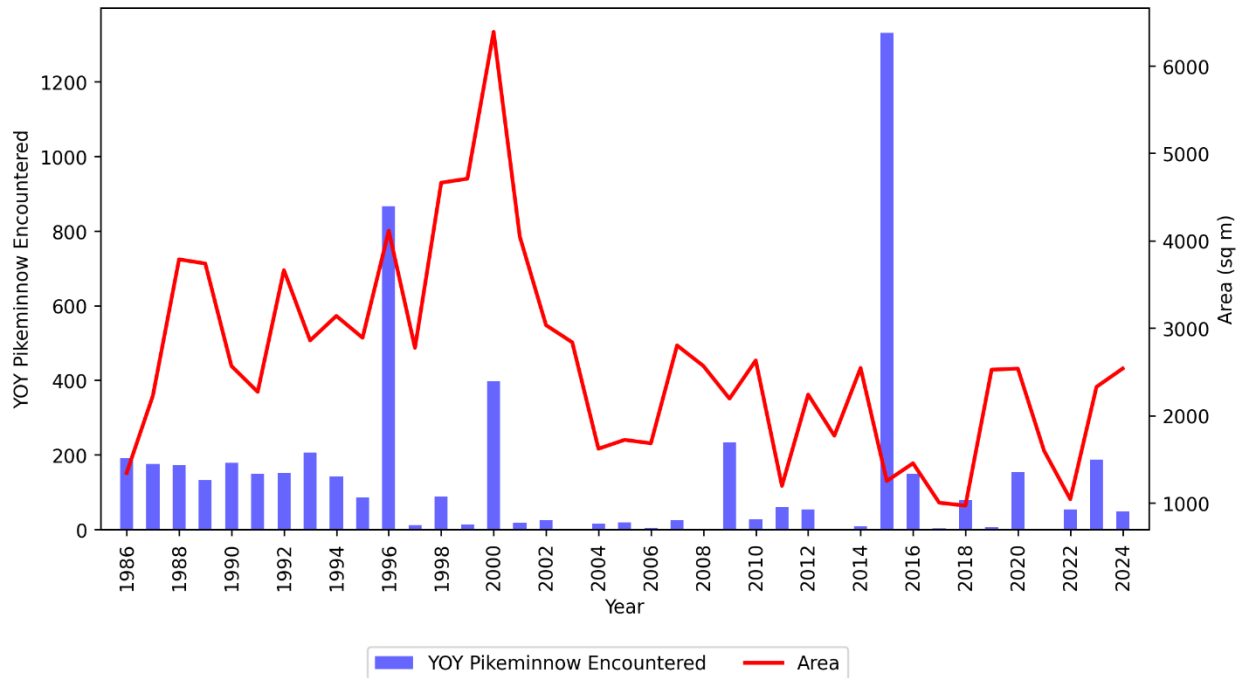


Figure 6. Annual ISMP sampling Catch Per Unit Effort (CPUE) for the lower Colorado River from 1986- 2024. Here CPUE is displayed as two distinct data sets, total number of Colorado Pikeminnow encountered and total area of habitat sampled per year.

Literature Cited

- Bestgen, K.R. and A.A. Hill. 2016. Reproduction, abundance, and recruitment dynamics of young Colorado Pikeminnow in the Green and Yampa rivers, Utah and Colorado, 1979-2012. Final report to the Upper Colorado River Endangered Fish Recovery Program, Project FW 51 BW-Synth, Denver, CO. Department of Fish, Wildlife, and Conservation Biology, Colorado State University, Fort Collins, CO. Larval Fish Laboratory Contribution 183.
- Altier, A.S. and Hansen, B.G. 2024. Assessment of Stocked Razorback Sucker Reproduction in the Lower Green and Lower Colorado Rivers, Annual Report. Upper Colorado River Endangered Fish Recovery Program Project 160.
- Miller, P. S. 2018. Population Viability Analysis for the Colorado Pikeminnow (*Ptychocheilus lucius*) An Assessment of Current Threats to Species Recovery and Evaluation of Management Alternatives. Final Report of the IUCN SSC Conservation Planning Specialist Group to Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.
- USFWS. 1987. Interagency standardized monitoring protocol handbook. U.S. Fish and Wildlife Service. Grand Junction, CO.