

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

FY 2020 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:

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R20PG00024 (GRBFWCO)

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End date: 09/30/2023

Reporting period end date: 09/30/2020

Is this the final report? No

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Abstract:

To document recruitment of age-0 Colorado pikeminnow (*Ptychocheilus lucius*; CPM) in the middle Green River over the summer base flow period in relation to experimental Flaming Gorge Dam releases (pre-ISMP sampling), and to collect individuals in autumn for development of a supplemental broodstock, the Utah Division of Wildlife Resources Vernal and Green River Basin Fish and Wildlife Conservation Office conducted a variety seining efforts in backwater nursery habitats in 2020. Despite a substantial amount of effort (558 seine hauls; total area seined = 64,429.5 m²), confirmation of age-0 CPM presence did not occur during either field task for this project. Other age-0 native fishes were collected during these efforts, but likely declined over time due to predation by a strong year class of age-0 smallmouth bass (*Micropterus dolomieu*).

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

Task 1. Determine age-0 Colorado pikeminnow presence, densities, and community composition in backwaters throughout the summer base flow period.

To document recruitment success of age-0 Colorado pikeminnow (*Ptychocheilus lucius*; 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, with assistance from the Green River Basin Fish and Wildlife Conservation Office, seined backwater habitats in the middle Green River on a temporal basis throughout the summer base flow period until broodstock collection began in early fall (Task 2 below). First appearance of larval CPM detected by drift net sampling conducted at the Echo Park site for Recovery Program Project #22f occurred on 28 June 2020. As determined prior to onset of this task, larval CPM emergence guided our sampling schedule; approximately six weeks after first emergence, and at approximately two week intervals until fall sampling occurred for the Interagency Standardized Monitoring Program (ISMP; Breen and Michaud 2020). Seining efforts for this task (pre-ISMP) took place from 10-14 August 2020 (pass 1) and 27 August to 02 September 2020 (pass 2). Beginning at Split Mountain boat ramp (river mile [RM] 319.3) and concluding at Sand Wash (RM 215.3), we sampled two backwater habitats in each 5-mile sub-reach. Upon further discussion (K. Bestgen, Colorado State University, personal communication), our project area shifted from an original end point at the Duchesne River confluence (RM 247.9) to Sand Wash to match the long-term ISMP sampling reach for potential future comparisons. In accordance with ISMP backwater selection criteria (USFWS 1987), we sampled selected backwaters and collected associated habitat information. However, given that the main goal of pre-ISMP was to document age-0 CPM captures over time, investigators exercised flexibility of ISMP sampling protocols (USFWS 1987). For example, seining locations within backwaters were selected using our best judgment where 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 (1/16" and 1/32" mesh, various net widths; Table 1) and a seine with standard ISMP dimensions (1/8" mesh). We also documented backwater condition for potential future comparisons (i.e., three transects in

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each backwater to measure sediment depth). Altogether, we sampled 81 backwater habitats (40 on pass 1 and 41 on pass 2) that met ISMP criteria, yielding a total sampling area of 15,732.3 m² (Table 1).

Discharge on the middle Green River is measured at USGS gage #09261000 at Jensen, Utah. At this location, the Green River peaked at 18,300 cubic feet per second (cfs) on 04 June 2020 and reached base flow ($\leq 3,000$ cfs; see Bestgen and Hill 2016) on 27 June 2020. During pre-ISMP sampling in 2020, flows averaged 2,010 cfs, which is within the summer flow regime demonstrated to benefit CPM recruitment in the middle Green River. Main channel temperatures during pre-ISMP sampling averaged 22.4 °C (range = 16.4–28.4 °C), while habitat temperatures averaged 23.1 °C (range = 19.2–27.6 °C). Main channel and backwater turbidity (depth of visibility) was not calculated because values exceeded 60 cm in most cases, which is beyond the range of conditions measureable by the equipment used. However, in terms of predator avoidance, lack of measurements for higher visibility levels is not that revealing (i.e., visual predators can be effective in more turbid conditions).

Despite a substantial amount of effort during pre-ISMP sampling (Table 1), we did not encounter age-0 CPM in 2020 (unless revealed by 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 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 Lab under Recovery Program Project #22f to avoid desiccation in the field, which was especially important for overwhelmingly large samples. More specifically, seine hauls that were manageable in the field were completely identified (common nonnatives counted if feasible and estimated if abundant), and all seine hauls were quickly sorted to remove natives and rare nonnatives for measurement. Until preserved samples are fully identified, enumerated, and incorporated into our data set, fish information presented here should be considered preliminary results. Likewise, it may appear that there are differences in gear efficiency, especially between 15 ft 1/8" and 1/16" inch mesh seines which had a similar amount of effort, but it is crucial to wait to incorporate the remaining data before drawing conclusions. Moreover, there may be inherent bias because seine selection was not randomized. For example, the majority of the seine hauls with the 1/8" mesh x 15 ft width were completed in standardized ISMP locations for future comparison, whereas the majority of seine hauls completed with the 1/16" mesh x 15 ft width were completed in the warm tail end of backwaters in an attempt to locate CPM based on investigator expertise. Of particular note, age-0 smallmouth bass (*Micropterus dolomieu*; $n = 100$; Table 1) were collected in 26 backwater habitats (32.1%), and an equal number of bass ($n = 50$) were captured during each pass. In contrast, only 15 age-0 native fishes were captured during pre-ISMP (Table 1); 10 flannemouth sucker (*Catostomus latipinnis*) and 5 bluehead sucker (*C. discobolus*). Possibly related to predation in overlapping rearing habitats, only 33% of native fish captures occurred on the second pass (1 bluehead and 4 flannemouth).

Task 2. Collect age-0 Colorado pikeminnow from backwaters during fall and transfer them to SNARRC.

The Green River Basin Fish and Wildlife Conservation Office, with the assistance of Utah Division of Wildlife Resources Vernal, American Southwest Ichthyological Researchers, U.S. Bureau of Reclamation, and U.S. National Park Service personnel attempted to collect age-0 CPM over the course of fifteen days between 23 September and 16 October 2020. Field crews conducted 378 seine hauls (Area = 48,697.2 m²; Table 1) within 108 backwaters between the Brush Creek confluence (RM 305.0) and the Ouray bridge (RM 248.1). Despite this extensive effort, age-0 CPM were not captured this year. In comparison, the 2019 effort encompassed 102 seine hauls (Area = 10,495.4 m²) in 23 backwaters over five days, yet yielded 130 CPM (Breen et al. 2019).

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Additional noteworthy observations:

Despite a substantial amount of effort, confirmation of CPM presence did not occur during either field task for this project or during ISMP efforts (Breen and Michaud 2020) in the middle Green River this year. Our inability to document 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). Furthermore, the dwindling number of native fishes collected over the course of the summer during pre-ISMP sampling and the fact that only one age-0 bluehead sucker and two age-0 flannelmouth sucker were collected during ISMP sampling (Breen and Michaud 2020), possibly suggests that predation may be an important factor. It has been demonstrated experimentally that native fish survival is significantly lower when not controlled for predation in low-velocity habitats (Breen and Jones 2019). As suggested in the aforementioned report, it is important that we determine the extent of predation on age-0 native fishes in nursery habitats to determine potential solutions for bolstering annual recruitment of this declining CPM population.

While the majority of backwaters seined during the CPM broodstock collection effort were connected to the Green River as per ISMP protocol (USFWS 1987), 14 seine hauls were conducted in six isolated backwaters or pools. At least some, if not most, of these isolated habitats had been recently cutoff due to the reduction of Flaming Gorge Dam releases in mid-October. Although field crews did not enumerate or record fish by species, it was very evident that seine hauls conducted in these recently isolated pools yielded more native suckers than all other seine hauls combined during broodstock collection efforts.

Recommendations:

We recommend using only the 1/8" and 1/16" mesh 15 ft seines during future sampling efforts based on overall field observations of effectiveness in middle Green River backwater habitats to capture small-bodied fishes.

We recommend conducting an evaluation of predation by nonnative fishes in backwater nursery habitats by deploying directional fyke nets at the mouth of select backwaters during the summer base flow period. This will allow us to better understand the dynamics and extent of nonnative fishes moving between riverine and backwater habitats to forage on native fishes. This knowledge may lead to additional recovery actions for CPM to help bolster recruitment potential.

Continue collecting age-0 CPM in backwaters along the middle Green River applying a similar strategy in 2021. Although we did not contribute to broodstock in 2020, we feel confident that our field methods and strategy would have been effective had young-of-year CPM been available for capture.

Project Status:

On track and ongoing

FY 2020 Budget Status

Funds Provided: \$132,844

Funds Expended: \$132,844

Difference: -0-

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

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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 USFWS by January 2021.

Signed:

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11/13/2020

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Table 1. Summary of 2020 seining efforts in the middle Green River.

Purpose	Seine Dimensions	# Seine Hauls	Total Area Seined (m ²)	# Samples Preserved
Pre-ISMP	1/32" Mesh x 10' Width	1	34.4	0
Pre-ISMP	1/16" Mesh x 10' Width	3	119.2	2
Pre-ISMP	1/16" Mesh x 15' Width	91	8,487.9	57
Pre-ISMP	1/8" Mesh x 15' Width	85	7,090.7	25
Broodstock Collection	1/8" Mesh x 15' Width	361	34,914.0	0
Broodstock Collection	1/8" Mesh x 25' Width	17	13,783.2	0
TOTALS		558	64,429.5	84

Table 2. Seine haul results during 2020 summer sampling efforts in the middle Green River.

Species	Seine Dimensions	Counts	Estimates	Total	CPUE (fish/100 m ²)	Mean TL (mm) & Range
bluehead sucker	1/16" Mesh x 15' Width	5	–	5	0.059	49 (34–57)
channel catfish	1/16" Mesh x 15' Width	21	–	21	0.247	63 (50–80)
	1/8" Mesh x 15' Width	2	–	2	0.028	199 (63–335)
common carp	1/16" Mesh x 15' Width	31	–	31	0.365	103 (71–142)
	1/8" Mesh x 15' Width	3	–	3	0.042	137 (133–140)
creek chub	1/8" Mesh x 15' Width	3	–	3	0.042	78 (66–97)
fathead minnow	1/32" Mesh x 10' Width	1	–	1	2.903	–
	1/16" Mesh x 10' Width	1	–	1	0.839	–
	1/16" Mesh x 15' Width	61	455	516	6.079	–
	1/8" Mesh x 15' Width	110	–	110	1.551	–
flannelmouth sucker	1/16" Mesh x 15' Width	9	–	9	0.106	58 (48–69)
	1/8" Mesh x 15' Width	1	–	1	0.014	60
green sunfish	1/16" Mesh x 15' Width	2	–	2	0.024	–
	1/8" Mesh x 15' Width	17	–	17	0.240	–
redside shiner	1/16" Mesh x 15' Width	4	–	4	0.047	–
	1/8" Mesh x 15' Width	1	–	1	0.014	–
red shiner	1/32" Mesh x 10' Width	34	–	34	98.716	–
	1/16" Mesh x 10' Width	10	–	10	8.391	–
	1/16" Mesh x 15' Width	1,593	2170	3,763	44.334	–
	1/8" Mesh x 15' Width	2,469	–	2,469	34.820	–
smallmouth bass	1/16" Mesh x 10' Width	1	–	1	0.839	38
	1/16" Mesh x 15' Width	75	–	75	0.884	54 (36–81)
	1/8" Mesh x 15' Width	24	–	24	0.338	70 (34–108)
sand shiner	1/32" Mesh x 10' Width	4	–	4	11.614	–
	1/16" Mesh x 10' Width	8	–	8	6.713	–
	1/16" Mesh x 15' Width	369	1350	1,719	20.252	–
	1/8" Mesh x 15' Width	1,123	–	1,123	15.838	–
white sucker	1/16" Mesh x 15' Width	10	–	10	0.118	51 (40–71)
	1/8" Mesh x 15' Width	37	–	37	0.522	85 (50–230)
TOTALS		6,029	3,975	10,004		

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Literature Cited

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