

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

FY 2022 ANNUAL REPORT

PROJECT: 158

Project Title

Assessment of larval Colorado pikeminnow presence and survival in low-velocity habitats in the middle Green River

Bureau of Reclamation Agreement Number:

R19AP00059 (UDWR)

R20PG00024 (USFWS GRBFWCO)

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Is this the final report? No

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Abstract:

To document age-0 recruitment of Colorado Pikeminnow (*Ptychocheilus lucius*) in the middle Green River, the Utah Division of Wildlife Resources Vernal and the U. S. Fish and Wildlife Service Green River Basin Fish and Wildlife Conservation Office (GRB-FWCO) conducted a variety of seining efforts in backwater nursery habitats in 2022. Sampling during the summer base flow period was conducted to relate age-0 Colorado Pikeminnow persistence to experimental Flaming Gorge Dam releases (pre-ISMP sampling), while fall collections were undertaken for development of a broodstock. Eighteen age-0 Colorado Pikeminnow were sampled during pre-ISMP seining efforts in backwater habitats. Other age-0 native fishes were collected during these efforts as well, but in low abundance. Fall collections were undertaken for development of a broodstock and encompassed 10 days of effort, during which 131 Colorado Pikeminnow were collected and transferred to Ouray National Fish Hatchery. All surviving

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fish collected this year will be transferred to the Southwestern Aquatic Recovery and Resource Center in the near future.

Study Schedule:

2009-Ongoing

Relationship to RIPRAP:

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

- IV. Conserve genetic integrity and augment or restore populations.
- IV.A.4.a.(1) Maintain genetic refuge for each endangered species in the Middle Green River.
- IV.A.4.d.(1) Upper Colorado River Basin Broodstock currently represented at Southwest Native ARRC and by wild fish in the river.
- V.B. Conduct research to acquire needed life history information.
- V.B.2. Conduct appropriate studies to provide needed life history information.

GREEN RIVER ACTION PLAN: MAINSTEM

- IV.A. Augment or restore populations as needed, and as guided by the Genetic Management Plan.
- V.C.3. Monitor age-0 Colorado Pikeminnow in backwaters.

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

Task 1. Age-0 Colorado Pikeminnow presence, densities, and community composition in backwaters.

To document age-0 recruitment success of Colorado Pikeminnow (CPM) in relation to experimental Flaming Gorge Dam releases and to inform questions raised in the summer flow evaluation report (Bestgen et al. 2020), the Utah Division of Wildlife Resources Vernal seined backwater nursery habitats in the middle Green River throughout the summer base flow period. The first presence of larval CPM was detected by drift net sampling conducted at the Echo Park site for Recovery Program Project #22f on 2 July 2022 (preliminary data; K. Bestgen, Colorado State University Larval Fish Laboratory, personal communication). As determined prior to the onset of this task, larval CPM emergence guided our sampling schedule; approximately six weeks after first emergence, and at approximately two-week intervals from 9-31 August 2022 until fall sampling occurred for the Interagency Standardized Monitoring Program (ISMP; Breen and Fennell 2022).

Seining efforts for pass 1 of this task (pre-ISMP) took place from 9-15 August 2022 and pass 2 occurred from 29-31 August 2022. Beginning at Split Mountain boat ramp (river mile [RM] 319.3) and concluding at Sand Wash (RM 215.3), we sampled backwater habitats in each 5-mile sub-reach (when available) and collected associated habitat information. We selected backwaters in accordance with ISMP backwater selection criteria (USFWS 1987). However, given the main goal of pre-ISMP was to document age-0 CPM captures over time, investigators exercised flexibility in applying ISMP sampling protocols (USFWS 1987). For example, seining locations within backwaters were selected using our best judgment. We avoided deep, difficult-to-sample areas in favor of shallower areas where we could seine more effectively, and we often targeted the warmer tail end of backwaters. Additionally, we integrated a protocol comparison to inform future sampling design where backwaters were sampled with seines of various dimensions (Table 1). However, during our second pass we determined that native fishes were large enough to capture with a 1/8 inch mesh seine, thus we discontinued use of the 1/16

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inch mesh seine. We also documented backwater sediment condition for potential future comparisons (i.e., three transects in each backwater to characterize sediment depth). In 2022, we maintained a less intensive sampling regime (i.e., typically only one backwater per 5-mile reach; Breen et al. 2021). Altogether, we sampled 41 backwater habitats (20 on pass 1 and 21 on pass 2), yielding a total sampling area of 3,703.1 m² (Table 1).

We encountered 18 age-0 CPM in 2022 (Table 2; likely more pending identification of preserved samples, see below). Other fish species collected during this effort are described in Table 2, as well as gear-specific catch-per-unit-effort (CPUE) and length data summaries. However, this information does not describe the majority of the fish collected during pre-ISMP because a large portion of the samples (see Table 1) were preserved (100% EtOH) for later identification by Colorado State University's Larval Fish Laboratory (LFL) under Recovery Program Project #22f. Preventing desiccation in the field was especially important for overwhelmingly large samples. All seine hauls were quickly sorted to remove native fishes for measurement. Then fishes from seine hauls that were manageable were identified and enumerated in the field, while larger samples were preserved. Until preserved samples are fully identified, enumerated, and incorporated into our data set, fish information presented here is incomplete and should be interpreted with caution. Eight additional age-0 native fishes were collected during this effort (Table 2): one Bluehead Sucker (*Catostomus discobolus*) and seven Flannelmouth Sucker (*C. latipinnis*). Eight nonnative fish species were also captured (see Table 2 for details).

Task 2. Collect age-0 Colorado Pikeminnow from backwaters during fall and transfer them to SNARRC. The GRB-FWCO with assistance from the Utah Division of Wildlife Resources Vernal, LFL, American Southwest Ichthyological Researchers, Bureau of Reclamation, and Biowest collected age-0 CPM over the course of 10 days between 27 September and 13 October 2022. Field crews conducted 352 seine hauls (area = 42,530.6 m²; Table 1) within 69 backwaters between the Brush Creek confluence (RM 305.0) and the Ouray bridge (RM 248.1) of the middle Green River (Figure 1). Other than avoiding flow-through backwaters with noticeable current and those too deep to seine, our collection protocol was flexible and focused on maximizing the likelihood of capturing CPM. During the first pass through a given stretch, we seined all low-velocity backwaters encountered. If CPM were collected in a given backwater, we returned at a later date which proved to be successful more often than not. A total of 131 age-0 CPM (CPUE = 0.308 fish/100 m²) were collected from seven of the 41 backwaters sampled. All CPM were transferred to Ouray National Fish Hatchery, 41 of which did not survive as of 13 December 2022. Most mortalities ($n=34$) were associated with the first week of this effort. Possible sources of mortality included impingement on a hatchery tank screen, generally warm (>25° C) water temperatures in backwaters, and up to a 6.2° C difference in water temperature between field live wells and the receiving hatchery water (Table 3). During subsequent transfers, effort was made to reduce stress by slowing water tempering rates to 1.5° C per hour, tempering in anticipation of the hatchery transfer while still in the field, and warming the receiving water.

Additional noteworthy observations:

Over the course of this project and on through annual ISMP sampling (only two age-0 CPM were collected; Breen and Fennell 2022), the abundance of age-0 CPM, as well as other native fishes in the middle Green River, dwindled through time. This result may be due to monsoon-driven increases in sedimentation (e.g., Breen et al. 2014), which was more pronounced in downstream areas, or direct predation by nonnative fishes in overlapping rearing habitats (e.g., Breen and Jones 2019). Given that our goal for the second task of this project is to collect as many age-0 CPM for an upper Colorado River basin broodstock as possible, we need to reconsider Recovery Program priorities in relation to annual

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ISMP sampling. Sacrifices may be necessary to achieve objectives outlined in this scope of work (see recommendation below).

Recommendations:

After two seasons utilizing both 1/8" and 1/16" mesh seines (both 15 ft. wide), we have a much better idea of what works best for a rapid sampling protocol (essential for this project). At this point we are confident that we will not miss any early life stage native fishes with a larger mesh size (1/8" mesh; see Table 2 for comparison). Therefore, we recommend only using 1/8" mesh seines during future sampling for Task 1 of this project because larger mesh limits the amount of algae and debris in our samples, ultimately simplifying each stage of sample processing.

Middle Green River CPM contributions to basin-wide broodstock over the past four years have been well below Southwestern Aquatic Recovery and Resource Center's targets. Initiating broodstock collection efforts earlier in the fall would allow for a longer collection period and likely increase CPM contributions during years such as 2022. To date, our collection efforts have started immediately after the ISMP pass in the middle Green River (e.g., Breen and Fennell 2022). Concerns regarding the collection of CPM prior to the completion of this long-term monitoring effort are valid and shared by the authors. However, the urgency of incorporating additional middle Green River CPM into broodstock may necessitate starting collections before ISMP during years when age-0 CPM presence has been confirmed in this reach through Task 1 activities.

During broodstock collections, only two of the 131 CPM collected this year were caught before noon (Table 3). The lack of morning captures might have been due to CPM avoiding cooler water temperatures in shallower habitats where seines are more efficient until after noon, when these areas warmed rapidly. As such, it would seem appropriate to avoid seining in before backwaters warm up, and especially before they are warmer than the main channel of the Green River, in future collection efforts. However, this will effectively shorten field days and the number of backwaters seined in a day, particularly when transferring fish from Jensen, Utah to the Ouray hatchery and accounting for water tempering.

Project Status:

On track and ongoing

FY 2022 Budget Status

Funds Provided: \$108,461

Funds Expended: \$108,461

Difference: -0-

Percent of the FY 2022 work completed, and projected costs to complete: 100%

Recovery Program funds spent for publication charges: -0-

Status of Data Submission

Data are formatted, have been QA/QC checked, and will be submitted to the database manager by January 2023.

Signed:

Matthew J. Breen & Christian Smith

Principal Investigators

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12/7/2022

Table 1. Summary of 2022 seining efforts in the middle Green River.

Purpose	Seine Dimensions	# Seine Hauls	Total Area Seined (m ²)	# Samples Preserved
Pre-ISMP	1/16" Mesh x 15' Width	13	982.1	11
Pre-ISMP	1/8" Mesh x 15' Width	31	2,721.0	25
Broodstock Collection	1/8" Mesh x 15' Width	322	34,291.8	NA
Broodstock Collection	1/8" Mesh x 30' Width	30	8,238.7	NA
TOTALS		396	46,233.6	36

Table 2. Seine haul results during 2022 summer sampling efforts in the middle Green River. Note that this table only accounts for fishes that were identified and enumerated in the field; samples preserved for later identification are not included.

Species	Seine Dimensions	Total	CPUE (fish/100 m ²)	Mean TL (mm) & Range
Black Bullhead	1/8" Mesh x 15' Width	4	0.147	–
Black Crappie	1/8" Mesh x 15' Width	6	0.221	–
	1/16" Mesh x 15' Width	2	0.204	–
Bluehead Sucker	1/16" Mesh x 15' Width	1	0.102	107
Channel Catfish	1/8" Mesh x 15' Width	8	0.294	–
	1/16" Mesh x 15' Width	1	0.102	–
Colorado Pikeminnow	1/8" Mesh x 15' Width	11	0.404	37.9 (33–42)
	1/16" Mesh x 15' Width	7	0.713	42.7 (34–57)
Fathead Minnow	1/8" Mesh x 15' Width	2	0.074	–
Flannelmouth Sucker	1/8" Mesh x 15' Width	6	0.221	74.7 (42–104)
	1/16" Mesh x 15' Width	1	0.102	87
Red Shiner	1/8" Mesh x 15' Width	185	6.799	–
	1/16" Mesh x 15' Width	60	6.109	–
Smallmouth Bass	1/8" Mesh x 15' Width	8	0.294	–
	1/16" Mesh x 15' Width	2	0.204	–
Sand Shiner	1/8" Mesh x 15' Width	64	2.352	–
	1/16" Mesh x 15' Width	21	2.138	–
White Sucker	1/8" Mesh x 15' Width	1	0.037	–
TOTALS		390		

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Table 3. Seine haul, fish transfer, and water tempering information from Colorado Pikeminnow (CPM) broodstock collection efforts in backwaters (BA; N = 69) of the middle Green River in 2022. Mean CPM Haul Temp (C) incorporates water temperature of each seine haul in a given backwater when CPM were captured.

Date	# BA's Seined before 1st CPM Capture	Time of 1st Seine Haul	Time of 1st CPM Capture	Time of final CPM Capture	River Mile	Mean CPM Haul Temp (C)	CPM Count (n)	Hatchery Arrival Time	Livewell Temp (C)	Hatchery Receiving Tank Temp (C)	Hatchery Tempering Time	
9/27/22	17	10:32	14:28	14:52	298.8	21.5	13	16:56	21.5	16.0	1:34	
9/28/22	11	10:17	14:26	15:25	298.8	20.0	46	17:13	22.2	16.0	1:12	
9/29/22	8	09:57	13:05	13:47	255.7	21.2	6	15:48	20.2	16.2	2:12	
9/29/22	8	09:57	14:10	14:58	254.2	21.5	7	15:48	20.2	16.2	2:12	
10/3/22	2	10:42	11:40	12:04	250.3	18.1	3	14:26	18.6	19.2	0:38	
10/3/22	2	10:42	14:55	15:14	254.2	19.0	4	16:45	19.6	18.9	0:45	
10/4/22	8	10:27	14:12	15:24	266.7	20.7	7	16:23	20.9	18.8	0:54	
10/5/22	8	11:49	15:01	16:17	274.4	18.6	16	17:40	19.2	18.1	1:15	
10/6/22	0	11:40	12:54	13:42	276.5	17.6	26	15:20	18.3	17.7	1:10	
10/6/22	0	11:40	13:50	13:50	276.5	18.4	3	17:15	19.6	17.8	1:45	
TOTALS							131					

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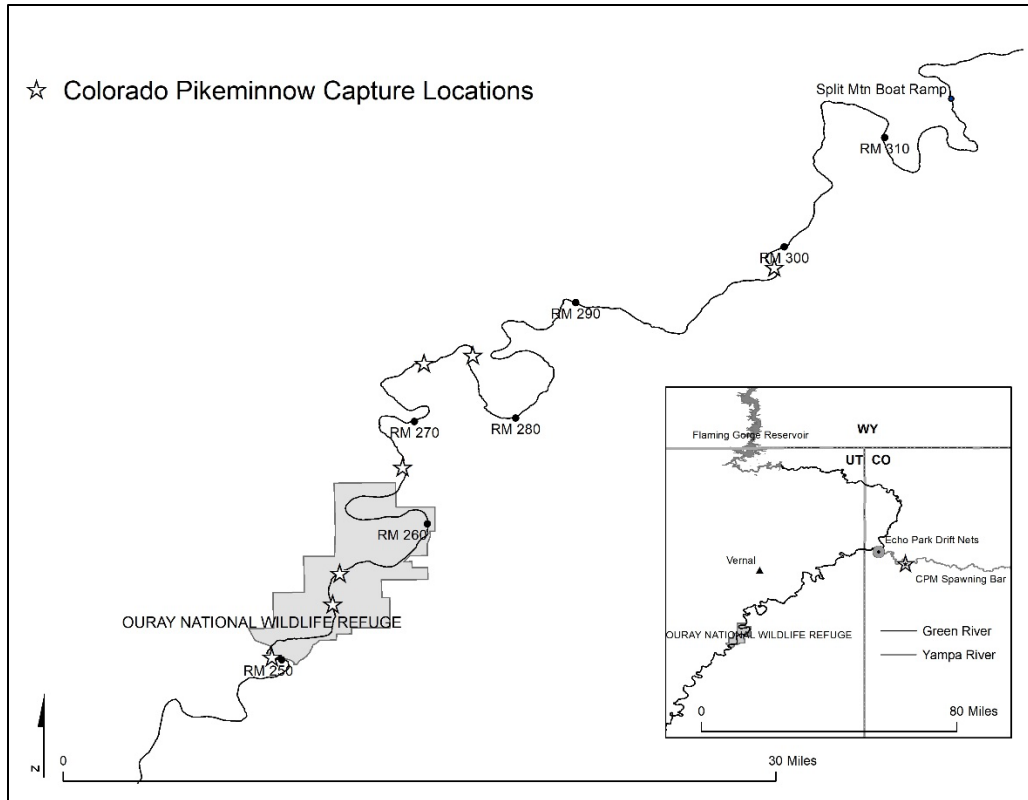


Figure 1. Overview of the broodstock collection reach and 2022 Colorado Pikeminnow capture locations.

Literature Cited

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