

UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

FY 2020 ANNUAL REPORT

PROJECT: 169

Project Title

Detecting endangered fishes using PIT tag antenna technology in the Upper Colorado River Basin

Bureau of Reclamation Agreement Number:

R20PG00024

Project/Grant Period:

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Is this the final report? Yes No

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Abstract:

Portable PIT tag antennas allow researchers to detect PIT-tagged fish in remote locations with minimal infrastructure, labor, or maintenance. During 2020, the Green River Basin Fish and Wildlife Conservation Office deployed portable antennas at three known spawning locations in the Green and Yampa Rivers in Dinosaur National Monument with the intention of detecting as many endangered razorback sucker, Colorado pikeminnow, and bonytail as possible. Out of 1,229 detections, we were able to identify 428 individual or unique tags. These unique tags represented 262 razorback sucker, 119 Colorado pikeminnow, five bonytail, 19 roundtail chub, 13 flannelmouth sucker, 9 bluehead sucker, and one bluehead x razorback sucker hybrid.

Study Schedule:

2012-Ongoing

Relationship to RIPRAP:

General Recovery Program Support Action Plan

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

Green River Action Plan: Mainstem

V.D.1. Implement razorback sucker monitoring plan.

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

Razorback Bar PIT tag antenna monitoring

The Green River Basin Fish and Wildlife Conservation Office (GRB FWCO) deployed six stand alone or “submersible” antennas on 22 May at Razorback Bar on the Green River, where the majority of PIT tag detections in this study have occurred (Figure 2, Smith et al. 2015, Smith et al. 2016, Smith et al. 2017, Smith et al. 2018, Smith and Beers 2019). COVID-19 fieldwork restrictions pushed the 2020 deployment date at least six weeks later than in previous years. Three antennas were pulled on 8 June (n=2) and 13 June (n=1) and moved to Cleopatra’s Couch bar on the Yampa River on 17 June, and the remaining three antennas were retrieved on 2 July. During this period we detected unique PIT tag codes associated with 262 razorback sucker, 27 Colorado pikeminnow, 3 bonytail, one roundtail chub, 9 flannelmouth sucker, 9 bluehead sucker, and 1 bluehead x razorback sucker hybrid (Table 1).

Razorback sucker

Fewer razorback sucker were detected at Razorback Bar in 2020 than in any year of this study. This should not be viewed as an indication of fewer razorback suckers in the sampling reach this year, but instead the result of an abbreviated and later sampling period. Furthermore, larval razorback sucker were first detected in light traps (Project 22f) in Cliff Creek (RM 304.7) on 19 May. Accordingly, spawning activity near Razorback Bar had been occurring for weeks prior to initial antenna deployment on 22 May given the delay between spawning and larval emergence. Unlike previous years where most detections were associated with fish stocked at least four years prior, razorback suckers stocked within the past three years comprised the majority of detections in 2020. Additionally, the distribution of stocking year classes was not normal as in the past (Figure 3; Smith et al. 2015, Smith et al. 2016, Smith et al. 2017, Smith et al. 2018, Smith and Beers 2019), and is likely the result of a smaller sample size.

Razorback suckers previously detected at Razorback Bar that were detected again in 2020 include 50 in 2019, 33 in 2018, 23 individuals in 2017, 16 in 2016, 8 in 2015, 3 in 2014, 6 in 2013, and 3 in 2012. In total, 32.4 percent (N = 84) of the razorback sucker detected at Razorback Bar in 2020 were previously detected by antennas at this spawning location at least once since 2012. Webber and Beers (2014) found that the majority (93%) of razorback sucker detected at Razorback Bar in 2012-2013 had not been previously captured during active river sampling. The majority, or 67.5 percent, of razorback suckers detected in 2020 had not been captured since stocking, and 39.3 percent had neither been captured nor previously detected by PIT tag antennas. The latter proportion decreased markedly from 73 percent in 2017, possibly the effect of more extensive PIT tag antenna coverage at Razorback Bar and throughout the Green River Basin in the last three years.

Ouray National Fish Hatchery (ONFH) stocked 95.8 percent (N=251) of the razorback suckers detected at Razorback Bar, and all of these fish were stocked in the Green River between Rainbow Park and Green River, Utah. A total of 9 fish (3.4 percent) were tagged by Utah Division of Wildlife Resources Vernal and GRB FWCO field crews after being captured in the field. Among these fish was an individual that was captured in July 2015 as a likely age-1 fish, measured at 281 mm total length, and returned to Stewart Lake. This fish was then recaptured on 6 September 2015 in Stewart Lake and released in the Green River. Subsequent encounters include detection and capture in the Stewart Lake

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outlet in spring 2017 and detection at the same location in 2019, which were noted in past reports (Partlow et al. 2019, Schelly and Breen 2015). Given that this fish has been at large in the Green River since September 2015 and was detected at Razorback Bar during the 2020 spawning season, this could be the first documentation of a wild-spawned Stewart Lake razorback sucker recruiting to the spawning population.

Colorado pikeminnow

Twenty-seven Colorado pikeminnow were detected at Razorback Bar in 2020 compared to 54 in 2019. Unlike most razorback sucker, all Colorado pikeminnow in the Upper Green River Basin are reared in the wild and PIT-tagged by field crews. Excluding two fish missing tag deployment records, the majority (N = 20) of Colorado pikeminnow detected at this site in 2020 were tagged in the Green River between RM 38.5 and RM 329.2. The five remaining traceable individuals were tagged in the White River between RM 0.8 and RM 97.0.

Bonytail

Razorback Bar antennas detected tags from 3 bonytail, all of which were stocked at Rainbow Park (RM 329.5) in September 2019.

Other species

Razorback Bar PIT tag detections associated with other species include 9 flannelmouth sucker, 9 bluehead sucker, one bluehead x razorback sucker, and one roundtail chub (Table 1). All were PIT-tagged by UDWR Vernal except for the roundtail chub which was tagged by GRB FWCO in the Yampa River in 2017.

Echo Park PIT tag antenna monitoring

The spawning bar that we refer to as Echo Park Bar is located 0.3 miles upstream from the Green-Yampa River confluence, and three submersible antennas were set at this location from 2 June to 10 July. Access to this site prior to Project 110 electrofishing passes entails a one-mile walk from the Echo Park road. Pack rafts were used to set two antennas off the right shore of the Yampa River in 2020.

Although rare, the majority of razorback sucker captures on the Yampa River in recent years have occurred at or near this gravel bar, and researchers documented spawning at this site prior to the razorback sucker's Federal listing under the Endangered Species Act in 1991 (Tyus and Karp 1990). In total, 58 identifiable unique tags were detected at Echo Park Bar in 2020, consisting of 47 Colorado pikeminnow, 2 bonytail, 5 roundtail chub, and 4 flannelmouth sucker (Table 2).

Of the 47 Colorado pikeminnow detected at Echo Park Bar in 2020, 37 were PIT-tagged in the Green River (RM 36.1 – RM 353.1), four in the Yampa River (RM 8.7 – RM 73.2), two in the White River (RM 18 and RM 19.2), and one in Vermillion Creek. Deployment records do not exist in the STReAMS database for the two remaining PIT tags. Twenty of the 47 Colorado pikeminnow detected at Echo Park Bar in 2020 have not been captured since they were PIT-tagged, yet all but three of these fish had been

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detected by antennas prior to 2020. Additionally, thirteen of the Colorado pikeminnow detected at Echo Park were also detected at Cleopatra's Couch in 2020.

The two bonytail detected at Echo Park Bar in 2020 were stocked at Echo Park (Green River RM 344) on 11 August 2015 and Castle Park (Yampa RM 11.8) on 7 September 2016. Although bonytail detections at Echo Park were not numerous, these fish demonstrated four or five years of overwinter survival. The bonytail that was stocked at Echo Park was also detected at this site in 2019, however on an antenna on the opposite side of the river, which hints at this fish being resident in the area.

All roundtail chub (n=5) detected by Echo Park Bar antennas in 2020 were PIT-tagged within 15 river miles of this monitoring site, two had been captured since tagging, and three had previously been detected by PIT tag antennas in the Yampa River.

Cleopatra's Couch Bar

Cleopatra's Couch Bar is located at Yampa River mile 16.5 and is one of two gravel bar complexes in the Upper Green River Basin that have been extensively documented as Colorado pikeminnow spawning locations. Three submersible antennas were deployed at or near this spawning bar on 19 June and retrieved on 19 July because of dropping flows on the Yampa River. Most of the deployment, data retrieval and maintenance of these antennas was conducted concurrently with Project 110 (Lower Yampa Nonnative Management). These antennas allowed the collection of presence-absence information pertaining to Colorado pikeminnow at this spawning bar that otherwise would not have occurred because GRB FWCO field crews do not shock this reach due to the potential for electrofishing-induced spawning disruption.

In total, we were able to locate codes for 79 individual fish, which consisted of 64 Colorado pikeminnow, one bonytail, and 14 roundtail chub (Table 3). The majority (67.2%, n= 43) of the 62 Colorado pikeminnow with tag deployment records were first encountered in the Green River (RM 18.0-347.1), and 13 individuals were tagged in the Yampa River (RM 0.2-73.2). There were also three fish that were PIT- tagged in the White River (RM 18.0, RM 19.2, and RM 97.0), one in Vermillion Creek, and one in the Colorado River (RM 40.7). The latter individual had not been encountered since it was PIT-tagged in April 2010.

Twenty-six of the Colorado pikeminnow detected in 2020 were also detected at this site between 2015 and 2019, five individuals have been detected four different years, and four fish's PIT-tags were recorded in three separate years. Among the Colorado pikeminnow detected at Cleopatra's Couch this year were 13 fish that were also recorded at Echo Park Bar and five fish at Razorback Bar in 2020. The maximum time at large without capture for a Colorado pikeminnow detected at Cleopatra's Couch in 2020 was 13 years for a fish tagged by GRB FWCO (formerly known as Colorado River Fish Project Vernal) in April 2007 at Green River RM 197.8.

Among the roundtail chub detected, ten had been tagged in the Yampa River between RM 0.2 – RM 42.5 during Project 110 fish community monitoring passes and two were tagged on the Green River (RM 342.0) by the Colorado State University Larval Fish Lab (LFL) as part of Project FR-115. The remaining two PIT tags lack deployment information.

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PIT tag antenna data collected from antennas placed in locations throughout the Green River Basin combined with other encounter history data sourced from STReAMS (www.streamsystem.org), the Recovery Program's online database, can reveal Colorado pikeminnow movements not previously documented. Although this species is known to be highly migratory, this relatively new technology and data accessibility contributes important life history information that would otherwise require additional expense and time (i.e. radio telemetry). Beyond providing new life history information and increased individual detections that could contribute to more robust survival estimates, PIT tag antenna data can help guide hatchery management by providing metrics such as the relative strength of stocking year classes.

Shortcomings

COVID 19 delayed the initial deployment of PIT-tag antennas at Razorback Bar and Echo Park at least one month. We would have expected to detect many more PIT tags, especially at Razorback Bar, had we been able to deploy these antennas earlier.

Additional noteworthy observations:

The majority of Colorado pikeminnow PIT tag detections at Cleopatra's Couch in 2020 occurred on one antenna. Instead of pulling this antenna on the final Project 110 pass, with the permission of Dinosaur National Monument, we used pack rafts to retrieve it two weeks later, thereby extending the monitoring period. The pack rafts not only allowed us to run the Yampa River when flows were too low for rafts, but also access Cleopatra's Couch as a one-day trip from our office in Vernal, Utah.

Recommendations:

Continue using PIT tag antennas to monitor fish at Razorback Bar, Echo Park Bar, and Cleopatra's Couch Bar. The congregation of fish in these locations for spawning increases the chances for detection of individuals that may otherwise be spread over large distances. Furthermore, PIT tag antennas provide an unobtrusive method of monitoring endangered fishes at spawning locations as opposed to electrofishing, which can disrupt spawning behavior and egg viability.

Continuing the use of these antennas during years where razorback sucker are collected during field work could allow for better survival estimates, and perhaps derived population estimates.

If access to Cleopatra's Couch via Project 110 passes is not possible, use pack rafts to deploy, maintain, and/or retrieve PIT-tag antennas from this site.

Compare dates of high razorback sucker detections to back-calculated age for larvae collected. This may allow us to determine if these tag detections can be used as a relative index of spawning activity. It would also increase our confidence that fish detected at this location are likely engaging in spawning activity

Project Status:

On track and ongoing.

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FY 2020 Budget Status

Funds Provided: \$34,350

Funds Expended: \$33,359

Difference: \$991

Percent of the FY 2020 work completed, and projected costs to complete: 60%, \$0

Recovery Program funds spent for publication charges: -X-

Status of Data Submission

Data was uploaded into STReAMS on 9/4/2020

Signed:

Chris Smith

Principal Investigator

14 December 2020

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References

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- Schelly, R.C. and M.J. Breen. 2015. Use of Stewart Lake floodplain by larval and endangered fishes. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.
- Smith, C.T., M.T. Jones, and D. Beers. 2015. Detecting endangered fishes using PIT tag antenna technology in the Upper Colorado River Basin. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.
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- Smith, C.T., M.T. Jones, and D. Beers. 2017. Detecting endangered fishes using PIT tag antenna technology in the Upper Colorado River Basin. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.
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- Tyus, H.M. and C.A. Karp. 1990. Spawning and Movements of Razorback Sucker, *Xyrauchen texanus*, in the Green River Basin of Colorado and Utah. *The Southwestern Naturalist* 35 (4): 427-433.
- 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. Figure 1. Year of stocking for razorback sucker detected with the PIT antennas in 2014.

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Table 1. PIT tag antenna detections of unique codes per species at Razorback Bar, UT in 2020.

Species	Number of Unique Tags Detected
Razorback sucker	262
Colorado pikeminnow	27
Bonytail	3
Bluehead sucker	9
Bluehead x razorback sucker	1
Flannelmouth sucker	9
Roundtail chub	1
Total	312

Table 2. PIT tag antenna detections unique codes per species at Echo Park Bar, CO in 2020.

Species	Number of Unique Tags Detected
Colorado pikeminnow	47
Bonytail	2
Roundtail chub	5
Flannelmouth sucker	4
Total	58

Table 3. PIT tag antenna detections of unique codes per species at Cleopatra's Couch Bar, CO in 2020.

Species	Number of Unique Tags Detected
Colorado pikeminnow	64
Bonytail	1
Roundtail Chub	14
Total	79

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Figure 1. Locations of PIT tag antenna arrays set by Green River Basin FWCO in 2020 are indicated by stars. The shaded polygon shows the extent of Dinosaur National Monument.

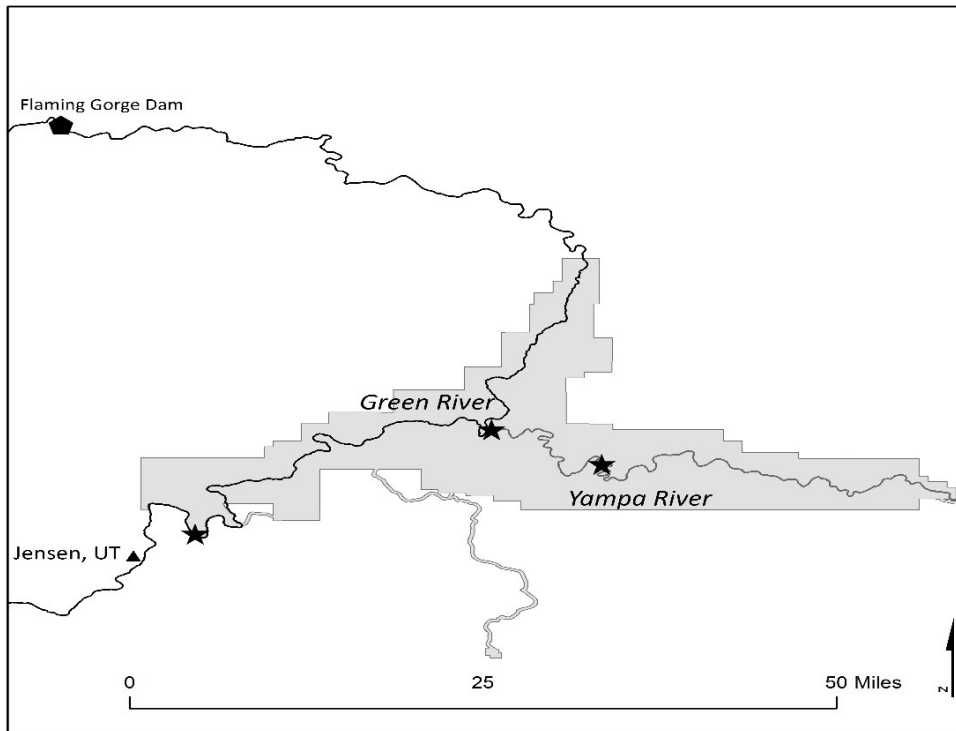
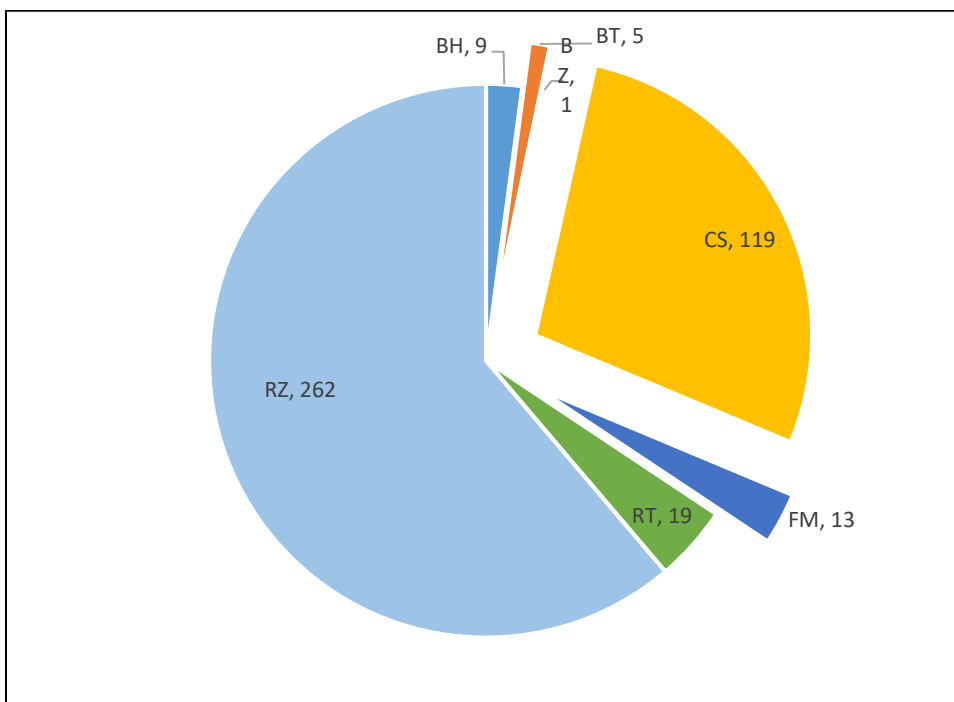


Figure 2. Relative proportion and number of PIT-tagged fish detected at Passive Interrogation Arrays (PIAs) set at Razorback Bar on the Green River, Echo Park Bar on the Yampa River, and Cleopatra's Couch Bar on the Yampa River in 2020



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Figure 3. Year of stocking and number of unique detections for razorback sucker detected by Razorback Bar PIT tag antennas in 2020.

