

**RECOVERY PROGRAM  
FY 2020-2021 SCOPE OF WORK for:**

Recovery Program Project Number: 172

Remote monitoring of endangered fishes in the middle Green River

Reclamation Agreement number: R19AP00059  
Reclamation Agreement term: Oct. 1, 2019 – Sept. 30, 2024

Note: Recovery Program FY20-21 scopes of work are drafted in May 2019. They often are revised before final Program approval and may subsequently be revised again in response to changing Program needs. Program participants also recognize the need and allow for some flexibility in scopes of work to accommodate new information (especially in nonnative fish management projects) and changing hydrological conditions.

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<u>Category:</u>	<u>Expected Funding Source:</u>
<input checked="" type="checkbox"/> Ongoing project	<input checked="" type="checkbox"/> Annual funds
<input type="checkbox"/> Ongoing-revised project	<input type="checkbox"/> Capital funds
<input type="checkbox"/> Requested new project	<input type="checkbox"/> Other [explain]
<input type="checkbox"/> Unsolicited proposal	

I. Title of Proposal: Remote monitoring of endangered fishes in the middle Green River

II. 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.
  - 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.
- V.D. Establish sampling procedures to minimize adverse impacts to endangered fishes.
- V.D.2. Implement scientific sampling protocols to minimize mortality for all endangered fishes.
- V.F. Assess relative biological importance of tributaries and their potential contributions to endangered fish recovery.

#### GREEN RIVER ACTION PLAN: MAINSTEM

- V. Monitor populations and habitat and conduct research to support recovery actions (research, monitoring and data management).
- V.A. Conduct research to acquire life history information and enhance scientific techniques required to complete recovery actions.

### III. Study Background/Rationale and Hypotheses:

Wild razorback sucker (*Xyrauchen texanus*) populations were in sharp decline in the 1980s and extirpated shortly after in the upper Colorado River basin. Populations have been reestablished through a stocking program beginning in 1995 (Bestgen et al. 2012). Due to extensive stocking efforts, populations have increased to a point where individuals are successfully reproducing, including range expansion to other areas (Webber et al. 2013). Known spawning locations in the middle Green River include Razorback and Escalante bars (Modde and Irving 1998), and it has been shown that hatchery-reared razorback sucker migrate to these same spawning areas (Modde et al. 2005). Although razorback sucker (hatchery-reared and/or wild fish) likely congregate in other areas of the middle Green River for various aspects of their life history, there is limited information on the abundance and extent of areas outside of the aforementioned spawning bars.

As identified in Bestgen et al. (2012), there is a critical need to improve recaptures of razorback sucker; recently the same need has been identified for Colorado pikeminnow (*Ptychocheilus lucius*). Moreover, managers require a better tool to increase encounters/recaptures of these species in order to generate population and/or survival estimates to aid in understanding recovery status. However, there is no dedicated active sampling effort (e.g., boat or raft electrofishing) to increase razorback recaptures (e.g., UCREFRP Project #128). More importantly, active sampling techniques have provided low recapture rates of PIT-tagged razorback sucker (~2%) and Colorado pikeminnow recaptures have decreased during recent population estimate surveys (Kevin Bestgen, personal communication). In contrast, passive techniques (i.e., stationary PIT antennas) have been quite successful, including encounters of individuals that have avoided active capture for years or even decades (Webber and Beers 2014). As shown by Webber and Beers (2014), targeting razorback sucker when in spawning aggregates greatly increases encounter rates, but this should be accomplished non-intrusively in a passive manner given the high level of disturbance from multiple projects that rely on electrofishing techniques in the upper Colorado River basin.

We identify procedures to investigate razorback sucker aggregations within the proximity of proven spawning locations to better understand population dynamics, range expansion, and to provide supplemental information for vital rate estimation. In addition, with flexibility in

sampling location, we anticipate encounters of other endangered species in these same areas, especially when in close proximity to tributaries. For example, opportunistic remote submersible antenna monitoring conducted in 2018 detected an abundance of Colorado pikeminnow (presumable spawning aggregation) at Placer Point in Dinosaur National Monument (Partlow et al. 2018).

#### IV. Study Goals, Objectives, End Product(s):

##### Goal:

Investigate razorback sucker aggregations to increase encounter rates, including other native fishes (e.g., Colorado pikeminnow), with the overall goal of accommodating data needs in the absence of a large-scale active sampling effort to gather similar information.

##### Objectives:

1. Deploy remote submersible PIT antennas to increase razorback sucker encounters in the middle Green River.
2. Adjust sampling locations and timing as needed to increase encounter rates of other endangered fishes (e.g., Colorado pikeminnow).

##### End product:

Knowledge gained through this project will allow us to determine new locations for stationary PIT equipment to increase razorback sucker encounter rates in a more cost-effective manner so that we can improve monitoring of adult life stages (see Zelasko et al. 2010). Razorback sucker and other native and endangered fish encounter data will be provided to the STReaMS database where it may be utilized by researchers to complement existing data gained through other UCREFRP projects in order to provide a more robust data set for basin-wide survival and/or population estimation.

Given the close proximity of antennas used in this study to antennas simultaneously deployed under UCREFRP Project #169 (USFWS–Green River Basin Fish and Wildlife Conservation Office), the level of duplicate detections between the two projects should be assessed. For example, 671 total tags were detected under both projects #169 and #172 in 2018 (Partlow et al. 2018), indicating that the majority of tags detected under this study were not detected under project #169. Further investigation of potential overlap between these two projects should occur in subsequent years for collaborative data analyses to determine metrics such as movement timing and direction, habitat use, and relationships between spawning bars.

#### V. Study Area:

Designed to complement UCREFRP Project #169 (previously Baeser #C6), which focuses on remote submersible antenna deployment at Razorback Bar and other locations upstream of that site, our study area consists of an 11.8 mile section of the middle Green River downstream of Razorback Bar. For razorback sucker, our focus will be from just below Razorback Bar (RM 310.8) to the downstream boundary of Dinosaur National Monument (RM 305.8), but we will

also sample key tributary habitats downstream, mainly Brush Creek (RM 304.6) and Ashley Creek confluences (RM 299.0) to obtain additional information on Colorado pikeminnow and other native fishes. In addition, to monitor a previously discovered aggregation of Colorado pikeminnow, remote submersible antennas will be deployed at Placer Point (RM 315.9) in Dinosaur National Monument.

VI. Study Methods/Approach:

Surveys will focus around the estimated spawning period for razorback sucker (and potentially Colorado pikeminnow as directed by the Recovery Program); based on temperature-derived model predictions (i.e., peak spawning dates) provided by the Larval Fish Lab and real-time observations of fish captures during UCREFRP Project #123b. More specifically, sampling events will be timed in an attempt to maximize encounters and determine additional aggregations within the study reach. The presence of larval razorback sucker and/or larval Colorado pikeminnow in Green River drift as determined through UCREFRP Project #22F, will serve as verification that the spawning period is complete and that these surveys should no longer occur.

Submersible PIT antennas (Biomark Inc.; 36” circular design) will be deployed prior to the ascending limb of the hydrograph and arrival of spawning razorback sucker. Initial deployment will likely occur in March/April (June/July for Colorado pikeminnow), but timing will depend on annual hydrology. Other than established areas (Brush and Ashley creeks) where submersible antennas will be used in combination with fyke nets for UCREFRP Project#123b, antenna locations will be selected using a random stratified design, incorporating desirable habitats determined from an initial scouting trip. Up to 10 submersible PIT antennas will be deployed in total, depending on equipment availability. Following initial deployment, crews will revisit antenna locations to replace batteries, download data, and conduct general equipment maintenance once every three weeks. At each deployment location, antennas will be tethered to a fixed object on the shoreline, weighted to the river bottom, and attached to float buoys at the water surface. Antenna locations will be adjusted as needed to maximize encounters.

VII. Task Description and Schedule:

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

Task 2. Data entry, analysis, and reporting.

Task	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1			X	X	X	X	X					
2										X	X	X

VIII. Deliverables, Due Dates, and Budget by Fiscal Year:

FY 2020-2024

Program annual reports due each November.

Project data will be submitted to the Recovery Program Database Manager by January.

Submission of 6-12 photos of project components or individuals completing tasks by February 28th. Images can be uploaded to;

<https://www.flickr.com/photos/coloradoriverrecovery/>

Photographs will likely be taken with cell phone phones and uploaded photos to a folder named by project number. Each image will have a number, and an email will be sent to the I&E Coordinator with the number and a brief description of the photo. For example, date, location, what is happening and who the photographer is.

#### IX. Budget Summary:

FY2020:	\$8914.08
FY2021:	\$9092.36
FY2022:	\$9274.21
FY2023:	\$9459.70
FY2024:	\$9648.88

#### X. Reviewers: Program Staff and Committees

#### XI. References:

Bestgen, K.R., K.A. Zelasko, and G.C. White. 2012. Monitoring reproduction, recruitment, and population status of razorback suckers in the Upper Colorado River basin. Final Report to the Upper Colorado River Endangered Fish Recovery Program, U.S. Fish and Wildlife Service, Denver, Colorado. Larval Fish Laboratory Contribution 170.

Modde, T., Z.H. Bowen, and D.C. Kitcheyan. 2005. Spatial and temporal use of a spawning site in the Middle Green River by wild and hatchery-reared razorback suckers. Transactions of the American Fisheries Society 134:937–944.

Modde, T., Z.H. and D.B. Irving. 1998. Use of multiple spawning sites and seasonal movement by razorback suckers in the middle Green River, Utah. North American Journal of Fisheries Management 18:318–326.

Partlow, M.S., G.T. Tournear, and M.J. Breen. 2018. Remote monitoring of endangered fishes in the middle Green River. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, Colorado.

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(1):191–196.

Webber, P.A., K.R. Bestgen, and G.B. Haines. 2013. Tributary spawning by endangered Colorado River basin fishes in the White River. *North American Journal of Fisheries Management* 33:1166–1171.

Zelasko, K.A., K.R. Bestgen, and G.C. White. 2010. Survival rate estimation and movement of hatchery-reared razorback suckers *Xyrauchen texanus* in the Upper Colorado River Basin, Utah and Colorado. *Transactions of the American Fisheries Society* 139:1478–1499.