

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

FY 2020 ANNUAL REPORT

PROJECT: FR-164

Project Title

Middle Green River Floodplain Sampling and Management

Bureau of Reclamation Agreement Number:

R20PG00024

Project/Grant Period:

Start date: 10/1/2019

End date: 9/30/2024

Reporting period end date: 09/30/2020

Is this the final report? Yes _____ No X

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Abstract:

Spring and early summer fish monitoring in middle Green River floodplain wetlands was limited by delayed seasonal employee onboarding which resulted from COVID-19 concerns. However, management of the water control structures at Johnson Bottom and Old Charley Wash was deemed mission critical by U.S. Fish and Wildlife Service regional director in early May. This work was performed by one person to limit the risk of spreading COVID-19 between employees and allowed for the coordinated filling of these wetlands. Razorback sucker that were entrained in the Sheppard Bottom and Stirrup wetlands in 2019 were captured in late May and early June 2020, thus demonstrating overwinter survival. Young-of-year razorback sucker were caught in August and October in Johnson Bottom and Old Charley Wash, thereby demonstrating successful entrainment and survival in these wetlands in 2020.

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.e. Stirrup

II.A.5.f. Other sites

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V.D.1. Implement razorback sucker monitoring plan

Accomplishment of FY 2020 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 (RZB) drift through the use of light traps, starting each spring in May or as water temperatures indicate spawning is imminent. The first detection of RZB larvae was on May 19 at Cliff Creek and the Stewart Lake outlet, when mean daily flow at Jensen, UT was 9,759 cfs and mean water temperature was 15.2°C. The Bureau of Reclamation (BR) increased Flaming Gorge Dam releases to 8,600 cfs on 27 May in response to increasing RZB larval captures in light traps and maintained bypass flows through 10 June. During this time, the Green River at Jensen peaked at 18,300 cfs on 4 June, and flows stayed above 18,000 cfs for under 12 hours. In comparison, discharge at Jensen remained above 18,000 cfs for nine days in 2019. 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 still pending laboratory verification, which is currently in process.

Johnson Bottom Wetland Management and Sampling Results

Water Management

Fish access was not screened from the river through the large, downstream breach despite building a sandbag wall, which failed during peak flows. Up to this point, we managed water through the screened canal control structure starting on 22 May. The summer of 2020 was very dry which caused markedly rapid evaporative water losses in many neighboring wetlands at Ouray National Wildlife Refuge. However, supplemental water was not required at Johnson Bottom, and we began draining the wetland on 28 September, when water depth measured 2.8 feet. Draining was ceased and the kettle gates were closed on 23 November, however the water depth still measured 1.36 feet. The decision to stop draining was made because the wetland had only dropped 0.24 feet between 23 October and 23 November, RZB had not been captured since 28 October, and ice was becoming thick enough to prevent closure of the gates.

Fish Sampling

Sampling was conducted with 10 fyke nets 5-6 August to determine whether RZB were entrained during peak flows and survived in Johnson Bottom. Summer sampling was limited to 24 hours due to concerns for fish health and survival given prior experience with high juvenile mortality while handling fish when air temperature is near or above 100° F. In total, 120 RZB (range= 45-105 mm TL) were captured during this sampling event. A similar number of fish (n= 115) were caught over approximately 72 hours in July 2015, but unfortunately razorbacks were not caught while draining the wetland that fall.

Fish sampling resumed when the water control structure was opened to drain the wetland on 24 September and continued periodically until 19 November. This sampling involved pulling seines in the fish kettle, which is isolated between two water control gates, and within the canal on the wetland side of the kettle. The downstream gate (during wetland draining) is screened with 6mm x 75mm slots to

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hold fish in the kettle. Over the 8 weeks of sampling during draining, we were able to catch 56 RZB, which were then transferred to the Green River near the mouth of the wetland canal outlet. The RZBs were all age-0 fish, and since larval RZB were not stocked to the wetland in 2020, all fish were of wild origin. These RZBs had a mean total length (TL) of 105 mm (range= 66-172 mm TL), and we PIT-tagged 39 RZBs that were larger than 90 mm TL.

The majority of fish captured at Johnson Bottom in autumn were nonnative species consisting of common carp, red shiner, green sunfish, fathead minnow, white sucker, black bullhead, black crappie, and sand shiner. The combined mass of all nonnative fish removed totaled 229.4 kilograms. In comparison, RZB total mass amounted to 742 grams. Other nonnative species that have been captured in this wetland in past years such as channel catfish, yellow perch, and walleye were not caught in 2020.

Old Charley Wash Wetland Management and Sampling Results

Water Management

This was the second year Old Charley Wash (aka Woods Bottom) has been managed as RZB nursery habitat. Wetland filling was initiated on 22 May, and the water control structure was closed on 5 June. During the filling period, plywood boards used to seal a decommissioned filling culvert connecting the kettle and Green River failed. This unscreened breach allowed entry of larger nonnative fishes into the wetland, and despite attempts to seal it after peak flows, water leaked from the wetland through this structure. Supplemental water was added in August because of this failure, leaks around other gates in the water control structure, and evaporative losses. Despite pumping water into Old Charley for over one week, gains in water elevation were negligible which caused the draining period to last a matter of days instead of weeks.

Fish Sampling

Mid-summer sampling was conducted with one fyke net on 5 August to determine whether larval RZB were entrained during peak flows and survived in Old Charley. The fyke net was deployed in the wetland within 50 feet of the kettle when supplemental water was being added, and the net location was chosen because current from pumping was apparent. We surmised that the oxygenated supplemental water from the Green River could attract RZB. The fyke net was checked after one hour, and three RZB (range = 74-88 mm TL) were captured. Given concerns related to capture and handling-induced stress and since our primary goal was to detect, not quantify RZB in this wetland, we decided that further sampling was not necessary.

Fish sampling was resumed on 23 September after draining began, commenced on September 25, and primarily entailed seine hauls in the fish kettle and inside canal. In comparison, the 2019 draining period lasted 28 days (Smith and Beers 2019). In total, six RZB (range = 52-86 mm TL) were captured during the draining period. These fish were released into the Green River near the outlet canal mouth however, none of them were PIT-tagged because they were too small.

As with Johnson Bottom in 2020, nonnative fishes comprised the majority of captures at Old Charley. Nonnative species caught and removed include common carp, black bullhead, white sucker, fathead minnow, black crappie, red shiner, green sunfish, brook stickleback, Iowa darter, sand shiner, and

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channel catfish. Many adult common carp were removed from the kettle and wetland canal, but they were not weighed or enumerated. Small-bodied nonnative fish combined mass amounted to 118.3 kilograms, and the total mass of the six RZB caught amounted to 20 grams. Considering the similar Johnson Bottom razorback sucker-nonnative fish mass comparison, this illustrates the competitive challenges RZB face in these wetlands.

Sampling Results for Other Wetlands

Leota Bottom

Evaporative water losses in Leota Bottom prompted Ouray National Wildlife Refuge to move water from the wetland complex's upper units to its lower units in September. Green River Basin FWCO was aware of potential RZB and/or bonytail presence in the upper units, so 13 fyke nets were set in Leota unit 4 (L4) September 14-17 while water was being moved to Leota unit 6 (L6). Endangered fish were not captured during this effort, however 146 kilograms of small-bodied non-native fish were removed. Non-native species removed include fathead minnow, green sunfish, black bullhead, common carp, brook stickleback, and red shiner.

Above Brennan

Twelve fyke nets were set in the Above Brennan wetland on 24 August to determine razorback sucker presence. All nets were pulled on 25 August despite a lack of RZB captures because of high capture mortality of nonnative fish, which is likely attributed to low water level, high water temperature, and possibly low dissolved oxygen. The mass of all small-bodied non-native fish removed during this sampling event totaled 55.4 kilograms.

Stirrup

September 2019 sampling of the Stirrup wetland yielded 12 RZB which were returned to the wetland to determine if these fish would survive through winter. As with other wetlands that GRB- FWCO samples, extended high flows in the Green River in 2019 filled the Stirrup enough that adequate water depth was maintained through fall.

Green River Basin FWCO, along with the Bureau of Land Management Vernal, returned to the Stirrup in early June 2020 and set 10 fyke nets to determine if RZB successfully overwintered. A total of four RZB (range= 117-175 mm TL) were captured during four days of sampling. These fish were PIT-tagged and released in the Green River approximately one half-mile downstream of the Stirrup. In addition, a bonytail that was stocked by Ouray National Fish Hatchery at Baeser Wash on 18 June 2019 was captured and released in the Green River during this sampling period.

Sampling resumed at the Stirrup on 21 September and continued through 25 September. Since the wetland was very shallow due to scant runoff additions and summer evaporative water losses, only seven fyke nets were deployed in the deepest locations in the wetland. The intent of this sampling was to determine if larval RZB were entrained during the brief connection period and to capture more 2019-spawned RZB. No RZB and relatively few (combined mass= 13.5 kilograms) non-nonnative fish were captured during this sampling event. Non-native fishes removed include fathead minnow, green sunfish, black bullhead, common carp, and red shiner. The minimal catch and shallow water depth at the Stirrup in September 2020 indicates a potential reset of the wetland before next year's runoff period, which could promote young-of-year RZB survival in 2021.

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Sheppard Bottom

Sheppard Bottom was renovated in spring of 2017 to improve its connection to the Green River during spring runoff, and during this construction a fish screen was installed between S2 (unit connected to the river via breach) and S3 (interior unit filled through water control structure from S2). Similar to the Stirrup, larval RZB were entrained to Sheppard Bottom during 2019 runoff then captured and returned to the wetland later in 2019 to determine if they could survive through winter. Eleven fyke nets were set in Sheppard Bottom from 26-29 May 2020, and five RZB (range= 185-237 mm TL) were captured, thereby demonstrating overwinter survival. These fish were noticeably larger than those caught one week later at the Stirrup, which could point to the productivity of this wetland. All of these fish were PIT-tagged and released in the Green River near Sheppard Bottom.

Sheppard Bottom connected to the Green River during peak runoff but as with other wetlands, the height and duration of peak flows was lower than in 2019. Post-runoff regional climate conditions were drier and hotter than average, which reduced the depth and size of fish habitat in Sheppard Bottom compared to 2019. Crews returned to Sheppard Bottom on 14 September, deployed 13 fyke nets, and pulled the nets on 17 September. Similar to the Stirrup, fyke net locations were limited by depth, and much of the wetland was less than one foot deep. Also similar to the Stirrup, no RZB were caught during this sampling event. The combined mass of non-native fish removed amounted to 113.8 kilograms and was composed of fathead minnow, green sunfish, black bullhead, common carp, brook stickleback, and red shiner.

Shortcomings

COVID-19 induced fieldwork restrictions delayed seasonal employee onboarding and limited spring and early summer larval fish light trap sampling to Project 22f. As such, we were unable to use light traps to determine if larval RZB were entrained in wetlands in 2020. In addition, fieldwork restrictions delayed sampling at the Stirrup and Sheppard Bottom and reduced the amount of effort dedicated to capturing and translocating RZB entrained in these wetlands in 2019.

Many adult common carp were observed in the Johnson Bottom fish kettle a few days after filling was initiated. Since the Green River had not yet risen high enough to breach the river's bank on the downstream end of the wetland, we feel confident that these fish overwintered in the wetland. Non-native fish overwinter survival has previously been documented in this wetland, including adult common carp. However, the increased numbers in 2020 raised concerns of the elevated risk of larval RZB being consumed upon entry to Johnson Bottom.

Despite building a sandbag wall at the unscreened downstream breach at Johnson Bottom, this barrier failed and allowed the entry of large-bodied non-native fish into the wetland during peak flows. In addition, large congregations of pelicans were observed at Johnson Bottom and Old Charley during summer and fall. Trail cameras were set at Johnson Bottom which thoroughly documented pelicans feeding, although confirmation of RZB as their prey was not.

During peak flows, a large unscreened leak connected the Green River to the Old Charley wetland which also allowed the wetland to leak into the Green River after runoff subsided. This leak resulted from the failure of plywood boards that had been installed to seal the culvert that was used to manage

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water prior to the current water control structure. Stopping this leak required waiting until the Green River was low enough to access the culvert and reliance upon the gate on the wetland side of the fish kettle. Unfortunately, leaks were also discovered around and near this gate, so water depth inside the wetland also decreased.

Supplemental water was added at Old Charley in August, but no significant increase in water height resulted from this effort. It appears likely that the water losses resulting from the previously mentioned leaks also caused wetland soil water losses that might help maintain adequate depths during the summer and conversely would not have required saturating when pumping. At Sheppard Bottom, supplemental water was not delivered until late in the summer and despite ONWR's desire to continue filling in the fall, regional water shortages limited the amount of supplemental water available.

The elevation of the sandbar at the mouth of the Johnson Bottom drainage canal was higher in 2020 than in previous years, effectively lengthening the drainage canal over 600 feet in distance. This appeared to decrease the gradient between the fish kettle and the Green River, and consequently wetland draining was slower in 2020 than in years past. Although sandbar locations and configurations vary from year to year in the middle Green River, if the canal outlet configuration is similar in the future, draining should begin earlier in the fall. Flow rate during draining could be increased by pumping water from the fish kettle into the drainage canal as well.

Additional noteworthy observations:

Although many adult common carp were observed in the Johnson Bottom fish kettle during the filling period, none were caught during fall draining.

Recommendations:

We recommend continuing light trapping to evaluate the entrainment of RZB, as well as other native species, under the Larval Trigger Study Plan. This work provides information on presence of larval RZB in monitored floodplain habitats, which has not historically been part of the long term light trapping study under Project 22f. This information also informs which site we might sample later in summer.

Install remote water level monitoring equipment in managed wetlands. This equipment would allow managers to document water height in wetlands throughout the summer and could greatly aid in the determination of when to add supplemental water and learn more about a wetland water storage dynamics.

Continue discussions with Ouray National Wildlife Refuge concerning improvements at Johnson Bottom and Old Charley Wash. More specifically, filling breaches that allow nonnative fish to enter these wetlands in moderate to moderately high runoff years should be given serious consideration.

Investigate techniques to control or eliminate nonnative fish populations that might overwinter in wetlands in order to reduce their numbers before river connection, including genetic or chemical methods. The species composition in the wetlands sampled is similar, and comprised of fish species not 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 otherwise not occur.

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Project Status:

On track and ongoing.

FY 2020 Budget Status

Funds Provided: \$87,410

Funds Expended: \$86,673

Difference: \$737

Percent of the FY 2020 work completed, and projected costs to complete: 99.2%

Recovery Program funds spent for publication charges: -X-

Status of Data Submission:: Data will be uploaded into STReAMS by the end of December 2020.

Signed:

Christian Smith
Principal Investigator
14 December 2020

References

Smith, C. and D. Beers. 2019. Middle Green River floodplain sampling. Annual Report to the Upper Colorado Endangered Fish Recovery Program. Denver, CO.

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Table 1. Summary of 2020 fish sampling and total captures.

Wetland	RZB larvae?	RZB juvenile (n)	RZB adult (n)	BT adult (n)
Above Brennan	NA	0	0	0
Johnson Bottom	NA	176	0	0
Leota Bottom	NA	0	0	0
Old Charley	NA	9	0	0
Sheppard Bottom**	NA	5	0	0
Stirrup**	NA	4	0	1
Total	0	194	0	1

*NA indicates sampling was not conducted.

**All RZB juveniles caught in the Stirrup and Sheppard Bottom in 2020 were age-1 (not age-0) fish.

Figure 1. Size distribution of razorback sucker caught in the Johnson Bottom wetland in September and October 2020.

