

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

FY 2023 ANNUAL REPORT

PROJECT: 164

Project Title

Middle Green River Floodplain Sampling and Management

Bureau of Reclamation Agreement Number:

R20PG00024

Project/Grant Period:

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Is this the final report? Yes _____ No X

Principal Investigators:

Christian Smith, Supervisory Biologist

Dave Beers, Fisheries Technician

U.S. Fish and Wildlife Service

Green River Basin Fish and Wildlife Conservation Office

1380 S 2350 W

Vernal, UT 84078

Phone: (435) 789-0351

Email: christian_t_smith@fws.gov

Abstract:

Spring runoff and releases from Flaming Gorge Dam in 2023 provided sufficient flows in the middle Green River to inundate the Johnson Bottom, Old Charley Wash, and Sheppard Bottom floodplain wetlands. Draining of the Johnson Bottom and Old Charley wetlands began in mid-September when water control structure gates were opened. While the Old Charley Wash wetland was effectively dry by mid-October, Johnson Bottom continues to drain at a very slow rate and will not reset prior to the 2024 runoff season.

Study Schedule:

2012-Ongoing

Relationship to RIPRAP:

Green River Action Plan: Mainstem

II.A.5. Manage and/or modify priority floodplain sites for nursery habitat for endangered fish

II.A.5.b. Johnson Bottom

II.A.5.c. Old Charley Wash

II.A.5.d. Sheppard Bottom

II.A.5.f. Other sites

V.D.1. Implement razorback sucker monitoring plan

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Accomplishment of FY 2023 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Larval Trigger and Spring Peak Flow Hydrology

U.S. Fish and Wildlife Service monitors larval razorback sucker *Xyrauchen texanus* (RZ) drift with light traps, starting each spring in May or as water temperatures indicate spawning is imminent. The first detection of RZ larvae was on May 31 at Cliff Creek, when mean daily flow was 15,216 cfs and mean water temperature was 14.7° C (USGS gauge 9261000 located near Jensen, UT). The U.S. Bureau of Reclamation (USBR) increased Flaming Gorge Dam releases on June 6 in response to increasing RZ larval captures in light traps and maintained elevated releases through June 13 (USGS gauge 9234500 located near Greendale, UT). During this time, the Green River near Jensen peaked at 19,300 cfs on June 10. Discharge in the Green River near Jensen (Figure 1) peaked at 20,300 cfs on May 18, two weeks before the first detection of RZ larvae at Cliff Creek and more than three weeks before the Larval Trigger. Details of spring larval sampling can be found in the annual report for Project 22f, but much of the larval identification and final data are pending laboratory verification.

Johnson Bottom Wetland Management and Sampling Results

Water Management

Starting on May 3, large-bodied fishes could enter Johnson Bottom when the Green River near Ouray (USGS gauge 09272400 located at Ouray, UT) exceeded approximately 13,000 cfs, and the river connected to the wetland through the large, unscreened downstream breach. As discharge continued to increase throughout May, Johnson Bottom filled through this unmanaged breach despite the water control structure gates being closed. The gates in the water control structure were opened on May 31. Unlike past years, in 2023 the gates were opened to drain (instead of fill) the wetland. The early drain was intended to promote larval entrainment by allowing the wetland to fill again during the Larval Trigger pulse that reached the middle Green River after June 8. The gates were closed on June 12, when flows began to subside, to hold as much water as possible. However, drainage through the unmanaged breach continued. Wetland draining began on September 26, when water depth at the fish kettle measured 3.6 feet. Draining continues and at a very slow rate: The staff gage read 2.26 on November 8. Sediment deposition in the drainage canal has elevated the bottom of the canal so that it is higher than the bottom of the fish kettle. Furthermore, drainage was impeded by beaver more in 2023 than in the past few years. We ceased managing Johnson Bottom in early November, and the wetland will not reset prior to next year's runoff season because the wetland will remain deep enough to allow overwinter survival. Next spring, GRB FWCO plans on seining Johnson Bottom to confirm fish presence in the wetland prior to filling.

Fish Sampling

Light traps were set inside the Johnson Bottom wetland from June 13-16 to detect larval RZ, of which none were captured. Five fyke nets were set from June 21-23 the following week to investigate species presence in this wetland. Common carp *Cyprinus carpio* comprised most of the catch. Other nonnative species captured included green sunfish *Lepomis cyanellus*, fathead minnow *Pimephales promelas*, black bullhead *Ameiurus melas*, black crappie *Pomoxis nigromaculatus*, red shiner *Cyprinella lutrensis*, and white sucker *Catostomus commersonii*. In addition, 21 bonyail *Gila elegans* (BT) and an adult RZ

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were captured. These bonytail were stocked in Johnson Bottom by the Ouray National Fish Hatchery (ONFH) on May 11, 2023. The RZ was last encountered when it was stocked by the ONFH Grand Valley Unit at RM -10.0 in the San Juan River on March 1, 2022. Boat electrofishing and additional fyke netting was conducted September 18-22, the week before wetland draining commenced. This effort was intended to capture RZ in the wetland while the water was deep enough for boat access. Extensive aquatic vegetation made electrofishing entirely inefficient, so effort was encompassed by 8 fyke nets throughout the week. A total of 4 RZ (range= 70-90 mm total length [TL]) were caught, none of which met our PIT-tagging threshold of 120 mm TL. In addition, 33 BT were captured and all except 3 of these fish carried PIT tags. Except for two young-of-year BT that were preserved and presumably hatched in this wetland, all endangered fish captured in Johnson Bottom in 2023 were transferred into the Green River at the downstream breach (RM 261.7).

Fish sampling at Johnson Bottom resumed when the water control structure gates were opened on September 26 and continued intermittently until November 9. Sampling entails seining in the fish kettle, which is isolated between two water control gates. The downstream gate (during wetland draining) is screened with 6 mm x 75 mm slots to hold fish in the kettle. Only one 175 mm TL RZ was captured during wetland draining this year, in contrast to the 177 RZ caught in 2023. Another 18 BT were also captured via seining the fish kettle, consisting of 11 YOY and 7 hatchery-stocked adults. In total, 72 BT were captured in Johnson Bottom this year and of those, 59 were adults (Table 1) stocked by ONFH along with 1,815 other individuals.

Most fish captured at Johnson Bottom in 2023 were nonnative species. In addition to the species caught during the June fyke netting effort, creek chub *Semotilus atromaculatus* were captured in the fall. The combined mass of all nonnative fishes removed totaled 261 kg. In comparison, RZ and BT total mass amounted to 83 g and 11.1 kg, respectively.

Additional sampling of Johnson Bottom was conducted with portable PIT tag antennas throughout the 2023 growing season. Two antennas were set in the filling canal near the culvert screen on May 24 and operated until June 15. In total, 121 RZ and 83 BT were detected at this location which is outside of the wetland and fish kettle. Most of the RZ (n = 116) detected were of hatchery origin. However, wild RZ that were initially captured in managed wetlands then PIT-tagged and released in October 2022 were also detected at this site. These included 3 fish from Stewart Lake and 2 more from the Stirrup wetland. Both antennas were moved into the wetland on June 21 and continue to operate as of November 20. As of October 26, 378 BT have been detected. These fish were all stocked in Johnson Bottom by ONFH on May 15 this year.

Old Charley Wash Wetland Management and Sampling Results

Water Management

This was the fourth year Old Charley Wash (aka Woods Bottom) has been managed as RZ nursery habitat. Wetland filling began as discharge increased in the Green River in April and the water control structure was closed on June 12. As at Johnson Bottom in 2023, not all of the water entering Old Charley during the filling period this year passed through the screens. Large-bodied fishes entered the wetland, likely via breaches in the exterior unit. Supplemental water from the Green River was not pumped into the wetland because leakage throughout summer was minimal compared to 2022, perhaps

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the result of sediment deposition in the fish kettle during filling. Wetland draining began on September 28 and was complete by October 11. Unlike Johnson Bottom, Old Charley will reset prior to runoff in 2024.

Fish Sampling

Ouray National Wildlife Refuge (ONWR) staff supported the GRB FWCO by setting 3 light traps inside the Old Charley wetland over 4 nights between June 14 and June 21. Larval fish were not captured during this effort. Species presence post-filling in Old Charley Wash was investigated with 6 fyke nets from June 21-23. Common carp were the most numerous species captured, followed by green sunfish, fathead minnow, and black bullhead. Fish collection in earnest began on September 28 when the water control structure gates were opened, ended on October 11, and entailed seine hauls in the fish kettle and inside canal. Razorback sucker presence was first confirmed in Old Charley when 4 were captured in the fish kettle on September 28. In total, 7 YOY (range= 87-139 mm TL; Table 1) and one 430 mm TL adult RZ were captured during the draining period. This PIT-tagged adult had not been encountered since it was stocked in the Green River at the hatchery ramp (RM 261.8) in September 2021. We PIT-tagged 4 of the YOY RZ using a tagging threshold of 120 mm TL, and all were released into the Green River 0.5 miles downstream.

As with Johnson Bottom in 2023, nonnative fishes comprised the majority of captures at Old Charley. Black crappie, brook stickleback *Culaea inconstans*, and Iowa darter *Etheostoma exile* were caught during fall draining in addition to the nonnative species caught in fyke nets in June. Estimated mass of nonnative fishes was 756 kg and 1 kg for the 7 RZ.

Additional sampling was conducted with two submersible PIT tag antennas that were set approximately 20 feet outside of the wetland water control structure from May 22 to June 22. Among the 56 RZ detected were 4 wild fish that were captured in Stewart Lake (n= 3) or the Stirrup (n= 1) and released into the Green River in October 2022. Five bonytail were also detected during this period, including 3 of the fish that were stocked in Johnson Bottom in May. These antennas were moved inside the wetland on June 22 and retrieved on October 10, and 15 unique RZ PIT tags were detected in this timeframe. Of those, 12 were detected within the last month of sampling and one of these fish was captured during draining. Since the remainder were neither detected nor captured, they were either preyed upon, possibly by otters or pelicans, or stranded when the wetland was drained.

Sampling Results for Other Wetlands

Leota Bottom

Fish sampling was not conducted in Leota Bottom in 2023, mainly due to GRB FWCO being short staffed throughout the field season.

Above Brennan

Fish Sampling was not conducted in the Above Brennan wetland in 2023, mainly due to GRB FWCO being short staffed throughout the field season.

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Stirrup

U.S. Bureau of Reclamation completed the construction of a water control structure in the Stirrup wetland prior to spring runoff in 2022. In addition, the Bureau of Land Management (BLM) began managing this wetland for RZ last year. Green River Basin FWCO assisted the BLM at this site by processing light trap samples, deploying portable PIT tag antennas outside the water control structure, providing an irrigation pump, and occasionally sending personnel to assist with RZ and wetland management. For more information regarding 2023 results, please see the Project 178 Annual Report.

Sheppard Bottom

Filling of Sheppard Bottom unit 3 began on May 23 when mean daily discharge in the Green River at Ouray, Utah measured 19,040 cfs. Ouray National Wildlife Refuge staff deployed 3 light traps within this wetland over the course of 4 nights between June 14 and June 21; no larval fish were captured. Fyke nets were set from September 18-22 to further determine RZ presence, however, none were caught. Fathead minnow dominated the nonnative species captured, followed by black bullhead, black crappie, common carp, and red shiner. Estimated nonnative fish biomass removed amounted to 68.4 kg.

Shortcomings

When discharge at the USGS Green River near Ouray reaches and exceeds approximately 13,000 cfs, the large, unscreened downstream breach at Johnson Bottom allows free passage of all fishes between the Green River and the wetland. Field crews noted that young-of-year common carp were by far the most numerous nonnative fish species while draining the wetland this year, yet no adult carp were captured. Although not directly observed, it appears likely that adult carp entered Johnson Bottom through this breach and spawned in the wetland and/or carp larvae were entrained from the Green River. In addition, this breach places a limit on water depth since after peak flow, the wetland will lose water into the Green River until the breach is no longer connected.

Old Charley also began filling prior to detection of RZ larvae in light traps at Cliff Creek this year. Runoff from the Yampa River that is high enough to connect middle Green River wetlands prior to RZ emergence occurs in most years, so ensuring that existing wetland water control structures do not leak is critical. Although gates were closed at Old Charley in mid-April, stop logs were not inserted into the ageing culvert. As the Green River rose, it initially filled the fish kettle and eventually over topped the interior wall and filled the wetland. Despite this oversight, screens prevented large-bodied fish entry through this culvert.

Dense willows have become established in the Johnson Bottom filling/drainage canal since 2020 which likely contributed to increased sedimentation which reduced the gradient in the canal. In addition, multiple large trees have fallen across the canal. It also appears that sedimentation in the interior canal has reduced gradient inside the wetland. These gradient reductions have decreased drainage rates to the point where the decision was made to abandon our efforts in early November despite the wetland being far from drained. In its current state, draining at Johnson Bottom to the point where RZ are forced to move into the fish kettle cannot be achieved.

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Additional noteworthy observations:

Ouray National Wildlife Refuge continues seeking input to improve wetland conditions for endangered fish management. U.S. Fish and Wildlife Service Water Resources Division hydrologists surveyed the Johnson Bottom fish kettle and drainage canal in November 2023 to determine the current gradient downstream of the exterior gate and how much sediment will need to be removed to improve drainage.

The species composition in the wetlands sampled includes fish species less commonly observed in the main channel. Wetlands can serve as preferred habitat where these species will reproduce and persist in the basin. They can also become a source to reintroduce these species back into main channel habitats where they might not otherwise occur.

Recommendations:

- (1) Excavate and re-grade the Johnson Bottom Canal as soon as conditions permit. This could be implemented with Green River Basin FWCO and Ouray National Wildlife Refuge staff and heavy equipment. The Johnson Bottom canal has not been excavated since 2015. Noticeable sediment deposition has occurred since then and is the most likely culprit of the slow drainage rates observed in 2023.
- (2) Investigate using detection and capture methods beyond light traps and seining at Johnson-Bottom and Old Charley. For example, environmental DNA (eDNA) could determine if RZ and/or nonnative fishes were present throughout the growing season and would not require capturing or handling fish.
- (3) Consider filling breaches that allow nonnative fishes to enter Johnson Bottom and Old Charley Wash wetlands and decrease water depth potential.
- (5) Investigate techniques to control or eliminate nonnative fish populations that might overwinter in wetlands in order to reduce their numbers before river connection, including chemical methods.
- (6) Assist Ouray National Fish Hatchery and the Bureau of Land Management with assessing the viability of the Pariette Wash wetland complex as an off-channel habitat for bonytail. This site holds a perennial source of water, water within the wetland can be directed to where it is needed, and perhaps most importantly, it is isolated from nonnative fishes in the nearby Green River.

Project Status:

Ongoing.

FY2023 Budget Status

Funds Provided: \$60,048

Funds Expended: \$60,048

Difference: \$0

Percent of the FY 2023 work completed, and projected costs to complete: 100%

Recovery Program funds spent for publication charges: -X-

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Status of Data Submission: Data will be uploaded into STReAMS by the end of November 2023.

Signed:

Christian Smith
Principal Investigator
November 15, 2023

Dave Beers
Principal Investigator
November 15, 2023

Table 1. Summary of 2023 endangered fish captures in the Johnson Bottom and Old Charley wetlands.

Wetland	RZ larvae	RZ juvenile (n)	RZ adult (n)	BT adult (n)	BT juvenile (n)
Johnson Bottom	0	5	1	59	13
Old Charley	0	7	1	0	0
Total	0	12	2	59	13

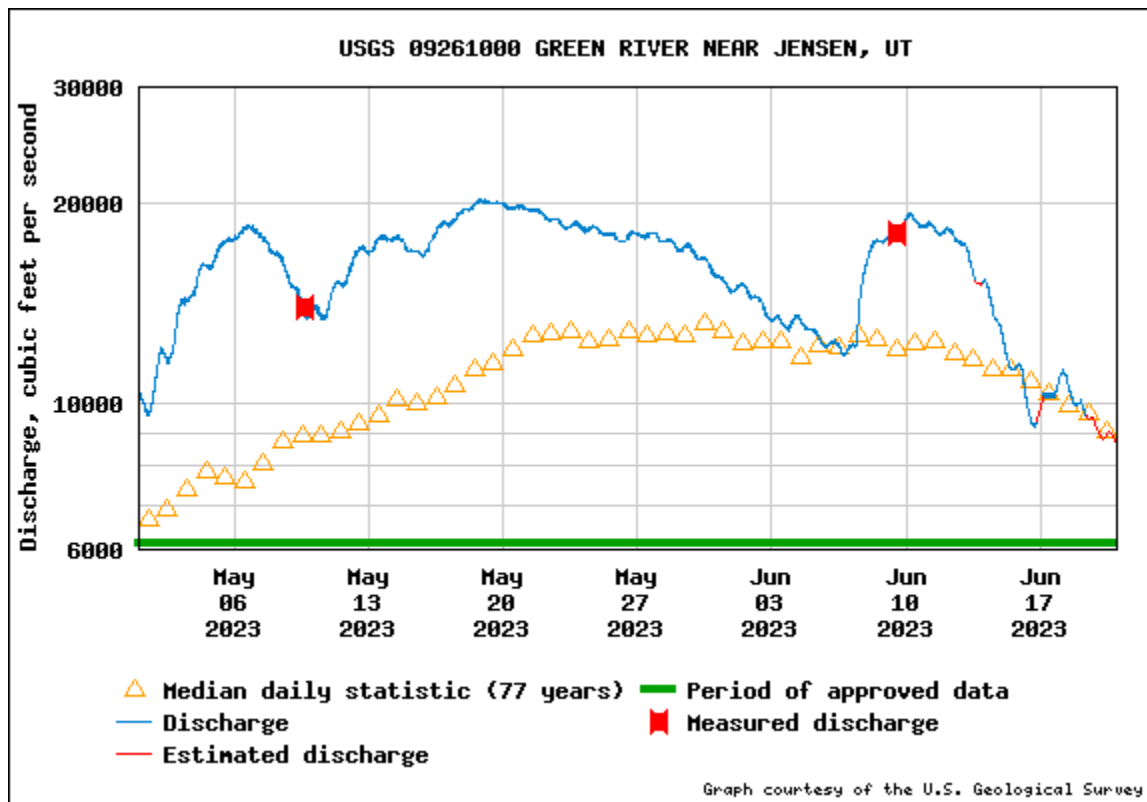


Figure 1. USGS Green River near Jensen discharge, May 1-June 15, 2023.