

COLORADO RIVER RECOVERY PROGRAM
FY 2019 ANNUAL PROJECT REPORT

RECOVERY PROGRAM
PROJECT NUMBER: 138

I. Project Title: Annual fall monitoring of young-of-year Colorado pikeminnow and small-bodied native fishes

II. Bureau of Reclamation Agreement Number: R19AP00059
Project/Grant Period: Start date: 10/01/2018
End date: 09/30/2023
Reporting period end date: 09/30/2019
Is this the final report? Yes _____ No X

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IV. 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 2019, five YOY Colorado pikeminnow were encountered on the lower Colorado River (Reach 1), 113 on the lower Green River (Reach 3), and only one on the middle Green River (Reach 4) that was collected from a tertiary backwater. We will continue to monitor 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.

V. Study Schedule:

1986–On going. It is anticipated that this study will continue indefinitely and will be a component of studies designed to evaluate a variety of management actions.

VI. 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. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).
- V.A. Conduct research to acquire life history information and enhance scientific techniques required to complete recovery actions.

COLORADO RIVER ACTION PLAN: MAINSTEM

- V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring, and data management).
- V.A. Conduct research to acquire life history information and enhance scientific techniques required to complete recovery actions

VII. Accomplishment of FY 2019 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 16 September 2019, and concluded on 25 September 2019. 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 54 backwater habitats (20 primary, 19 secondary, and 15 tertiary) that met ISMP criteria, yielding a total sampling area of 4,159 m². Note that tertiary backwaters were only sampled in Reach 4, in an effort to obtain additional information on low-velocity habitat use by native YOY and other small-bodied fishes without the constraints of the ISMP protocol.

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 21,000 cubic feet per second (cfs) on 11 June 2019. The river reached base flow ($\leq 3,000$ cfs; see Bestgen and Hill 2016) on 24 July 2019. During ISMP sampling in 2019, flows averaged 2,352 cfs.

Main channel temperatures averaged 17.5 °C (range = 15.0-20.5 °C), while habitat temperatures averaged 18.2 °C (range = 14.8-25.8 °C) in 2019. Main channel turbidity (mm visibility; mean ± standard deviation [SD]) was 243 ± 53 mm, while habitat turbidity was 230 ± 66 mm.

We encountered one YOY Colorado pikeminnow (total length [TL] = 45 mm) in Reach 4 during ISMP sampling in 2019; however, this individual was collected from a tertiary backwater habitat, thus does not reflect ISMP catch-per-unit-effort (CPUE = 0.00 fish/100 m²) in 2019. This figure is down from the 29-year median value of 0.47 fish/100 m² for this reach. Native and nonnative fish encounters for 2019 are listed in Tables 1 and 2; note that Table 1 accounts for primary and secondary backwaters only. In addition to one YOY pikeminnow, tertiary backwaters accounted for one *Gila* spp. (TL = 52 mm) and one flannelmouth sucker (*Catostomus latipinnis*; TL = 65 mm).

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

Lower Green River (Reach 3):

Utah Division of Wildlife Resources Moab began sampling for ISMP in Reach 3 on 17 September 2019, and concluded on 20 September 2019. 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 38 backwater habitats that met ISMP criteria, yielding a total sampling area of 2,622 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 28,600 cfs on 19 June 2019. The river reached base flow (≤ 3,800 cfs) on 02 August 2019. During ISMP sampling in 2019, flows averaged 2,970 cfs.

Main channel temperatures averaged 19.1 °C (range = 17.0-21.0 °C), while habitat temperatures averaged 20.0 °C (range = 16.0-25.0 °C) in 2019. Main channel turbidity (mm visibility; mean ± SD) was 429 ± 65 mm, while habitat turbidity was 382 ± 138 mm.

Researchers encountered 113 YOY Colorado pikeminnow in reach 3 during ISMP sampling in 2019 (Table 3). Colorado pikeminnow CPUE in 2019 was 4.31 fish/100 m². This figure is down from the 33-year median value of 6.41 fish/100 m² for this reach. Of 38 habitats sampled in Reach 3, 47% contained pikeminnow (Figure 4). Mean Colorado pikeminnow total length was 36 mm (range = 22-58 mm). Additional native and nonnative encounters for 2019 are listed in Tables 3 and 4.

Lower Colorado River (Reach 1):

Sampling on the lower Colorado River began on 11 September 2019, and ended on 14 September 2019. All sampling followed ISMP protocols from Cisco boat ramp (RM 110.5) to the confluence with the Green River (RM 0). Crews sampled 31 backwater habitats that met ISMP criteria, consisting of 2,525 m² of rearing habitat.

Discharge on the lower Colorado River is measured at USGS gage #09180500 near

Cisco, Utah (Figure 4). The Colorado River peaked on 10 June 2019 at 39,100 cfs. Revised base flow recommendations to benefit pikeminnow YOY recruitment have been suggested for the Colorado River (McAda 2003; McAbee 2017; Miller 2018), similar to those developed for the Green River by Bestgen and Hill (2016). Those flows are 3,000 — 6,400 cfs at the state line gage. For comparison purposes flows reached 3,800 cfs on 23 August 2019. Mean discharge during 2019 sampling was 4,140 cfs.

Average main channel temperature was 17.0 °C (range = 16.0-18.0 °C), and average habitat temperature was 18.8 °C (range = 15.0-22.0 °C) in 2019. Main channel turbidity (mm visibility; mean ± SD) was 56 ± 59 mm, while habitat turbidity was 145 ± 126 mm.

Crews captured five YOY Colorado pikeminnow in 2019 on the lower Colorado River (Table 5). Catch-per-unit-effort was 0.20 fish/100 m². This figure is down from the 33-year median value of 2.49 fish/100 m² for this reach. Of 31 habitats sampled in Reach 1, 6% contained pikeminnow (Figure 3). Mean total length was 28.8 mm (range = 25-32 mm). Additional native and nonnative encounters for 2019 are listed in Tables 5 and 6.

Task 4. Green River Canal salvage

Work and budget expenditure for this task in FY 2019 is reported separated under the 138/29c Green River Canal Salvage report. The Bureau of Reclamation installed a fish screen and barrier in spring 2019, so we do not expect this task to continue in FY2020 and beyond.

Task 5. Nursery habitat pilot study

Utah Division of Wildlife Resources Moab completed a nursery habitat evaluation pilot study between 12 and 20 August 2019. For the purposes of this study, researchers defined nursery habitat as any near-channel environment characterized by a maximum depth greater than 50 mm, an area larger than 30 m² and either very low or zero-velocity current. Crews sampled two discrete 10-mile reaches on the Colorado River (Moab, RM 65-55 and Little Bridge, RM 30-20) and one reach on the ,Green River (Mineral Bottom, RM 56-46). These reaches correspond to the same river segments that were studied by Trammell and Chart (1999a, b) for similar habitat evaluation. Habitat measurements were recorded for all nursery habitats encountered within each reach. Additionally, crews completed multiple seine hauls, where possible, within each habitat and recorded the total length of all fish encountered.

Total nursery habitat availability was estimated using Collector, a Global Positioning System application developed by Esri. Total available habitat and number of habitats encountered varied across reaches (Table 7). Comparative analyses between the current data and those of Trammell and Chart (1999a, b) are ongoing.

Mean discharge on the Colorado River, measured at gage #09180500 near Cisco, Utah was 2,980 cfs during the period of study. Main Channel temperatures averaged 23.9 °C (range = 23.0-25.0 °C) while turbidity (mm visibility; mean ± SD) was 482 ± 56 mm. Habitat temperature and turbidity was recorded at all sites. Habitat temperatures averaged 24.6 °C (range=22.0-31.0 °C) at Moab and 27.6 °C (range=25.0-33.0 °C) at Little Bridge. Turbidity varied across sites (505 ± 229 mm and 318 ± 140 mm

respectively). Researchers encountered no YOY pikeminnow and two flannelmouth sucker at the Moab site. At the Little Bridge site crews encountered no pikeminnow and one flannelmouth sucker.

During sampling, mean discharge on the Green River was 2,980 cfs, measured at gage #09315000 at Green River, Utah. Mean main channel temperature was 22.8 °C while turbidity (mm visibility; mean ± SD) was 163 ± 20 mm. Habitat temperatures and turbidity averaged 25.0 °C (range=22.0-29.0 °C) and 244 ± 94 mm respectively at the Mineral Bottom site. Researchers enumerated 19 YOY pikeminnow (CPUE = 1.88 fish/100 m²). Mean pikeminnow total length was 21.8 mm (range = 18-28 mm). Additional native encounters are listed in Table 8.

Task 6. Colorado pikeminnow broodstock collection

Utah Division of Wildlife Resources Moab and Southwestern Native Aquatic Resources Center collaborated to collect YOY Colorado pikeminnow from the lower Green River for the purpose of broodstock augmentation. This effort began on 25 September 2019, and concluded on 27 September 2019. All rearing habitats between RM 128 and 106 were sampled. In an attempt to reduce handling stress, we refrained from collecting length measurements on Colorado pikeminnow.

Discharge for this reach is measured on USGS gage #09315000 at Green River, Utah. Mean discharge through the collection effort was 2,750 cfs. Main channel water temperature and turbidity (mm visibility; mean ± SD) averaged 19°C (range = 18-20°C) and 268 ± 35 mm, respectively, while habitat temperatures and turbidity averaged 20°C (range = 16-25°C) and 22 ± 85 mm. During the three-day effort, we sampled an estimated 3,234 m² of rearing habitat and collected 115 YOY Colorado pikeminnow. Estimated CPUE for effort was 3.56 fish/100 m². Additional native encounters are listed in Table 9.

VIII. Additional noteworthy observations:

No additional noteworthy observations to discuss in detail at this time.

IX. 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.

X. Project Status: On track and ongoing

XI. FY 2019 Budget Status

- A. Funds Provided: \$80,245 (See task 4 above)
- B. Funds Expended: \$80,245(See task 4 above)
- C. Difference: \$0
- D. Percent of the FY 2019 work completed, and projected costs to complete: 100%
- E. Recovery Program funds spent for publication charges: \$0

XII. Status of Data Submission:

Data is formatted, has been QA/QC checked, and will be submitted to the USFWS by January 2020.

XIII. Signed: Matthew J. Breen & Christopher M. Michaud 11/12/2019
Principal Investigators Date

XIV. 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. Larval Fish Laboratory Contribution 183.

McAbee, K. 2017. Colorado River summer base flow scenario for PVA consideration. Report prepared for the Colorado Pikeminnow PVA Technical Team.

McAda, C.W. 2003. Flow recommendations to benefit endangered fishes in the Colorado and Gunnison rivers. Project #54 final report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

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 to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Trammell, M. and T.E. Chart. 1999a. Colorado pikeminnow young of year habitat use, Green River, Utah, 1992-1996. In Flaming Gorge studies: assessment of Colorado pikeminnow nursery habitat in the Green River. Publication Number 99-30, Utah Division of Wildlife Resources, Salt Lake City, UT.

Trammell, M. and T.E. Chart. 1999b. Aspinall studies: evaluation of nursery habitat availability and Colorado pikeminnow young of year habitat use in the Colorado River, Utah, 1992-1996. Publication Number 99-18, Utah Division of Wildlife Resources, Salt Lake City, UT.

USFWS. 1987. Interagency standardized monitoring protocol handbook. U.S. Fish and Wildlife Service. Grand Junction, CO.

Table 1. Native fish captures on the middle Green River during ISMP sampling, fall 2019. This table only contains individuals captured in primary and secondary backwaters of each sub-reach.

Species	Number	Density (fish/100 m ²)
bluehead sucker	5	0.16
<i>Gila</i> spp.	3	0.10
flannelmouth sucker	4	0.13
unidentified native sucker	1	0.03

Table 2. Nonnative fish captures on the middle Green River during ISMP sampling, fall 2019. Note: Nonnative fish are enumerated only during the first seine haul within primary habitats.

Species	Number	Density (fish/100 m ²)
black crappie	1	0.08
common carp	10	0.84
fathead minnow	202	17.03
green sunfish	1	0.08
red shiner	3,287	277.17
smallmouth bass	8	0.67
sand shiner	1,568	132.22
white sucker	26	2.19

Table 3. Native fish captures on the lower Green River during ISMP sampling, fall 2019.

Species	Number	Density (fish/100 m ²)
Colorado pikeminnow	113	4.31
speckled dace	11	0.42
flannelmouth sucker	8	0.31
bluehead sucker	2	0.08
unidentified native sucker	1	0.04

Table 4. Nonnative fish captures on the lower Green River during ISMP sampling, fall 2019.
 Note: Nonnative fish are enumerated only during the first seine haul within primary habitats.

Species	Number	Density (fish/100 m ²)
red shiner	1,454	165.98
sand shiner	805	91.89
fathead minnow	375	42.81
common carp	13	1.48
channel catfish	9	1.03
black crappie	1	0.11
yellow bullhead	1	0.11

Table 5. Native fish captures on the lower Colorado River during ISMP sampling, fall 2019.

Species	Number	Density (fish/100 m ²)
Gila ssp.	65	2.57
unidentified native sucker	54	2.14
speckled dace	7	0.28
flannelmouth sucker	6	0.24
Colorado pikeminnow	5	0.20
bluehead sucker	1	0.04

Table 6. Nonnative fish captures on the lower Colorado River during ISMP sampling, fall 2019. Note: Nonnative fish are enumerated only during the first seine haul within primary habitats.

Species	Number	Density (fish/100 m ²)
red shiner	1,198	138.02
sand shiner	889	102.42
fathead minnow	325	37.44
channel catfish	33	3.80
largemouth bass	6	0.69
black bullhead	3	0.35
gizzard shad	3	0.35
smallmouth bass	2	0.23
bluegill	1	0.12
common carp	1	0.12
mosquito fish	1	0.12
yellow bullhead	1	0.12

Table 7. Habitat availability by reach identified during the 2019 nursery habitat pilot study.

River	Reach	Available habitat (m ²)	Number of habitats
Colorado	Little Bridge	12,230	7
Colorado	Moab	11,428	9
Green	Mineral Bottom	7,602	12

Table 8. Native fish captures at the Mineral Bottom site during the 2019 nursery habitat pilot study.

Species	Number	Density (fish/100 m ²)
flannelmouth sucker	24	2.38
Colorado pikeminnow	19	1.88
speckled dace	13	1.29
unidentified native sucker	3	0.30

Table 9. Native fish captures on the lower Green River during the 2019 broodstock augmentation effort.

Species	Number	Density (fish/100m ²)
bluehead sucker	1	0.03
Gila ssp.	1	0.03
Colorado pikeminnow	115	3.56
flannelmouth sucker	5	0.15
speckled dace	31	0.96
unidentified native sucker	2	0.06

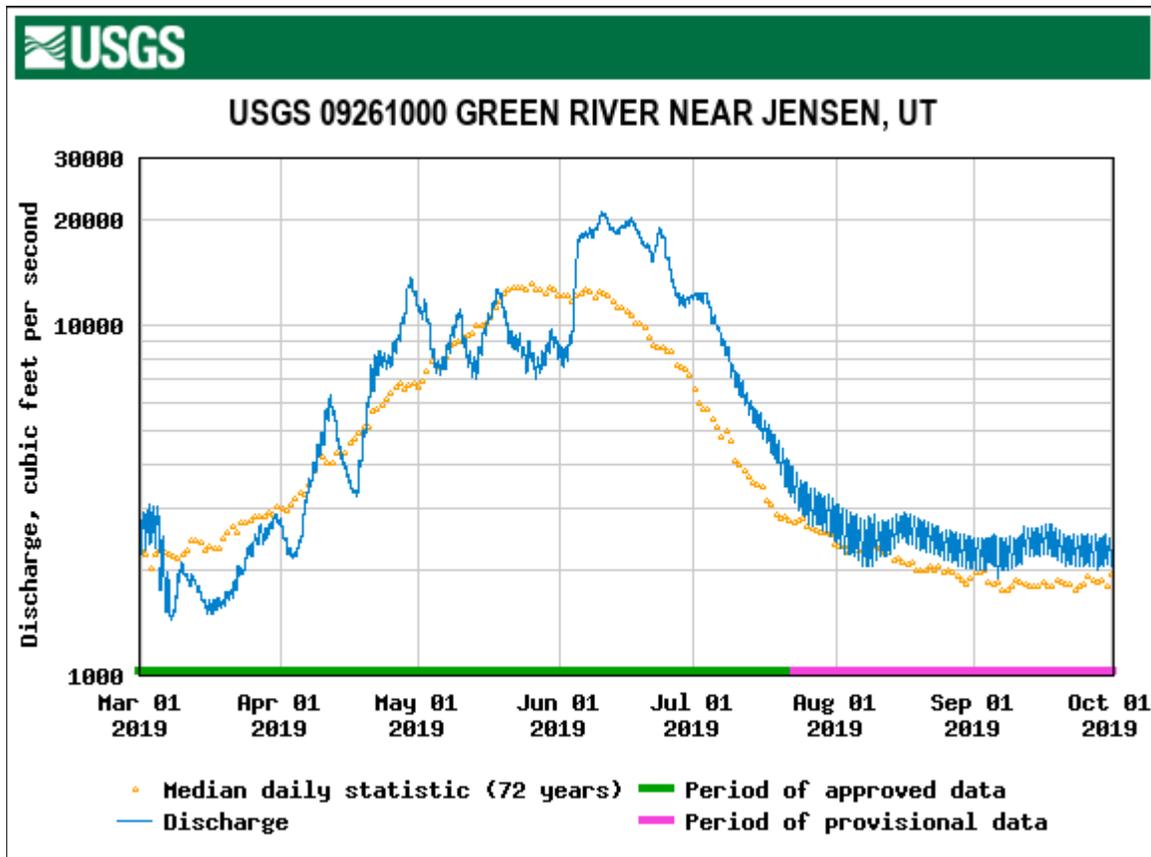


Figure 1. Middle Green River (Reach 4) discharge measured from USGS gage #09261000 at Jensen, Utah for the period of 1 March 2019 to 1 October 2019.

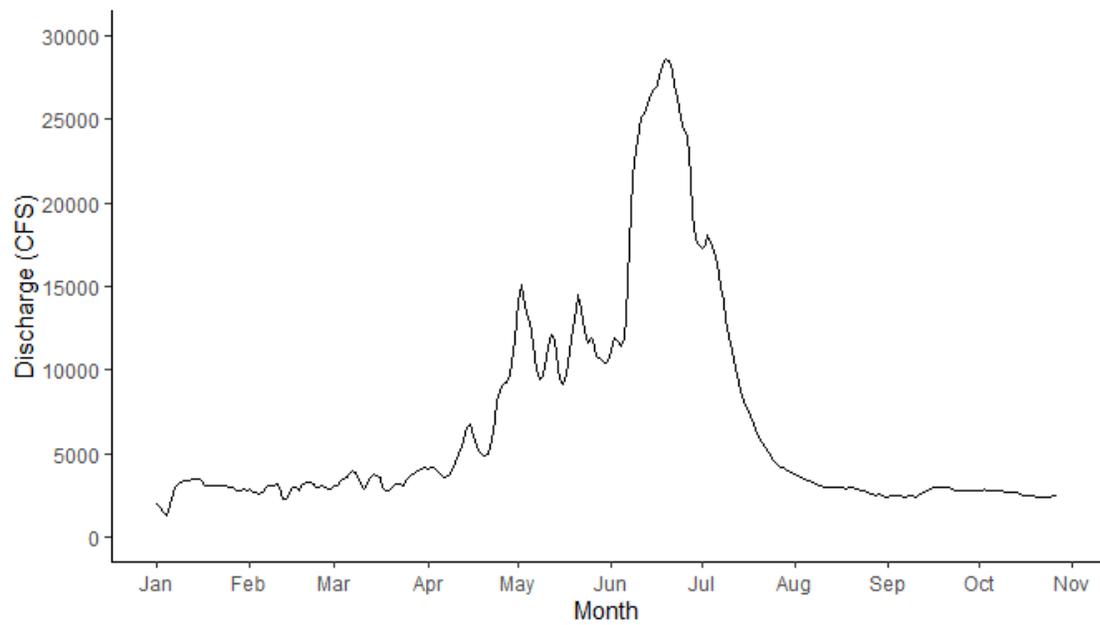


Figure 2. Discharge recorded in 2019 at USGS gage #09315000, Green River, Utah.

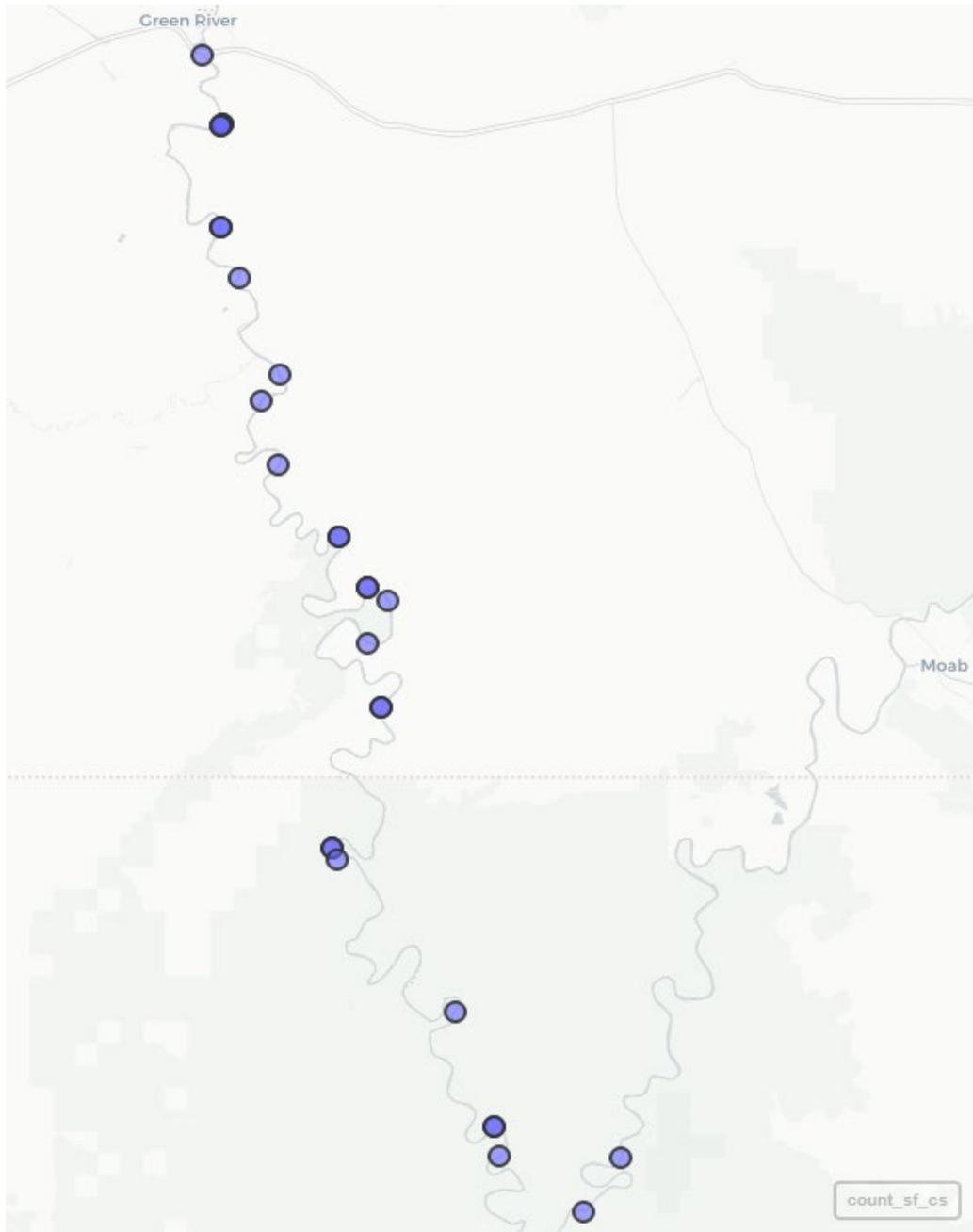


Figure 3. Locations of Colorado pikeminnow encountered during ISMP sampling in 2019 within Reaches 1 and 3.

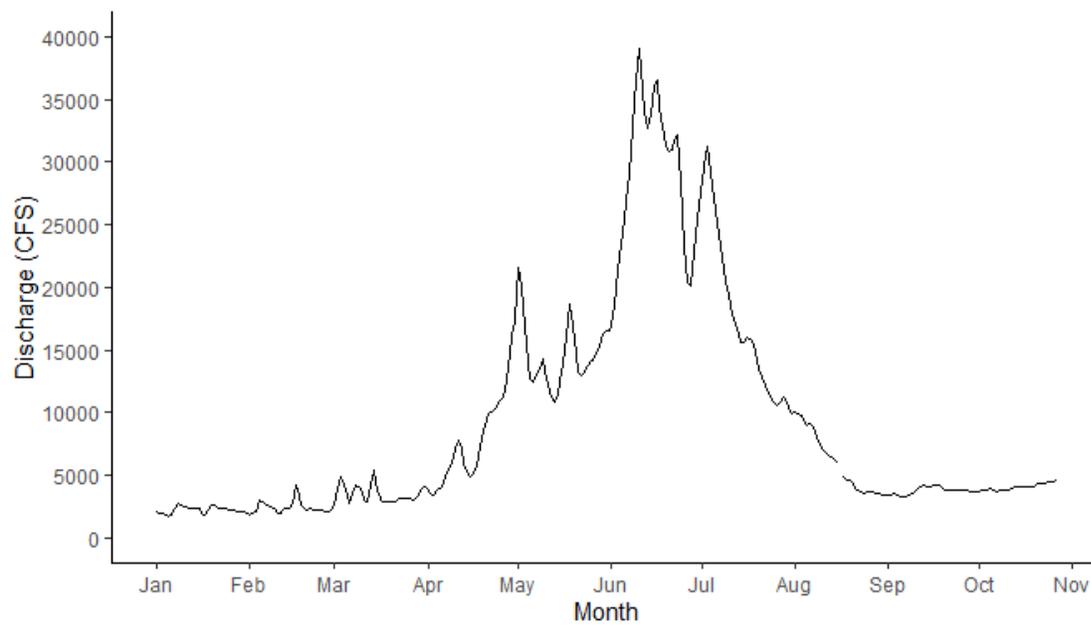


Figure 4. Discharge recorded in 2019 at USGS gage #09180500, near Cisco, Utah.