

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

FY 2020 ANNUAL REPORT

PROJECT: 138

Project Title

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

Bureau of Reclamation Agreement Number:

R19AP00059

Project/Grant Period:

Start date: 10/01/2018

End date: 09/30/2023

Reporting period end date: 09/30/2020

Is this the final report? No

Principal Investigator:

Matthew J. Breen, Native Aquatics Project Leader

Utah Division of Wildlife Resources

Northeastern Regional Office

318 North Vernal Ave.

Vernal, UT 84078

Phone: (435) 781-9453

Fax: (435) 789-8343

Email: mattbreen@utah.gov

Christopher M. Michaud, Fisheries Biologist

Utah Division of Wildlife Resources

Moab Field Station

1165 S. Highway 191- Suite 4

Moab, UT 84532

Phone: 435-259-3784

Fax: 435-259-3785

E-mail: cmichaud@utah.gov

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 2020, 153 YOY Colorado pikeminnow were encountered on the lower Colorado River (Reach 1), 125 on the lower Green River (Reach 3), and none on the middle Green River (Reach 4). 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

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Relationship to RIPRAP:

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 FY 2020 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task 1. Seining the middle Green River

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 15 September 2020, and concluded on 22 September 2020. 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 41 backwater habitats (21 primary and 20 secondary) that met ISMP criteria, yielding a total sampling area of 5,556 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 18,300 cubic feet per second (cfs) on 04 June 2020. The river reached base flow ($\leq 3,000$ cfs; see Bestgen and Hill 2016) on 27 June 2020. During ISMP sampling in 2020, flows averaged 1,881 cfs. Main channel temperatures averaged 17.5 °C (range = 14.5-19.7 °C), while habitat temperatures averaged 17.8 °C (range = 13.9-21 °C) in 2020. Main channel and backwater turbidity was not calculated because values exceeded 60 cm in most cases, which is beyond the range of conditions measureable by the equipment used.

We did not encounter YOY Colorado pikeminnow in Reach 4 during ISMP sampling in 2020; catch-per-unit-effort was 0 (CPUE = 0.00 fish/100 m²) in 2020. Native and nonnative fish encounters for 2020 are listed in Tables 1 and 2; note that Table 1 accounts for primary and secondary backwaters only. Nonnative fish species encountered, but not summarized in Table 2 (i.e., secondary backwaters and second seine hauls within primary backwaters) included channel catfish (*Ictalurus punctatus*), common carp (*Cyprinus carpio*), green sunfish (*Lepomis cyanellus*), redbreast shiner (*Richardsonius balteatus*), and smallmouth bass (*Micropterus dolomieu*). Of particular note, smallmouth bass ($n = 21$; mean \pm standard error = 73.3 ± 2.25 ; range = 53-100 mm total length [TL]) were collected in 8.1% of the seine hauls conducted in 2020.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Task 2. Seining the lower Green River and the Colorado River

Lower Green River (Reach 3):

Utah Division of Wildlife Resources Moab (UDWR Moab) began sampling for ISMP in Reach 3 on 09 September 2020, and concluded on 12 September 2020. Crews sampled 120 river miles, in accordance with ISMP protocols, from Green River State Park (RM 120) to the confluence with the Colorado River (RM 0). Altogether, we sampled 39 habitats that met ISMP criteria, yielding a total sampling area of 2,971 m².

Discharge on the lower Green River is measured at USGS gage #09315000 at Green River, Utah (Figure 2). At this location, the Green River peaked at 20,000 cfs on 09 June 2020. The river reached base flow ($\leq 3,800$ cfs; see Bestgen and Hill 2016) on 27 June 2020. During ISMP sampling in 2020, flows averaged 1,708 cfs. Main channel temperatures averaged 14.5 °C (range = 12-16.5 °C), while habitat temperatures averaged 16 °C (range = 10-21 °C) in 2020. Main channel turbidity was 66.3 ± 21.1 cm (cm visibility; mean \pm standard deviation [SD]), while habitat turbidity was 67.4 ± 17.1 cm.

Researchers encountered 125 YOY Colorado pikeminnow in Reach 3 during ISMP sampling in 2020 (Table 3). Colorado pikeminnow CPUE was 4.21 fish/100 m². This figure is down from the 34-year median value of 6.31 fish/100 m² for this reach. Of 39 habitats sampled in Reach 3, 62% contained pikeminnow. Mean Colorado pikeminnow total length was 44.2 mm (range = 28-73 mm). Additional native and nonnative encounters for 2020 are listed in Tables 3 and 4.

Lower Colorado River (Reach 1):

Sampling on the lower Colorado River began on 12 September 2020, and ended on 19 September 2020. All sampling followed ISMP protocols from Cisco boat ramp (RM 110.5) to the confluence with the Green River (RM 0). Crews sampled 40 habitats that met ISMP criteria, consisting of 2,537 m² of rearing habitat.

Discharge on the lower Colorado River is measured at USGS gage #09180500 near Cisco. The Colorado River peaked on 02 June 2020 at 14,900 cfs. An analysis of base flows to benefit Colorado pikeminnow YOY recruitment, using methods similar to Bestgen and Hill (2016), was conducted for the Colorado River (Valdez et al. 2017). This analysis identified base flow conditions where age-0 densities were higher than the long term mean. Flows reached the identified upper threshold of 6,000 cfs on 17 June 2020 (at the state line gage #09163500, which was used for the analysis). Discharge dropped below the lower threshold of 3,000 cfs on 10 July 2020 where it remained for most of the summer (Figure 3). Mean discharge during sampling was 3,020 cfs. Average main channel temperature was 17.3 °C (range = 16.5-18.5 °C), and average habitat temperature was 17.8 °C (range = 15-21 °C) in 2020. Main channel turbidity was 24 ± 6.8 cm, while habitat turbidity was 36.1 ± 13.7 cm.

Crews captured 153 YOY Colorado pikeminnow in 2020 on the lower Colorado River (Table 5). Catch-per-unit-effort was 5.4 fish/100 m². This figure is up from the 34-year median value of 2.7 fish/100 m² for this reach. Of 40 habitats sampled in Reach 1, 25% contained pikeminnow. Mean total length was 59.0 mm (range = 24 - 82 mm). Additional native and nonnative encounters for 2020 are listed in Tables 5 and 6.

Task 4. Colorado pikeminnow broodstock collection

Utah Division of Wildlife Resources Moab, in cooperation with American Southwest Ichthyological Researchers (Albuquerque, NM) and Southwestern Native Aquatic Resource and Recovery Center

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

(Southwestern ARRC, Dexter, NM) completed five passes targeting YOY Colorado pikeminnow. The purpose of this effort was capture and transport of pikeminnow from the wild to Southwestern ARRC. This captive stock augmentation project is aimed at increasing the genetic diversity of the refuge population. Crews optimized capture effort and fish health, limiting data collection and, more importantly, fish handling. Researchers collected and transferred a number of non-target species. Some of these individuals may have been incorrectly identified; however, most were inadvertently entrained while processing Colorado pikeminnow. Consequently, figures reported under Task 4 should be considered estimates.

Researchers completed one assessment pass and three collection passes on the lower Green River covering river miles 120 - 34 and one assessment pass and two collection passes on the lower Colorado River between river miles 61 - 21. Crews completed a single collection pass during March on the Green River producing only 12 Colorado pikeminnow. Collaborators completed the majority of collection work between 22 September and 15 October 2020. Fall efforts were considerably more successful (Figures 4 and 5).

During 2020, collaborators sampled for a total of 12 days, visited 119 low-velocity habitats and seined approximately 21,448 m² of viable pikeminnow habitat. Through this effort, crews collected four Colorado pikeminnow during the assessment phase (returned to the wild) and 1,582 during the collection phase of the project (Table 7). All pikeminnow encountered during the collection phase were transported to Southwestern ARRC.

Task 5. Database management for UCREFRP

Utah Division of Wildlife Resources Moab assisted the Upper Colorado River Endangered Fish Recovery Program on several database management projects between 15 January and 15 May 2020. These projects included the development of remote access methods for the STReAMS database allowing interactive data query with program R, creation of bonytail and PIA data summaries, the scripting of generalizable descriptive analyses and figure generation for nonnative fish focused projects and hatchery stocking efforts. Additionally, UDWR Moab allocated considerable effort toward locating and correcting data inconsistencies within the STReAMS database.

Additional noteworthy observations:

Complete lack of age-0 Colorado pikeminnow recruitment in the middle Green River in 2020 is quite concerning. This may have resulted from limited larval transport from the Yampa River (Bestgen and Hill 2016) due to drier hydrologic conditions, which were similar to 2012 (Breen and Jones 2019), and/or higher predation rates due to an increased abundance of age-0 smallmouth bass in combination with increased water clarity (i.e., lack of turbidity to help avoid predation). In addition, smallmouth bass collected in this project likely do not reflect overall abundance in backwater habitats for the majority of the growing season. For example, pre-ISMP sampling was conducted for Project #158 several weeks prior to this project, and smallmouth bass were both more abundant and widespread. The larger size of age-0 smallmouth bass collected during both projects also indicates that age-0 smallmouth bass may have largely shifted to occupy riverine habitats over the course of the summer, thus they may have been underrepresented in this sampling. Moreover, it has been demonstrated experimentally that native fish survival is significantly lower when not controlled for predation when predators can move freely between riverine and low-velocity habitats (Breen and Jones 2019).

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Extensive algal production, within low-velocity habitats, hampered ISMP sampling on the lower Colorado River (Reach 1) in 2020. The presence of algae reduced seining efficiency, hindered fish identification and forced crews to abandon sampling within several habitats. Increased algal production seems consistent with years characterized by dry hydrology and lacking summer (monsoonal) precipitation. Researchers experienced similar, though less severe, conditions in 2018.

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.
- Pursue additional analyses to provide historical context and a more comprehensive look at this project's long-term data.
- Consider the creation of an analysis drawing data from all small-bodied fish work in the upper Colorado River basin; including data from projects 138, 158 and 160.

Project Status:

On track and ongoing

FY 2020 Budget Status

Funds Provided: \$67,618

Funds Expended: \$67,618

Difference: -0-

Percent of the FY 2020 work completed, and projected costs to complete: 100%

Recovery Program funds spent for publication charges: -0-

Status of Data Submission

Data is formatted, has been QA/QC checked, and will be submitted to the USFWS by January 2021.

Signed:

Matthew J. Breen & Christopher M. Michaud

Principal Investigators

11/11/2020

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Table 1. Native fish captures on the middle Green River during ISMP sampling, fall 2020.

Species	Number	Density (fish/100 m ²)
bluehead sucker	1	0.02
<i>Gila</i> spp.	1	0.02
flannelmouth sucker	2	0.04

Table 2. Nonnative fish captures on the middle Green River during ISMP sampling, fall 2020. Nonnative fish are enumerated only during the first seine haul within primary habitats.

Species	Number	Density (fish/100 m ²)
fathead minnow	17	1.05
red shiner	5,830	358.55
sand shiner	1,715	105.47
white sucker	1	0.06

Table 3. Native fish captures on the lower Green River during ISMP sampling, fall 2020.

Species	Number	Density (fish/100m ²)
Colorado pikeminnow	125	4.21
bluehead sucker	5	0.17
<i>Gila</i> spp.	2	0.07
flannelmouth sucker	2	0.07

Table 4. Nonnative fish captures on the lower Green River during ISMP sampling, fall 2020. Nonnative fish are enumerated only during the first seine haul within primary habitats.

Species	Number	Density (fish/100m ²)
red shiner	1,850	161.71
sand shiner	1,395	121.94
fathead minnow	945	82.60
green sunfish	45	3.93
gizzard shad	15	1.31
channel catfish	1	0.09

Table 5. Native fish captures on the lower Colorado River during ISMP sampling, fall 2020.

Species	Number	Density (fish/100m ²)
Colorado pikeminnow	153	6.03
bluehead sucker	49	1.93
flannelmouth sucker	10	0.39
<i>Gila</i> spp.	1	0.04

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Table 6. Nonnative fish captures on the lower Colorado River during ISMP sampling, fall 2020. Nonnative fish are enumerated only during the first seine haul within primary habitats.

Species	Number	Density (fish/100m ²)
sand shiner	4,920	572.09
fathead minnow	2,780	323.26
red shiner	2,530	294.19
gizzard shad	450	52.33
western mosquitofish	14	1.63
green sunfish	11	1.28
common carp	4	0.47
black bullhead	2	0.23
smallmouth bass	1	0.12
white sucker	1	0.12

Table 7. Broodstock collection effort summary, 2020.

River	Season	Pass type	Total area sampled (m ²)	Pikeminnow encountered	Days sampled
Colorado	Spring	Assessment	800	0	1
Colorado	Fall	Collection	11,302	546	5
Green	Spring	Assessment	400	4	1
Green	Spring	Collection	2,930	12	3
Green	Fall	Collection	6,016	1,024	2
Total			21,448	1,586	12

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

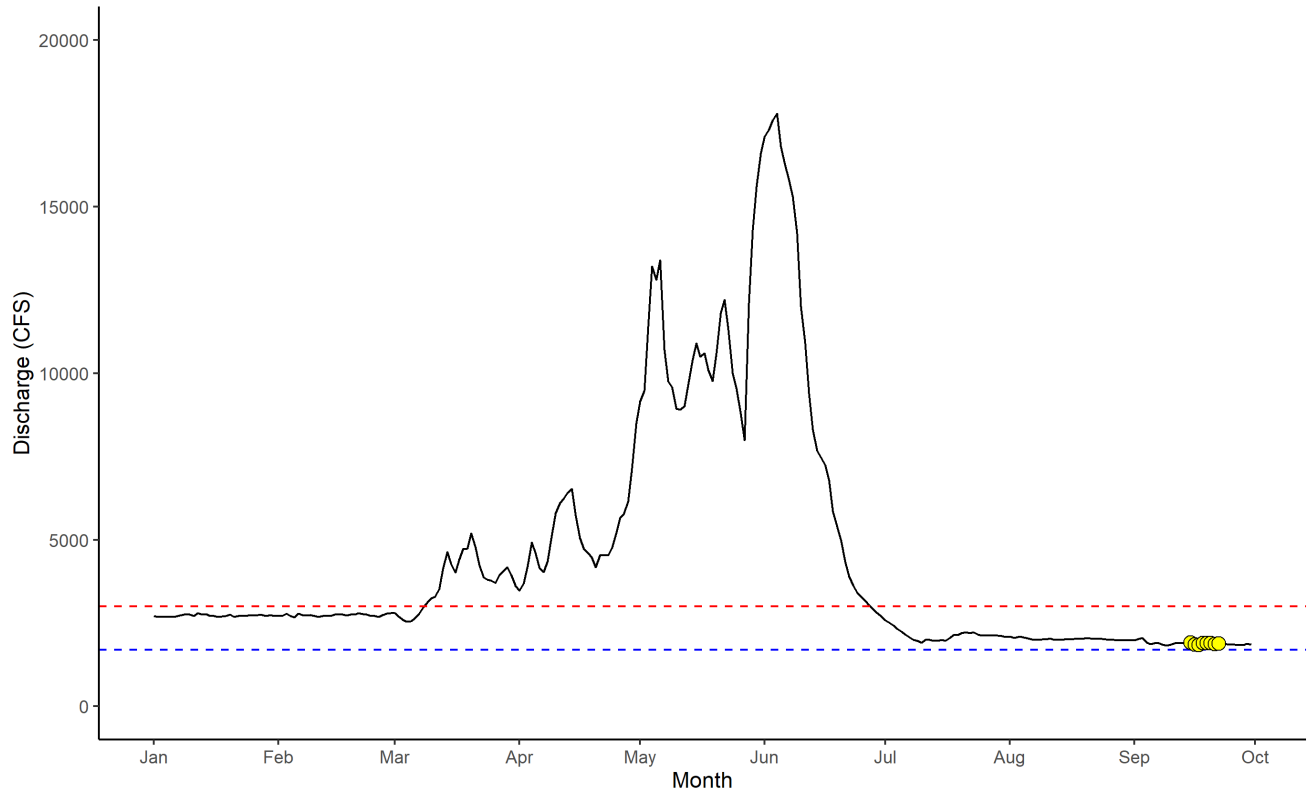


Figure 1. Discharge recorded in 2020 at USGS gage #09261000 at Jensen, UT. Red and blue dotted lines represent recommended base flow ranges for the middle Green River (1,700-3,000 cfs) identified in Bestgen and Hill (2016). Yellow points denote sampling events.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

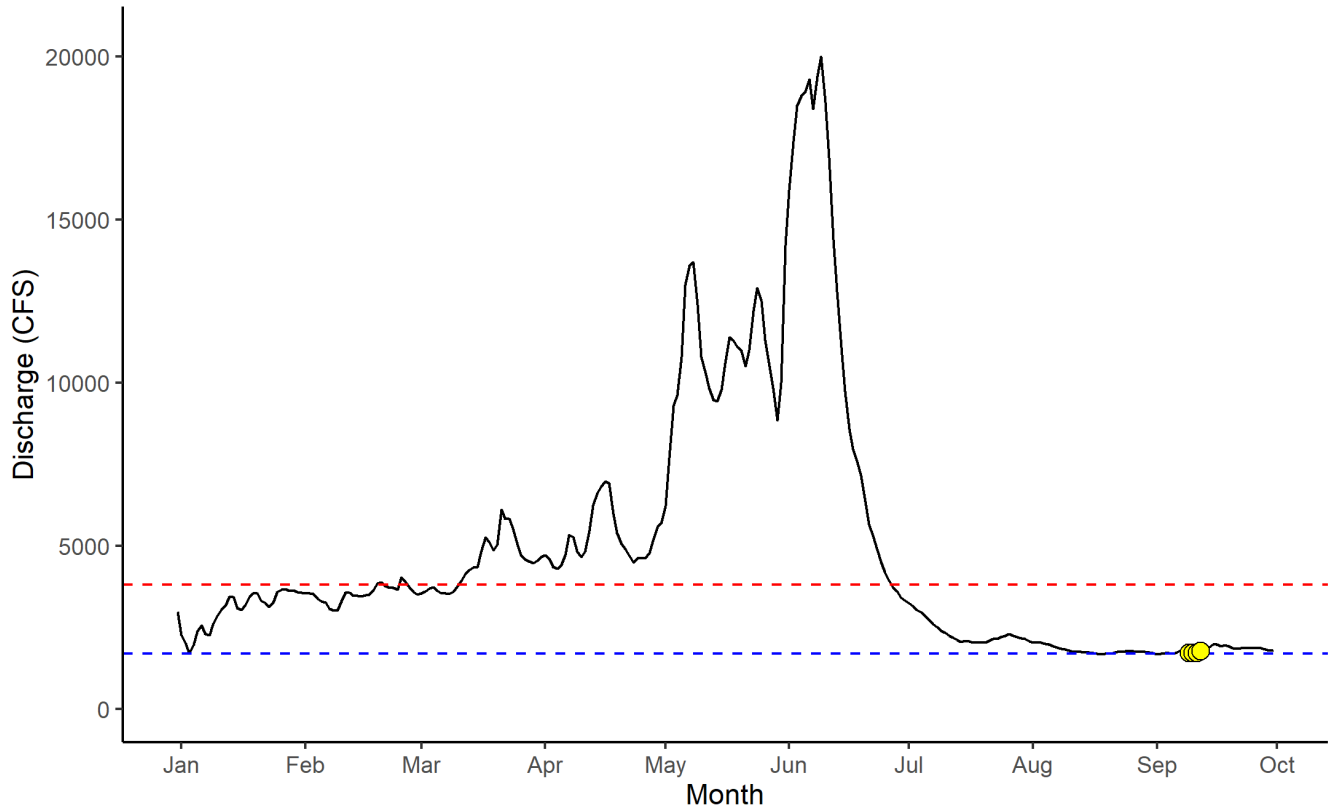


Figure 2. Discharge recorded in 2020 at USGS gage #09315000, Green River, UT. Red and blue dotted lines represent recommended base flow ranges for the lower Green River (1,700-3,800 cfs) identified in Bestgen and Hill (2016). Yellow points denote sampling events.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

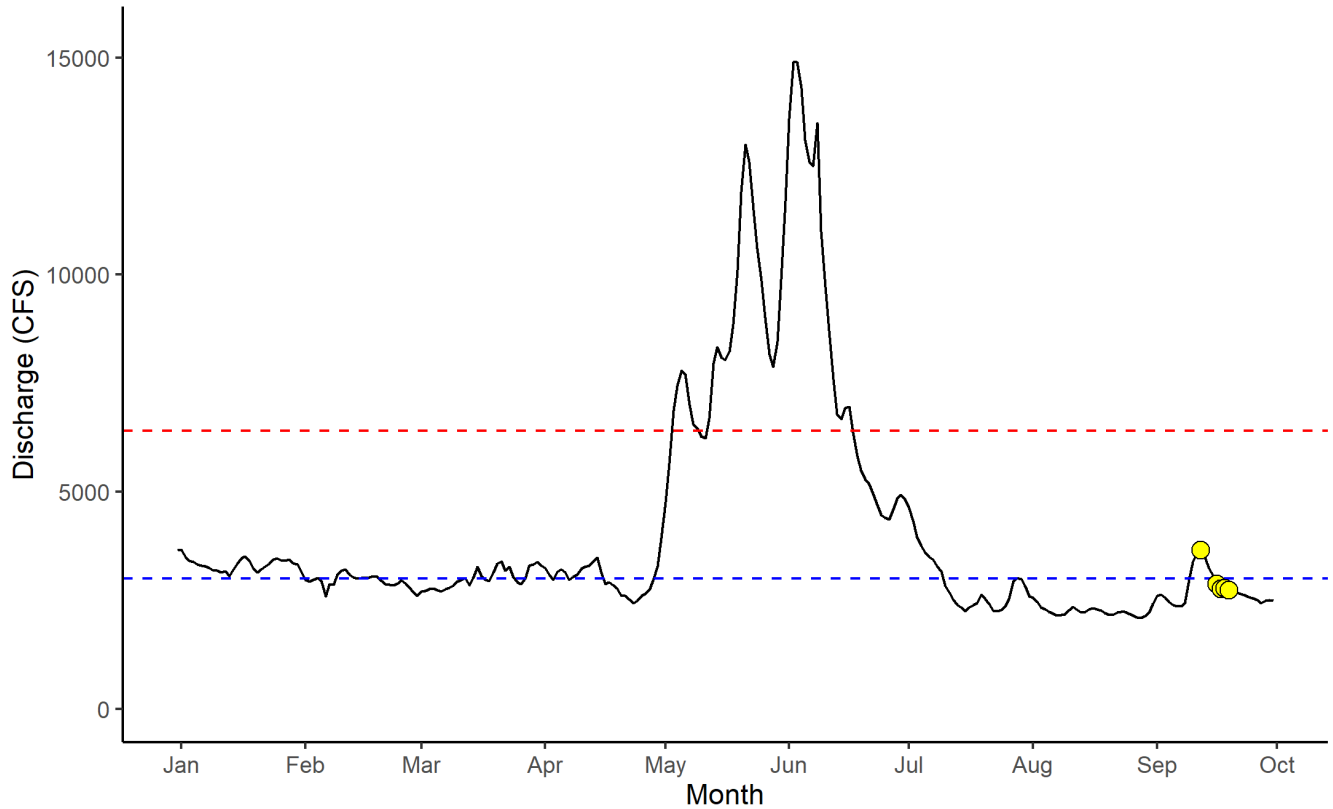


Figure 3. Discharge recorded in 2020 at USGS gage #09180500, near Cisco, UT. Red and blue dotted lines represent recommended base flow ranges for the lower Colorado River (3,000-6,400 cfs) identified in Valdez et al. (2017). Yellow points denote sampling events.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

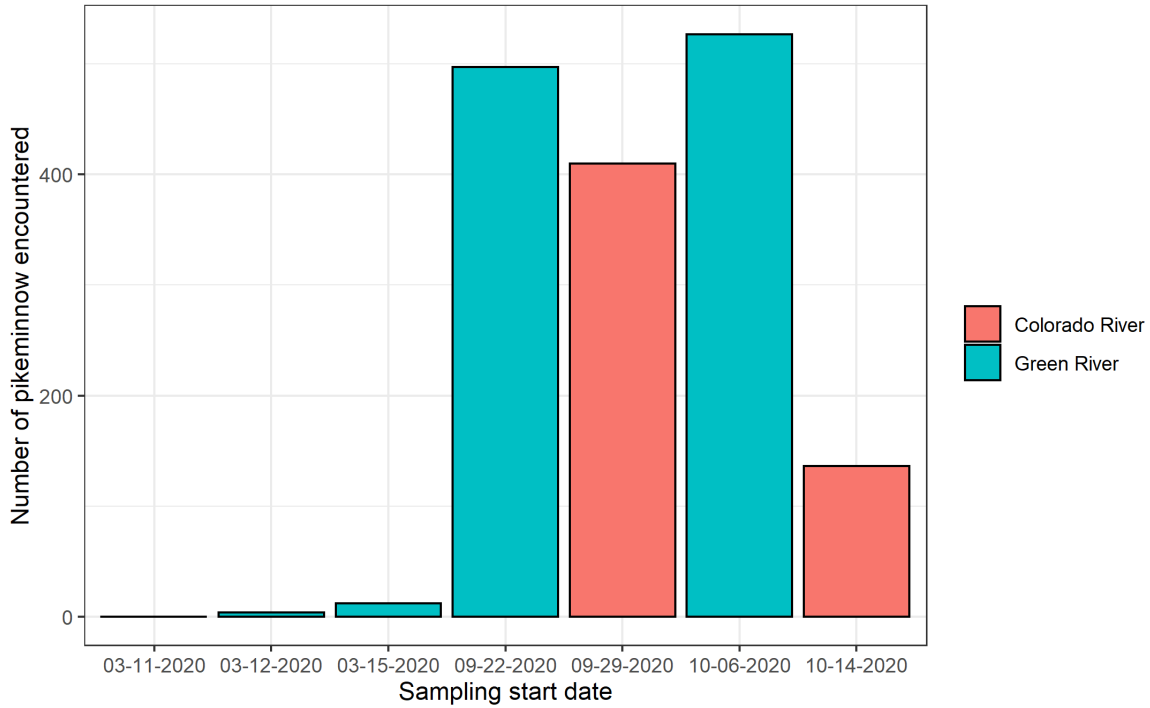


Figure 4. Total number of Colorado pikeminnow encountered by pass during the broodstock collection effort, 2020.

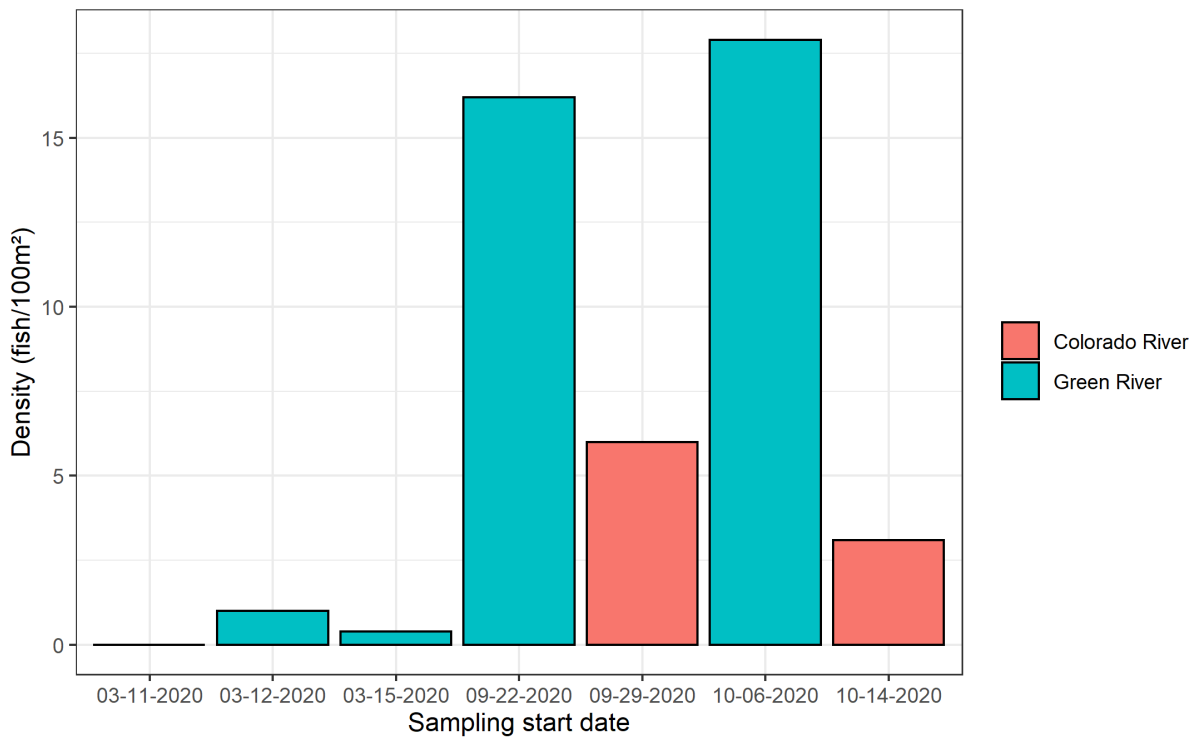


Figure 5. Estimated Colorado pikeminnow densities by pass during the broodstock collection effort, 2020.

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Literature Cited

- Breen, M.J. and M.T. Jones. 2019. Assessment of larval Colorado pikeminnow presence and survival in low velocity habitats in the middle Green River: 2009-2012. Final report to the Upper Colorado River Endangered Fish Recovery Program, Denver, CO. Utah Division of Wildlife Resources, Salt Lake City, UT. Publication number 19-05.
- 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.
- USFWS. 1987. Interagency standardized monitoring protocol handbook. U.S. Fish and Wildlife Service. Grand Junction, CO.
- Valdez, R.A., T. Francis, D. Elverud, and D. Ryden. 2017. Colorado Pikeminnow PVA Scenarios for the Upper Colorado River Subbasin. Report prepared for the Colorado Pikeminnow PVA Technical Team.