

**RECOVERY PROGRAM
FY 2016-2017 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: R13PG40020
Reclamation Agreement term: 10/1/2012– 9/30/2015

Note: Recovery Program FY16-17 scopes of work are drafted in May 2015. 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

Submitted by: M. Tildon Jones and Chris Smith

US Fish and Wildlife Service, Colorado River Fish Project

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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 1,101 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 with 2+ week battery life.

IV. Study Goals, Objectives, End Product:

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, the mouth of Vermillion Creek on the Green River in Brown's Park, 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 ≥ 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 from/to 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. These antennas are currently being borrowed from Bureau of Reclamation and Biomark, and in this SOW, we propose acquiring the equipment for the FWS Vernal office.

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.

Schedule: FY-2016

Task	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1				X	X	X						
2	X										X	X

Schedule: FY-2017

Task	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1				X	X	X						
2	X										X	X

Schedule: FY-2018

Task	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1				X	X	X						
2	X										X	X

Schedule: FY-2019

Task	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1				X	X	X						
2	X										X	X

VIII. Deliverables, Due Dates, and Budget by Fiscal Year:
 FY 2016: Annual report and raw data submitted November 2016.

Task Activity	Rate \$/h	Hours	Cost
Task 1			
Labor			
GS-7 Fisheries Biologist	\$28.44	80	\$2,275
GS-5 Fisheries Tech	\$24.96	40	\$998
GS-8 Fisheries Tech	\$38.72	131	\$5,072
Subtotal			\$8,346
Equipment			
Vernal to Escalante Ranch river access, round trip (1 truck/trip x 72 mi/truck x \$0.31/mi x 10 trips)			\$223
Vernal to Echo Park, round trip (1 truck/trip x 148 mi/truck x \$0.31/mi x 8 trips)			\$367
Vernal to Vermillion Creek, round trip (1 truck/trip x 374 mi/truck x \$0.31/mi x 2 trips)			\$232
GSA truck (rate/mo x # truck-months)	\$313.00	3	\$939
Razorback Bar boat gas (2 gal gas/boat x 1 boat/trip x \$4.00/gal x 10 trips)			\$80
Razorback Bar boat oil (0.5 qts motor boat oil/boat x 1 boat/trip x \$11.00/qt x 10 trips)			\$55
* Biomark submersible PIT tag antenna w/ spare battery and charger (cost, quantity)	\$5,500.00	5	\$27,500
Equipment (Cables, batteries, wire, stakes, etc.)			\$500
Subtotal			\$2,396
* Items will be purchased with FY2016 PIT tag funds			
*TASK 1 TOTAL			\$10,742
Task 2- Data Analysis, Annual Report			
Labor			
GS-7 Fisheries Biologist	\$28.44	80	\$2,275
GS-12 Supervisory Fish Biologist	\$55.14	40	\$2,206
GS-9 Admin Assist.	\$39.19	80	\$3,135
TASK 2 TOTAL			\$7,616
SOW TOTAL			\$18,358

FY 2017: Annual report and raw data submitted November 2017.

Task Activity	Rate \$/h	Hours	Cost
Task 1			
Labor			
GS-9 Fisheries Biologist	\$35.36	80	\$2,829
GS-5 Fisheries Tech	\$24.96	40	\$998
GS-8 Fisheries Tech	\$39.74	131	\$5,206
Subtotal			\$9,033

Equipment			
Vernal to Escalante Ranch river access, round trip (1 truck/trip x 72 mi/truck x \$0.32/mi x 10 trips)			\$230
Vernal to Echo Park, round trip (1 truck/trip x 148 mi/truck x \$0.32/mi x 8 trips)			\$379
Vernal to Vermillion Creek, round trip (1 truck/trip x 374 mi/truck x \$0.32/mi x 2 trips)			\$239
GSA truck (rate/mo x # truck-months)	\$320.00	3	\$960
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Razorback Bar boat gas (2 gal gas/boat x 1 boat/trip x \$4.00/gal x 10 trips)			\$80
Razorback Bar boat oil (0.5 qts motor boat oil/boat x 1 boat/trip x \$11.00/qt x 10 trips)			\$55
Biomark submersible PIT tag antenna	\$5,500.00	2	\$11,000
Equipment (cables, batteries, wire, stakes, etc.)			\$500
	Subtotal		\$13,444
	TASK 1 TOTAL		\$22,477
Task 2- Data Analysis, Annual Report			
Labor			
GS-9 Fisheries Biologist	\$35.36	80	\$2,829
GS-12 Supervisory Fish Biologist	\$56.25	40	\$2,250
GS-9 Admin Assist.	\$39.98	80	\$3,198
	TASK 2 TOTAL		\$8,277
	SOW TOTAL		\$30,754

FY 2018: Annual report and raw data submitted November 2018.

Task Activity	Rate \$/h	Hours	Cost
Task 1			
Labor			
GS-11 Fisheries Biologist	\$36.07	80	\$2,885
GS-5 Fisheries Tech	\$25.46	40	\$1,018
GS-8 Fisheries Tech	\$40.53	131	\$5,310
	Subtotal		\$9,214
Equipment			
Vernal to Escalante Ranch river access, round trip (1 truck/trip x 72 mi/truck x \$0.33/mi x 10 trips)			\$238
Vernal to Echo Park, round trip (1 truck/trip x 148 mi/truck x \$0.33/mi x 8 trips)			\$391
Vernal to Vermillion Creek, round trip (1 truck/trip x 374 mi/truck x \$0.33/mi x 2 trips)			\$247
GSA truck (rate/mo x # truck-months)	\$325.00	3	\$975
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Razorback Bar boat gas (2 gal gas/boat x 1 boat/trip x \$4.00/gal x 10 trips)			\$80
Razorback Bar boat oil (0.5 qts motor boat oil/boat x 1 boat/trip x \$11.00/qt x 10 trips)			\$55
Equipment (cables, batteries, wire, stakes, etc.)			\$500
	Subtotal		\$2,485
	TASK 1 TOTAL		\$11,699

Task 2- Data Analysis, Annual Report			
Labor			
GS-11 Fisheries Biologist	\$36.07	80	\$2,886
GS-12 Supervisory Fish Biologist	\$57.38	40	\$2,295
GS-9 Admin Assist.	\$40.78	80	\$3,262
TASK 2 TOTAL			\$8,443
SOW TOTAL			\$20,142

FY 2019: Annual report and raw data submitted November 2019.

Task Activity	Rate \$/h	Hours	Cost
Task 1			
Labor			
GS-11 Fisheries Biologist	\$36.79	80	\$2,943
GS-5 Fisheries Tech	\$25.97	40	\$1,039
GS-8 Fisheries Tech	\$41.35	131	\$5,416
Subtotal			\$9,398
Equipment			
Vernal to Escalante Ranch river access, round trip (1 truck/trip x 72 mi/truck x \$0.34/mi x 10 trips)			\$245
Vernal to Echo Park, round trip (1 truck/trip x 148 mi/truck x \$0.34/mi x 8 trips)			\$403
Vernal to Vermillion Creek, round trip (1 truck/trip x 374 mi/truck x \$0.34/mi x 2 trips)			\$254
GSA truck (rate/mo x # truck-months)	\$332.00	3	\$996
Razorback Bar boat gas (2 gal gas/boat x 1 boat/trip x \$4.00/gal x 10 trips)			\$0
Razorback Bar boat oil (0.5 qts motor boat oil/boat x 1 boat/trip x \$11.00/qt x 10 trips)			\$0
Equipment (cables, batteries, wire, stakes, etc.)			\$500
Subtotal			\$2,398
TASK 1 TOTAL			\$11,796
Task 2- Data Analysis, Annual Report			
Labor			
GS-11 Fisheries Biologist	\$36.79	80	\$2,943
GS-12 Supervisory Fish Biologist	\$58.52	40	\$2,341
GS-9 Admin Assist.	\$41.60	80	\$3,328
TASK 2 TOTAL			\$8,612
SOW TOTAL			\$20,408

FY 2020: Annual report and raw data submitted November 2020.

Task Activity	Rate \$/h	Hours	Cost
Task 1			
Labor			
GS-11 Fisheries Biologist	\$37.53	80	\$3,002
GS-5 Fisheries Tech	\$26.49	40	\$1,060
GS-8 Fisheries Tech	\$42.17	131	\$5,525
Subtotal			\$9,586
Equipment			
Vernal to Escalante Ranch river access, round trip (1 truck/trip x 72 mi/truck x \$0.35/mi x 10 trips)			\$252
Vernal to Echo Park, round trip (1 truck/trip x 148 mi/truck x \$0.35/mi x 8 trips)			\$414
Vernal to Vermillion Creek, round trip (1 truck/trip x 374 mi/truck x \$0.35/mi x 2 trips)			\$262
GSA truck (rate/mo x # truck-months)	\$338.00	3	\$1,014
Razorback Bar boat gas (2 gal gas/boat x 1 boat/trip x \$4.00/gal x 10 trips)			\$0
Razorback Bar boat oil (0.5 qts motor boat oil/boat x 1 boat/trip x \$11.00/qt x 10 trips)			\$0
Equipment (cables, batteries, wire, stakes, etc.)			\$500
Subtotal			\$2,442
TASK 1 TOTAL			\$12,028
Task 2- Data Analysis, Annual Report			
Labor			
GS-11 Fisheries Biologist	\$37.53	80	\$3,002
GS-12 Supervisory Fish Biologist	\$59.69	40	\$2,388
GS-9 Admin Assist.	\$42.43	80	\$3,394
TASK 2 TOTAL			\$8,784
SOW TOTAL			\$20,813

IX. Budget Summary:

FY 2016: \$34,858
 FY 2017: \$30,754
 FY 2018: \$20,142
 FY 2019: \$20,408
 FY 2020: \$20,813

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.