

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

FY 2021 ANNUAL REPORT

PROJECT: 172

Project Title

Remote monitoring of endangered fishes in the middle Green River

Bureau of Reclamation Agreement Number:

R19AP00059

Project/Grant Period:

Start date: 10/01/2018

End date: 09/30/2023

Reporting period end date: 09/30/2021

Is this the final report? Yes _____ No X

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Abstract:

In order to increase encounters of endangered fish in the Green River sub-basin, we deployed remote submersible PIT antennas in the middle Green River to complement Recovery Program Project #169. Seven antenna sites included known and suspected razorback sucker spawning locations and flooded tributary mouths. In 2021, remote submersible antennas logged 4,720 total detections, comprised of 1,239 unique individuals. We confirmed species identity for 1,169 of these individuals referencing STReaMs database records, indicating that we detected 1,114 razorback sucker, 45 Colorado pikeminnow, five flannelmouth sucker, two roundtail chub, two bluehead sucker and one flannelmouth X razorback sucker hybrid. For the fourth consecutive year, this project yielded a number of native fish detections, predominately razorback sucker.

Study Schedule:

2018-2021

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.A.1.a.(2) Investigate improving recapture rates through passive PIT tag monitoring, nets, etc. to improve population abundance estimates.

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- V.A.3. Collect and submit data according to standard protocol (e.g., location, PIT tag #, length, weight, etc.) on endangered fish encountered in all field activities in order to provide annual information on population status outside of formal population estimates.
- 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

- V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring and data management).
- V.D.1. Implement razorback sucker monitoring plan.

Accomplishment of FY 2021 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task 1. Submersible antenna deployment, maintenance, and downloads.

Passive detection of PIT-tagged fish at Razorback Bar (river mile [RM] 310.9) is undertaken annually by the Green River Basin Fish and Wildlife Conservation Office (GRB-FWCO) under Recovery Program Project #169 and has proven to be an efficient means of detecting PIT-tagged razorback sucker (*Xyrauchen texanus*; Smith et al. 2018; Webber and Beers 2014). To compliment this project, we deployed remote submersible PIT antennas in the middle Green River to further increase razorback sucker encounters. Antennas were deployed at cobble substrate microhabitats downstream of Razorback Bar each spring from 2018 until 2021 (Partlow et al. 2018). Following antenna downloads, we associated PIT-tagged individuals with deployment records and past encounters cataloged in the Recovery Program's STReaMS database (STReaMS, 10/27/2021). Unique detections with associated records are quantified by site in Table 1.

Escalante Ranch

For consistency, in 2020 we deployed antennas in the same three Escalante Ranch locations as in 2018 and in 2019 (Elbin and Partlow 2020; Partlow et al. 2018). These locations included sites on the right bank at RM 309.7 (Escalante Ranch #1), RM 309.5 (Escalante Ranch #2) and the left bank at RM 306.8 (Escalante Bar). However, in 2021, the antenna placed at RM 309.5 in previous years was moved to a downstream location atop a cobble spit off the out flow from Red Wash, also located on river right within Dinosaur National Monument. This antenna, referred to as "Red Wash Spit", was placed at RM 308.9.

We deployed antennas at Escalante Ranch #1, Red Wash Spit, and Escalante Bar on 08 April 2021. Antennas placed at Red Wash Spit and Escalante Ranch #1 were removed 13 June 2021. Due to fluctuations in hydrology, Escalante Ranch #1 antenna was exposed and ceased detections after 06 June 2021. Furthermore, the Escalante Ranch #1 antenna was buried under several feet of sand below the water surface and could not be removed until water levels dropped and the sandbar became exposed. The buried antenna recorded its final detection 10 June 2021. At Escalante Ranch #1 we associated detections with 161 individual razorback sucker. The antenna at Escalante Bar detected 107 razorback sucker, two Colorado pikeminnow (*Ptychocheilus lucius*), and one flannelmouth sucker (*Catostomus latipinnis*; Table 1). Located between these two antennas, the exploratory antenna placed on Red Wash Spit detected 739 razorback sucker. This antenna also detected a diverse assemblage of native fishes including 22 Colorado pikeminnow, three flannelmouth sucker, two bluehead sucker (*C. discobolus*), one flannelmouth sucker X razorback sucker hybrid, and one roundtail chub (*Gila robusta*; Table 1).

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Other antenna locations

In an attempt to increase detections of Colorado pikeminnow and bonytail (*G. elegans*), and to provide additional opportunities for razorback sucker detections, we deployed antennas in flooded tributary mouths and backwater habitats. These sites included Ashley Creek (RM 299.0) and Brush Creek (RM 304.6).

A single antenna was deployed in Ashley Creek from 03 May until 14 June 2021. At this site the submersible antenna recorded 536 detections, comprised of 15 unique individuals. The unique individuals included 11 razorback sucker, three Colorado pikeminnow and one roundtail chub (Table 1). In previous years this antenna yielded higher numbers of detections and unique individuals. For example, 732 razorback sucker associated with unique tags were detected in Ashley Creek in 2020 (Elbin and Partlow 2020).

We also deployed an antenna near the mouth of Brush Creek from 03 May until 14 June 2021. This antenna had a total of 1,569 detections, including encounters from 150 razorback sucker and five Colorado pikeminnow (Table 1).

Additionally, an antenna was deployed at Placer Point (RM 315.9), in Dinosaur National Monument, where Colorado pikeminnow have been detected in the past (Partlow et al. 2018). From 14 June 2021 to 17 August 2021 this antenna recorded 25 unique tags, 16 of which were associated with Colorado pikeminnow (Table 1).

Finally, one antenna was deployed in the Stewart Lake outlet canal (RM 299.2) near the control gate structure to document fish attempting to enter the wetland. After several weeks of deployment in May, no detections were recorded at this antenna and it was removed. Stewart Lake was not inundated this spring, and it is important to note that connection from Stewart Lake drain to the Green River was minimal at lower water levels likely prohibiting access to the canal.

Additional noteworthy observations:

We encountered fewer total detections in 2021 than in all previous years of the study (Elbin and Partlow 2020; Elbin et al. 2019; Partlow et al. 2018). We had a combined total of 4,720 detections, 1,239 of which were non-duplicate tags with associated data on the STReaMs database (STReaMS, 10/27/2021). In 2021, we were able to associate tags to a similar number of unique individual fish as compared to the 1,353 in 2020 (Elbin and Partlow 2020). Although, many fish were detected multiple times at one antenna over the duration of the project, 74 fish were encountered at more than one antenna. Despite fewer total detections than in 2020, total unique razorback sucker detections were similar in 2021 (Table 1).

We compared overlap of individuals that were also detected with GRB-FWCO's project #169 antennas. In 2018 and 2019, over half of the individual fish detected were unique to project #172 antennas (Elbin et al. 2019; Partlow et al. 2018). However, only 444 individuals detected on project #172 antennas also visited project #169 antennas in 2021 (C. Smith, GRB-FWCO, personal communication).

Overall, fewer native fish detections occurred in 2021 than in previous years of the study. Similar to previous years, Colorado pikeminnow were detected by our submersible antenna located at Placer Point (16 of 54 detections). However, the trial antenna location at Red Wash Spit yielded the overall highest number of unique individuals as well as the greatest number of individual Colorado pikeminnow (22 of

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54 unique individuals detected; Table 1). Although this was the first attempt to encounter fish via submersible antennas at this location, if funding allows in the future an antenna placed in this proximity could continue to yield valuable information of native fishes utilizing the habitat.

Recommendations:

Antenna detections within close proximity of Stewart Lake Waterfowl Management Area provide invaluable information about wild-spawned razorback sucker released during Recovery Program Project #165, returning to natal habitats. We recommend incorporating antennas at the Stewart Lake drain and Ashley Creek based on proximity to the wetland under the scope of project #165.

Passive detections of razorback sucker can be a cost-effective means of improving population and vital rate estimation (i.e., Zelasko et al. 2021). This study has demonstrated that additional antennas in the Escalante Bar spawning area, as well as antenna deployments in tributary mouths, can be an effective means of increasing reencounters of tagged fish. Relatively low overlap between antennas highlights the importance of using a widespread array to increase the probability of encountering wild-spawned razorbacks released as young-of-year during wetland projects (Partlow et al. 2019). These findings should be considered in the event of future strategic planning for placement of submersible antennas during basin-wide population or survival estimation and/or to enhance our knowledge of wild-spawned razorback sucker previously reared in wetland habitats returning as spawning adults.

Project Status:

Terminated; future implementation pending reinstatement based on funding outlook.

FY 2021 Budget Status

Funds Provided: \$9,092

Funds Expended: \$9,092

Difference: \$0

Percent of the FY 2021 work completed, and projected costs to complete: 100%

Recovery Program funds spent for publication charges: \$0

Status of Data Submission

Data will be submitted to the STReAMS database manager by 07 January 2022.

Signed:

Keena R. Elbin & Michael S. Partlow

Principal Investigator

11/16/2021

Works Cited

Elbin, K.R., M.S. Partlow. 2020. Remote monitoring of endangered fishes in the middle Green River. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

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Webber, P.A. and D. Beers. 2014. Detecting razorback suckers using passive integrated transponder tag antennas in the Green River, Utah. *Journal of Fish and Wildlife Management* 5:191-196.

Zelasko, K. A., K. R. Bestgen, and G. C. White. 2021 (In Review). Incorporating passive antenna detections with physical recaptures improves survival rate estimates for razorback suckers *Xyrauchen texanus* stocked in the upper Colorado River basin. Final report to the Upper Colorado River Endangered Fish Recovery Program. Denver, Colorado. Larval Fish Laboratory Contribution 225.

Table 1.

Remote submersible PIT antenna locations and detections by species in the middle Green River in 2021. Unique detections and associated individuals (STReAMS, 10/27/2021) are reported on a site by site basis. Nearest river mile (RM) is included next to site name for reference.

Site	Species	Unique Detections
Ashley Creek (RM 299.0)	Razorback sucker	11
	Colorado pikeminnow	3
	Roundtail chub	1
Brush Creek (RM 304.6)	Razorback sucker	150
	Colorado pikeminnow	5
Escalante Bar (RM 306.8)	Razorback sucker	107
	Colorado pikeminnow	2
	Flannelmouth sucker	1
Escalante Ranch #1 (RM 309.7)	Razorback sucker	161
	Colorado pikeminnow	6
	Flannelmouth sucker	1
Red Wash Spit (RM 308.9)	Razorback sucker	739
	Colorado pikeminnow	22
	Roundtail chub	1
	Bluehead sucker	2
	Flannelmouth sucker	3

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Site	Species	Unique Detections
	Flannelmouth x razorback sucker	1
Placer Point (RM 315.9)	Colorado pikeminnow	16
	Razorback sucker	4