

COLORADO RIVER RECOVERY PROGRAM
FY 2015 ANNUAL PROJECT REPORT

RECOVERY PROGRAM
PROJECT NUMBER: 169

I. Project Title: Detecting endangered fishes using PIT tag antenna technology in the Upper Colorado River Basin

II. Bureau of Reclamation Agreement Number: R13PG40020

Project/Grant Period: Start date: 10/01/2012
End date: 09/30/2015
Reporting period end date: 09/30/2015
Is this the final report? Yes X No _____

III. Principal Investigators:
Chris Smith, David Beers, and Tildon Jones
U.S. Fish & Wildlife Service
Green River Basin Fish & Wildlife Conservation Office
1380 S 2350 W, Vernal, UT 84078
(435) 789.0351; christian_t_smith@fws.gov

IV. Abstract: This project is designed to detect as many endangered fish as possible using PIT-tag antenna technology. In particular, we sought to collect information on razorback sucker and Colorado pikeminnow survival by deploying antennas at Razorback Bar on the Green River and Echo Park and Cleopatra's Couch bars on the Yampa River where these fish are known to congregate during spawning (Figure 1). We were able to detect and identify 743 unique tags, representing 593 razorback sucker, 95 Colorado pikeminnow, 5 bonytail, 1 humpback chub, 30 roundtail chub, 16 flannelmouth sucker, 1 bluehead sucker, and 2 flannelmouth x razorback sucker hybrids (Figure 2).

V. Study Schedule: 2012-ongoing.

VI. 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.

VII. Accomplishment of FY 2015 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Razorback Bar

We deployed two flat plate antennas and three submersible antennas on 8 April at Razorback Bar, a known spawning location for razorback sucker. These antennas functioned through the end of May. There were 618 codes that could be traced in the Recovery Program database. Of these, we were unable to retrieve records for 5 detections, but they were tags distributed to Program field offices. There were 14 tags detected that likely belonged to razorback sucker stocked from Ouray National Fish

Hatchery in 2011, and were part of a group where stocking records were lost. One tag distributed to Ouray NFH in 2007 was presumably inserted into a razorback sucker as well. Finally, there were 2 tags associated with the UDWR Wahweap Hatchery that we suspect belonged to bonytail. Out of 613 tags, we were able to identify 582 razorback sucker, 15 flannelmouth sucker and 1 bluehead sucker tagged under Three Species work by the Utah Division of Wildlife Resources, 5 bonytail, 1 flannelmouth x razorback sucker hybrid, and 9 Colorado pikeminnow (Table 1). Tag information by species is listed below.

Razorback sucker

We were able to detect 582 razorback sucker at Razorback Bar, which included 14 individuals presumed to be from a 2011 stocking cohort from Ouray NFH and 9 fish that were river captures without tags. The stocking year for these fish is illustrated in Figure 2. The majority of stocked razorback sucker detected were stocked in 2010 and 2011. These fish have been at large since fall of their stocking year, either 4.5 or 3.5 years, respectively. This is consistent with data from 2012–2014, which showed the majority of fish detected at the spawning bar had been at large 2.5–4.5 years post-stocking. The majority of fish (97%) were stocked from Ouray NFH. Fish at this hatchery are spawned in early May, and stocked in fall as 1+ year olds. These data suggest the majority of these fish are returning to the spawning bar as 4–6 year-olds. This is consistent with other work that shows razorback sucker mature at 3–4 years (McAda and Wydoski 1980; Minckley 1983). There were, however, tags detected from fish that had been at large as long as eleven years. Seventeen razorback suckers detected at Razorback Bar in 2014, 21 individuals in 2013, and 3 in 2012 were also detected in 2015. However, there were no records of fish that returned more than two years. Webber and Beers (2014) found that the majority of razorback sucker (93%) detected in 2012–2013 on these antennas had not been previously captured during active river sampling. Five hundred sixty-two fish had been stocked from Ouray NFH, 10 were from the Baeser Bend wetland. All fish had been stocked in the Green River between Green River, Utah and Rainbow Park.

Other species:

We detected nine Colorado pikeminnow at Razorback Bar this year. There are a few tags still remaining to identify, and two were distributed for Colorado pikeminnow population estimates. One of the Colorado pikeminnow detected at Razorback Bar in April was later detected at the Echo Park Bar on the Yampa River in May and the Cleopatra's Couch Bar on the Yampa in June 2015.

We also detected tags from 5 bonytail. These included: two fish stocked in 2014 by Ouray NFH, where one had been stocked at the Escalante Ranch wetland and the other at the Ouray National Wildlife Refuge; one fish from Mumma hatchery stocked at Deerlodge Park last year; and two individuals from the Wahweap Hatchery that currently lack a known stocking location. These fish demonstrate some level of overwinter survival for stocked bonytail and a range of movement from 6–80 miles.

The antennas also recorded 15 flannelmouth sucker tags. These fish were marked by UDWR predominantly in 2008–2009 as part of their “Three Species” monitoring. As mentioned in the 2014 Annual Report for this project, it is slightly concerning that

flannelmouth sucker were encountered at a known razorback sucker spawning location. The two species can interbreed, and flannelmouth sucker were detected during periods when many razorback sucker were present, presumably to spawn. The detection of one flannelmouth x razorback sucker hybrid at Razorback Bar in 2015 provides evidence of this specific type of hybridization.

Spawning Bars on the Yampa River

Using the same approach as Razorback Bar on the Green River, we expanded this project in 2015 to two locations on the Yampa River in Dinosaur National Monument by setting submersible PIT tag antennas at known spawning bars. Unlike Razorback Bar, the new sites are located within river stretches that are managed as wilderness by the National Park Service and receive a high amount of recreational river use. The less obtrusive nature of the submersible antennas in comparison to other PIAs, which require more surface infrastructure (batteries, solar panels, etc.) to operate, allowed us to monitor native and endangered fish presence without compromising wilderness qualities, impacting user experience, or risking the chance of vandalism or tampering.

Echo Park Bar

The spawning bar that we refer to as "Echo Park Bar" is located 0.3 miles upstream from the Green-Yampa River Confluence, and two submersible antennas were set at this location from 14 April–1 June. Although rare, the majority of razorback sucker captures on the Yampa River in recent years have occurred at or near this gravel bar. In total, 38 unique tags were detected at Echo Park Bar, consisting of 10 razorback suckers, 25 Colorado pikeminnow, one roundtail chub, one flannelmouth sucker, and one flannelmouth x razorback sucker hybrid (Table 2). The razorback sucker detected here were stocked by Ouray NFH between 2007 and 2013. Two of these fish were stocked in Green River, Utah and the remainder at Ouray National Wildlife Refuge. Although detections at Echo Park Bar were not as numerous as at Razorback Bar in 2015, more razorback sucker were documented by these antennas than have been reported in the Yampa River the past 20 years. Of the 25 Colorado pikeminnow detected at Echo Park Bar in 2015, 22 were PIT-tagged in the Green River and the remaining three individuals 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 bars in the Upper Green River Basin that has been extensively documented as a Colorado-pikeminnow spawning location. Three submersible antennas were deployed at or near this spawning bar on 4 June and retrieved on 9 July. We were able to locate codes for 92 individual fish, which consisted of 61 Colorado pikeminnow, 1 razorback sucker, 1 humpback chub, and 29 roundtail chub (Table 3). 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 of the potential for electrofishing- induced spawning disruption .

In contrast to Echo Park Bar, Colorado pikeminnow detections at Cleopatra's Couch Bar in 2015 were not comprised of a significant majority of fish that were PIT-tagged in the

Green River (88% versus 54%, respectively). Twenty-seven Colorado pikeminnow detected at the Cleopatra's Couch antennas were tagged in the Yampa River and one individual was PIT-tagged in the White River. Of the 29 roundtail chub detected at Cleopatra's Couch Bar, 20 were recorded by one antenna that was deployed approximately one-third of a mile downstream of the spawning bar proper. This hints at the possibility of a roundtail chub spawning aggregation. Half of the roundtail chub detected were PIT-tagged in the Green River within 10 miles of the Green-Yampa River confluence, and the other half were tagged in the Yampa River within 10 miles of Cleopatra's Couch Bar. There was also one roundtail detected that was part of a group of fish brought from the Yampa as young of year to Ouray NFH. This fish was kept in the hatchery as part of a potential humpback chub refuge population, but was then released to Island Park after it was confirmed to be a roundtail. If these roundtail chub are indeed spawning at this location, then at some point fish that were tagged in the Green River moved to the Yampa River to spawn. The detection of one razorback sucker at Cleopatra's Couch Bar this year further displays the utility of these antennas: razorback sucker sightings in the Yampa River are infrequent at best.

Shortcomings

The deployment of submersible antennas in the Yampa River and two additional antennas at Razorback Bar produced more PIT tag detections in 2015 than in previous years. However, we experienced technical difficulties that we believe have been resolved for 2016. One of the flat plate antennas at Razorback Bar was not operating during the latter portion of the sampling period because of a non-functioning solar panel. Two of the submersible antennas produced truncated PIT-tag code records and indecipherable text that we suspect resulted from interference with metal anchors. To resolve the interference issues, we replaced the metal anchors with PVC tube anchors that were filled with gravel and sand.

VIII. Additional noteworthy observations:

IX. Recommendations:

- Continue to use PIT tag antennas to monitor fish at Razorback Bar, Echo Park Bar, and Cleopatra's Couch Bar. The fact that fish congregate in these locations for spawning increases the chances for detection of fish that may otherwise be spread over large distances. Furthermore, PIT tag antennas provide a method of monitoring endangered fishes at spawning locations as opposed to electrofishing, which has been shown to 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.
- 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.

X. Project Status: This project is on track and ongoing

XI. FY 2015 Budget Status

A. Funds Provided: \$17,910.02

B. Funds Expended: \$17,910.02

C. Difference: -0-

D. Percent of the FY 2015 work completed: 100%

E. Recovery Program funds spent for publication charges: -0-

XII. Status of Data Submission: Data are still being compiled and will be submitted to the database manager by 31 December 2015

XIII. Signed: Christian Smith 11/18/2015
Principal Investigator Date

Literature Cited

McAda, C.W. and R.S. Wydoski. 1980. The razorback sucker, *Xyrauchen texanus*, in the upper Colorado River basin, 1974-1976. U.S. Fish & Wildlife Service Technical Papers 99, Washington, D.C.

Minckley, W.L. 1983. Status of the razorback sucker, *Xyrauchen texanus*, in the lower Colorado River basin. *Southwestern Naturalist* 28: 165-187.

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. 2 4 8 3 11 54 122 1

Table 1. PIT tag antenna detections of unique codes per species at Razorback Bar, UT in 2015.

| Species | Number of Unique Tags Detected |
|---------------------------------|--------------------------------|
| Razorback sucker | 582 |
| Colorado pikeminnow | 9 |
| Bonytail | 5 |
| Flannelmouth sucker | 15 |
| Bluehead sucker | 1 |
| Flannelmouth x razorback sucker | 1 |
| Total | 613 |

Table 2. PIT tag antenna detections unique codes per species at Echo Park Bar, CO in 2015.

| Species | Number of Unique Tags Detected |
|---------------------------------|--------------------------------|
| Razorback sucker | 10 |
| Colorado pikeminnow | 25 |
| Roundtail chub | 1 |
| Flannelmouth sucker | 1 |
| Flannelmouth x razorback sucker | 1 |
| Total | 38 |

Table 3. PIT tag antenna detections of unique codes per species at Cleopatra's Couch-Bar, CO in 2015.

| Species | Number of Unique Detections |
|---------------------|-----------------------------|
| Razorback sucker | 1 |
| Colorado pikeminnow | 61 |
| Roundtail chub | 29 |
| Humpback chub | 1 |
| Total | 92 |

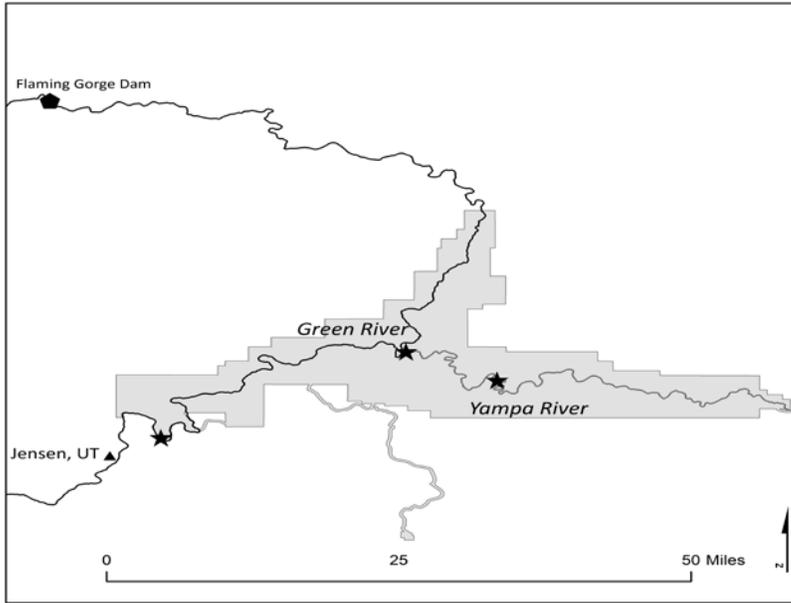


Figure 1. Locations of PIT tag antenna arrays set by Green River Basin FWCO in 2015 are indicated by stars. The shaded polygon shows the extent of Dinosaur National Monument.

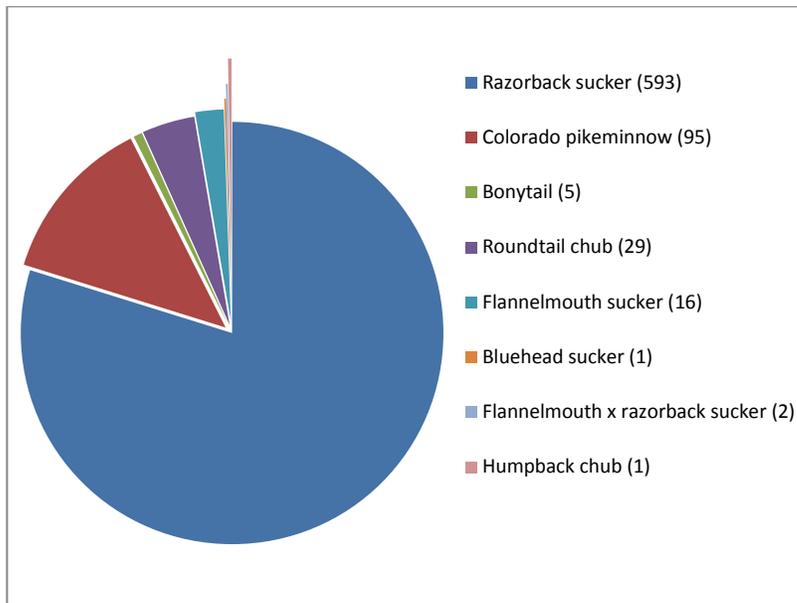


Figure 2. Relative proportion of PIT-tagged fish detected at Passive Interrogation-Arrays (PIAs) set at Razorback Bar on the Green River, Echo Park Bar on the Yampa River, and Cleopatra's Couch Bar on the Yampa River in 2015.

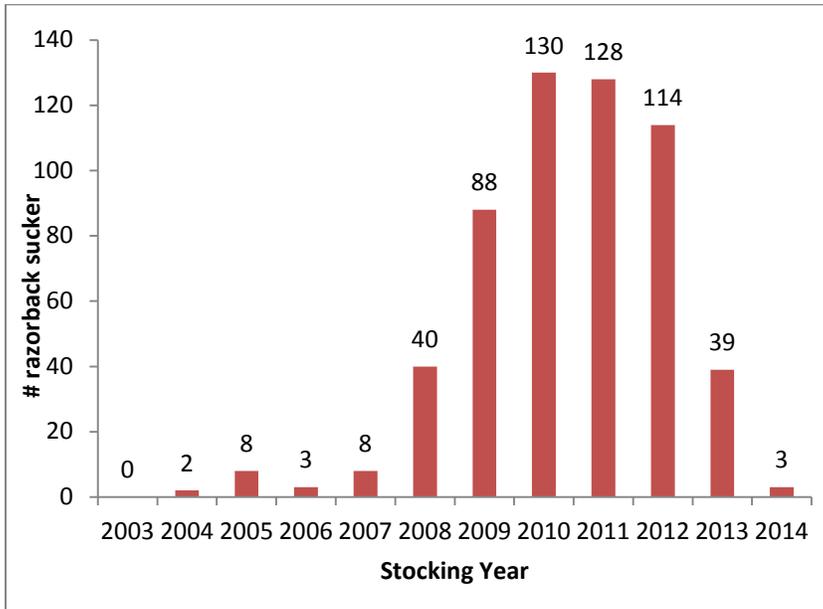


Figure 3. Year of stocking for razorback sucker detected at Razorback Bar PIT tag antennas in 2015.