

**RECOVERY PROGRAM  
FY 2018-2019 SCOPE OF WORK for:**

Recovery Program Project Number: 169

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

Reclamation Agreement number: R15PG00083  
Reclamation Agreement term: 10/1/2014-9/30/2019

Note: Recovery Program FY18-19 scopes of work are drafted in May 2017. 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.

Lead agency: USFWS Vernal  
Submitted by: Chris Smith and M. Tildon Jones  
US Fish and Wildlife Service, Green River Basin FWCO  
1380 South 2350 West  
Vernal, UT 84078  
(435) 789-0351 x 21; FAX: (435) 789-4805  
[christian\\_t\\_smith@fws.gov](mailto:christian_t_smith@fws.gov)

Date Last Modified: 5/24/2017 10:59:00 AM

Category:

- Ongoing project
- Ongoing-revised project
- Requested new project
- Unsolicited proposal

Expected Funding Source:

- Annual funds
- Capital funds
- Other *[explain]*

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

II. Relationship to RIPRAP:

General Action Plan:

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

Green River Action Plan:

V.D.1. Implement razorback sucker monitoring plan

III. Study Background/Rationale and Hypotheses:

Researchers monitor endangered fishes in the Upper Colorado River Basin. Periodic population abundances are estimated using capture-recapture techniques. This type of estimation requires that marked animals are recaptured in some way, and the more recaptures, the higher the precision of the estimate. Precise population estimates allow managers to be more confident about the status of the species in question.

In recent years, Colorado pikeminnow monitoring efforts have provided researchers with enough data to generate population estimates, however, captures and recaptures have been declining, and more recaptures are desired for better precision (K. Bestgen, personal communication). Razorback suckers are captured while conducting work to estimate Colorado pikeminnow. However, recaptures are lacking for this species to generate a precise population estimate. Managers have identified a need to increase razorback sucker recaptures to thus generate population parameters (Bestgen et al. 2012). This study was initiated with this purpose: to generate as many razorback sucker detections as possible in an attempt to generate data that can be used for estimating populations and survival. Added detections of PIT-tagged Colorado pikeminnow could also provide more robust population estimates of this long-lived species.

#### Flat Plate Antenna at Razorback Bar

We have used 2 flat plate antennas and 3 submersible antennas on the Green River at Razorback Bar since 2012 (Webber and Beers, 2014), and in that time we have detected 2,924 unique tags. Many of these individuals would have otherwise gone undetected by other methods, such as electrofishing. Since the initial year of study, we have added solar power to the antennas, reducing battery changes, and have added submersible antennas that are powered by batteries that hold a charge for two weeks or more.

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

Our goals are to: 1) To detect as many endangered fish as possible at Razorback Bar, Cleopatra's Couch bar, and Echo Park bar and 2) find other locations where PIT tag antenna technology can be used to obtain more detections. Potential locations include but are not limited to: Brush Creek, Douglas Creek, Vermillion Creek, Escalante Bar, Yampa River endangered fish spawning sites, and wetlands that connect to rivers. All recapture data will be provided electronically to the Recovery Program database for future survival estimates. This project is not intended to estimate razorback sucker survival in and of itself, but rather to augment other datasets (ancillary captures through pikeminnow estimates and nonnative fish removal). We will also provide results of our findings in the form of an annual report.

#### V. Study Area: Razorback Bar near Jensen, Utah, Echo Park and Cleopatra's Couch bars on the Yampa River in Dinosaur National Monument, Colorado, and other locations along the middle Green and Yampa Rivers.

#### VI. Study Methods/Approach:

Passive Interrogation Arrays in the middle Green River Basin

We will deploy two 27" x 13" flat plate PIT tag antennas and multiple 40" x 6" submersible antennas. We have acquired sampling permits from the National Park Service since most of the spawning bars we sample are located within Dinosaur National Monument. We will deploy the PIAs several weeks before flows begin to rise on Razorback and Echo Park bars (probably late March or early April) to detect spawning razorback sucker. Detection of PIT-tagged Colorado pikeminnow will be attempted once peak flows begin to subside in the Yampa River (typically in early June). We will deploy submersible PIAs at Cleopatra's Couch bar, which will coincide with an early pass on Project 110, thus allowing access to this location. The PIAs at Echo Park bar will additionally serve to detect Colorado pikeminnow in the

Green-Yampa River confluence vicinity.

#### Flat Plate Antennas

We will use four  $\geq 24$ " stakes to secure each flat plate to the river bottom. We intend to set up one flat plate at the upper end of the spawning bar and one at the lower end. Depending on flows, these flat plates will likely be 1'-3' underwater. There will be a 50' cable from the flat plate which would either be secured to the bottom of the river channel or buried. This cable would be connected to a PIT tag reader housed in a secured box on the bank above high water. Batteries (12 V deep cycle) would be recharged and changed weekly or powered by solar panels during the razorback spawn, and we would take down the equipment after flows recede. Data would be downloaded and an annual report would summarize our findings.

#### Submersible Antennas

The standalone nature of submersible PIAs allows a much smaller footprint, which makes them desirable in rivers that are managed as wilderness, such as the Yampa River and the Green River above the Split Mountain boat ramp in Dinosaur National Monument. We will use appropriate lengths of weighted 1/8" wire rope to secure submersible PIAs to a fixed natural object on shore that will allow for easy retrieval and eliminate the chance of losing the antenna to the current. We will also attach an identification tag to the shore end of the anchor that will explain its purpose and provide our contact information to anyone interested. Batteries will be changed bi-weekly by driving to Echo Park and hiking batteries to/from the antenna, driving a john boat to Razorback Bar, or stopping at Cleopatra's Couch and Echo Park bars during Project 110 passes. Data retrieval will also occur during these weekly maintenance visits.

#### VII. Task Description and Schedule:

Task 1: Document razorback sucker and Colorado pikeminnow on or near spawning bars

Task 2: Data Analysis, report writing, presentations.

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

USFWS personnel costs are based on FY2017 GS and WG tables, with current benefit rates included for each position. Future rates were determined assuming a 2% inflation and cost of living increase. Vehicle and travel costs are based on current GSA rates, again assuming a 2% rate of inflation in future years.

FY 2018

Deliverables: Annual report in November. Data submitted to database manager.

Budget

Task Activity	Rate \$/h	Hours	Cost
<b>Task 1</b>			
<b>Labor</b>			
GS-11 Fisheries Biologist	\$42.37	88	\$3,729
GS-5 Fisheries Tech/ WG-5 Boat Operator	\$23.16	72	\$1,668
GS-8 Fisheries Tech	\$43.43	120	\$5,212
<b>Subtotal</b>			<b>\$10,608</b>
<b>Travel</b>			
Lodging (1 room/night x \$93/night x 1 trip) Logan, UT			\$93
Per diem (1 person/day x \$52/day x 2 days x 1 person) Logan, UT			\$104
<b>Subtotal</b>			<b>\$197</b>
<b>Equipment</b>			
Vernal to Red Wash river access, round trip (1 truck/trip x 46 mi/truck x \$0.33/mi x 10 trips)			\$152
Vernal to Echo Park, round trip (1 truck/trip x 148 mi/truck x \$0.33/mi x 6 trips)			\$293
Vernal to Logan, UT antenna maintenance, round trip (1 truck/trip x 504 mi/truck x \$0.33/mi x 1 trip)			\$166
GSA truck (rate/mo x # truck-months)	\$250	3	\$750
Razorback Bar boat gas (2 gal gas/boat x 1 boat/trip x \$4.00/gal x 12 trips)			\$96
Razorback Bar boat oil (0.5 qts motor boat oil/boat x 1 boat/trip x \$11.00/qt x 12 trips)			\$66
Equipment (Cables, batteries, wire, stakes, etc.)			\$500
<b>Subtotal</b>			<b>\$2,023</b>
<b>TASK 1 TOTAL</b>			<b>\$12,828</b>
<b>Task 2- Data Analysis, Annual Report</b>			
<b>Labor</b>			
GS-11 Fisheries Biologist	\$42.37	80	\$3,390
GS-12 Supervisory Fish Biologist	\$60.84	40	\$2,434
GS-9 Admin Assist.	\$41.57	80	\$3,326
<b>Subtotal</b>			<b>\$9,149</b>
<b>TASK 2 TOTAL</b>			<b>\$9,149</b>
<b>SOW TOTAL</b>			<b>\$21,977</b>

FY 2019

Deliverables: Annual report in November. Data submitted to database manager.

Budget

Task Activity	Rate \$/h	Hours	Cost
<b>Task 1</b>			
<b>Labor</b>			
GS-11 Fisheries Biologist	\$43.73	160	\$6,997
GS-5 Fisheries Tech/ WG-5 Boat Operator	\$23.63	72	\$1,701
GS-8 Fisheries Tech	\$44.29	178	\$7,884
<b>Subtotal</b>			<b>\$16,582</b>
<b>Travel</b>			
Lodging (1 room/night x \$94/night x 1 trip) Logan, UT			\$94
Per diem (1 person/day x \$54/day x 2 days x 1 person) Logan, UT			\$108
<b>Subtotal</b>			<b>\$202</b>
<b>Equipment</b>			
Vernal to Red Wash river access, round trip (1 truck/trip x 46 mi/truck x \$0.34/mi x 10 trips)			\$156
Vernal to Echo Park, round trip (1 truck/trip x 148 mi/truck x \$0.34/mi x 6 trips)			\$302
Vernal to Logan, UT antenna maintenance, round trip (1 truck/trip x 504 mi/truck x \$0.34/mi x 1 trip)			\$171
GSA truck (rate/mo x # truck-months)	\$255	4	\$1,020
Razorback Bar boat gas (2 gal gas/boat x 1 boat/trip x \$4.00/gal x 12 trips)			\$96
Razorback Bar boat oil (0.5 qts motor boat oil/boat x 1 boat/trip x \$11.00/qt x 12 trips)			\$66
Equipment (Cables, batteries, wire, stakes, etc.)			\$500
<b>Subtotal</b>			<b>\$2,312</b>
<b>TASK 1 TOTAL</b>			<b>\$19,095</b>
<b>Task 2- Data Analysis, Annual Report</b>			
<b>Labor</b>			
GS-11 Fisheries Biologist	\$43.73	140	\$6,122
GS-12 Supervisory Fish Biologist	\$62.05	40	\$2,482
GS-9 Admin Assist.	\$42.69	36	\$1,537
<b>Subtotal</b>			<b>\$10,141</b>
<b>TASK 2 TOTAL</b>			<b>\$10,141</b>
<b>SOW TOTAL</b>			<b>\$29,237</b>

FY 2020

Deliverables: Annual report in November. Data submitted to database manager.

Budget

Task Activity	Rate \$/h	Hours	Cost
<b>Task 1</b>			
<b>Labor</b>			
GS-11 Fisheries Biologist	\$46.92	160	\$7,507
GS-5 Fisheries Tech/ WG-5 Boat Operator	\$24.10	72	\$1,735
GS-8 Fisheries Tech	\$46.34	178	\$8,249
<b>Subtotal</b>			<b>\$17,491</b>
<b>Travel</b>			
Lodging (1 room/night x \$96/night x 1 trip) Logan, UT			\$96
Per diem (1 person/day x \$55/day x 2 days x 1 person) Logan, UT			\$110
<b>Subtotal</b>			<b>\$206</b>
<b>Equipment</b>			
Vernal to Red Wash river access, round trip (1 truck/trip x 46 mi/truck x \$0.34/mi x 10 trips)			\$156
Vernal to Echo Park, round trip (1 truck/trip x 148 mi/truck x \$0.34/mi x 6 trips)			\$302
Vernal to Logan, UT antenna maintenance, round trip (1 truck/trip x 504 mi/truck x \$0.34/mi x 1 trip)			\$171
GSA truck (rate/mo x # truck-months)	\$260	3	\$780
Razorback Bar boat gas (2 gal gas/boat x 1 boat/trip x \$4.00/gal x 12 trips)			\$96
Razorback Bar boat oil (0.5 qts motor boat oil/boat x 1 boat/trip x \$11.00/qt x 12 trips)			\$66
Equipment (Cables, batteries, wire, stakes, etc.)			\$500
<b>Subtotal</b>			<b>\$2,072</b>
<b>TASK 1 TOTAL</b>			<b>\$19,769</b>
<b>Task 2- Data Analysis, Annual Report</b>			
<b>Labor</b>			
GS-11 Fisheries Biologist	\$46.92	140	\$6,569
GS-12 Supervisory Fish Biologist	\$63.30	40	\$2,532
GS-9 Admin Assist.	\$44.42	36	\$1,599
<b>Subtotal</b>			<b>\$10,700</b>
<b>TASK 2 TOTAL</b>			<b>\$10,700</b>
<b>SOW TOTAL</b>			<b>\$30,469</b>

FY 2021

Deliverables: Annual report in November. Data submitted to database manager.

Budget

Task Activity	Rate \$/h	Hours	Cost
<b>Task 1</b>			
<b>Labor</b>			
GS-11 Fisheries Biologist	\$47.86	88	\$4,212
GS-5 Fisheries Tech/ WG-5 Boat Operator	\$24.58	72	\$1,770
GS-8 Fisheries Tech	\$47.26	152	\$7,184
<b>Subtotal</b>			<b>\$13,165</b>
<b>Travel</b>			
Lodging (1 room/night x \$97/night x 1 trip) Logan, UT			\$97
Per diem (1 person/day x \$57/day x 2 days x 1 person) Logan, UT			\$114
<b>Subtotal</b>			<b>\$211</b>
<b>Equipment</b>			
Vernal to Red Wash river access, round trip (1 truck/trip x 46 mi/truck x \$0.35/mi x 10 trips)			\$161
Vernal to Echo Park, round trip (1 truck/trip x 148 mi/truck x \$0.35/mi x 6 trips)			\$311
Vernal to Logan, UT antenna maintenance, round trip (1 truck/trip x 504 mi/truck x \$0.35/mi x 1 trip)			\$176
GSA truck (rate/mo x # truck-months)	\$265	3	\$795
Razorback Bar boat gas (2 gal gas/boat x 1 boat/trip x \$4.00/gal x 12 trips)			\$96
Razorback Bar boat oil (0.5 qts motor boat oil/boat x 1 boat/trip x \$11.00/qt x 12 trips)			\$66
Equipment (Cables, batteries, wire, stakes, etc.)			\$500
<b>Subtotal</b>			<b>\$2,105</b>
<b>TASK 1 TOTAL</b>			<b>\$15,481</b>
<b>Task 2- Data Analysis, Annual Report</b>			
<b>Labor</b>			
GS-11 Fisheries Biologist	\$47.86	80	\$3,829
GS-12 Supervisory Fish Biologist	\$66.37	40	\$2,655
GS-9 Admin Assist.	\$45.61	58	\$2,645
<b>Subtotal</b>			<b>\$9,129</b>
<b>TASK 2 TOTAL</b>			<b>\$9,129</b>
<b>SOW TOTAL</b>			<b>\$24,610</b>

FY 2022

Deliverables: Annual report in November. Data submitted to database manager.

Budget

Task Activity	Rate \$/h	Hours	Cost
<b>Task 1</b>			
<b>Labor</b>			
GS-11 Fisheries Biologist	\$48.81	88	\$4,295
GS-5 Fisheries Tech/ WG-5 Boat Operator	\$25.07	72	\$1,805
GS-8 Fisheries Tech	\$48.21	152	\$7,328
<b>Subtotal</b>			<b>\$13,428</b>
<b>Travel</b>			
Lodging (1 room/night x \$99/night x 1 trip) Logan, UT			\$99
Per diem (1 person/day x \$58/day x 2 days x 1 person) Logan, UT			\$116
<b>Subtotal</b>			<b>\$215</b>
<b>Equipment</b>			
Vernal to Red Wash river access, round trip (1 truck/trip x 46 mi/truck x \$0.36/mi x 10 trips)			\$166
Vernal to Echo Park, round trip (1 truck/trip x 148 mi/truck x \$0.36/mi x 6 trips)			\$320
Vernal to Logan, UT antenna maintenance, round trip (1 truck/trip x 504 mi/truck x \$0.36/mi x 1 trip)			\$181
GSA truck (rate/mo x # truck-months)	\$271	3	\$813
Razorback Bar boat gas (2 gal gas/boat x 1 boat/trip x \$4.00/gal x 12 trips)			\$96
Razorback Bar boat oil (0.5 qts motor boat oil/boat x 1 boat/trip x \$11.00/qt x 12 trips)			\$66
Equipment (Cables, batteries, wire, stakes, etc.)			\$500
<b>Subtotal</b>			<b>\$2,142</b>
<b>TASK 1 TOTAL</b>			<b>\$15,785</b>
<b>Task 2- Data Analysis, Annual Report</b>			
<b>Labor</b>			
GS-11 Fisheries Biologist	\$48.81	80	\$3,905
GS-12 Supervisory Fish Biologist	\$67.70	40	\$2,708
GS-9 Admin Assist.	\$46.53	58	\$2,699
<b>Subtotal</b>			<b>\$9,312</b>
<b>TASK 2 TOTAL</b>			<b>\$9,312</b>
<b>SOW TOTAL</b>			<b>\$25,097</b>

IX. Budget Summary:

Total budget to USFWS Vernal by fiscal year:

FY2018: \$21,977

FY2019: \$29,237

FY2020: \$30,469

FY2021: \$24,610

FY2022: \$25,097

X. Reviewers:

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. Report to the Upper Colorado River Endangered Fish Recovery Program. Larval Fish Laboratory Contribution 170, Colorado State University, Fort Collins.

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.

Webber, P. A., P. D. Thompson and P. Budy. 2012. Status and structure of two populations of bluehead suckers (*Catostomus discobolus*) in the Weber River, Utah. *Southwestern Naturalist* 57(3):267-276.

