

**COLORADO RIVER RECOVERY PROGRAM
FY-2013-2016 PROPOSED SCOPE OF WORK for:**

Project No.: C-28a

Stationary PIT detection system in the Green River Canal, Green River, UT

Lead Agency: U.S. Bureau of Reclamation

Submitted by: Dave Speas

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Date: Jan 7, 2013

Category:

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

Expected Funding Source:

- Annual funds
- Capital funds
- Other (explain)

- I. Title of Proposal: Monitoring of entrainment rates in the Green River Canal, Green River, UT
- II. Relationship to RIPRAP:

Green River Action Plan

II. Restore habitat

II.B.2 Screen Tusher Wash diversion to prevent endangered fish entrainment, if warranted.

II.B.2.b Design.

III. Study Background/Rationale and Hypotheses:

On August 13, 2012, representatives of the Upper Colorado River Endangered Fish Recovery Program (Program) recommended that in conjunction with renovation to the Tusher Wash diversion dam in Green River, UT, the Program should construct an electrical fish barrier above the diversion dam raceway and evaluate its effectiveness at preventing entrainment of endangered fish in the raceway. As part of this proposal, also, the group recommended that a passive interrogation array (PIA) should be installed in the Green River Canal (GRC) to evaluate entrainment of endangered fish in the absence of the proposed electrical barrier and again once the barrier is operating. Installation of a PIA in GRC is the subject of this proposal.

IV. Study Goals, Objectives, End Product:

Goal: Evaluate entrainment of non-listed native and endangered fish in the GRC prior to construction of an electrical barrier at the canal intake and again after the barrier is operational.

Objectives:

- 1) Working with the Green River Canal Company, obtain permission to construct, operate and maintain a PIA in the Green River Canal.
- 2) Construct and install PIA in the Green River Canal.
- 3) Operate PIA for at least one irrigation season prior to and following construction and initial operation of an electrical fish barrier at the canal intake.
- 4) Dismantle and remove PIT system at close of the study.
- 5) Analyze results and compare pre-barrier entrainment rates to post-barrier rates.

End Products:

- 1) Operational PIA in the GRC prior to and following installation of an electrical fish barrier.
- 2) Annual reports on PIA operations and results.
- 3) Final report on entrainment of non-listed native and endangered fish prior to and following construction and operation of an electrical fish barrier.

V. Study area

The study area is near the top of the GRC near the town of Green River, UT. The PIA will be located immediately below a concrete flume about 100 m below the canal radial gates.

VI. Study Methods/Approach

Overview. Passive interrogation arrays function by using stationary antennae which scan the overlaying water column for the presence of fish containing passive internal transponder (PIT) tags, which are tiny transponder tags (i.e., about the size of a grain of rice) implanted into the body cavity of the fish by various fisheries agencies. We propose to install an automated, solar powered PIA in the GRC immediately below the concrete flume located about 100 yd downstream the top of the canal (Figure 1). At an on-site meeting (August 24, 2012) with a Green River Canal Company representative, we determined that this site was most amendable to the installation due to the ease of its vehicular access and ideal canal width. We were unable to assess ambient electrical interference levels at the time, however we believe the site will afford good coverage for detection of PIT-tagged endangered fish and that the PIA will not interfere with the existing sonic velocity meter on the concrete flume.

The PIA system we propose will be constructed from components from the Maybell Ditch PIA (near Maybell, CO), which is shown in figures 2-3. Antenna loops will be two rectangles constructed from schedule 80 PVC to house the antenna wiring. The size of the loops will be 4' X 16' (inside dimensions) which will be fastened in an upright position to t-posts driven into the canal substrate at the channel margins. This configuration will not impede water flow and there should be almost 2' of space between the water surface and the upper antenna limb through which any entrained debris can pass. Our experience from the Maybell Ditch PIA proves this to be adequate.

The antenna loops will be connected to the scanner and data logger via cables buried in a shallow trench (6-8" deep). All electronics will be located in a sealed job box placed next to at the solar panel mounting (figure 3). The power system will consist of two, 160 Watt solar panels with a 256 amp hour battery bank. If necessary, the entire set up can be fenced with a temporary using t-posts and fencing wire to deter cattle. All electronics will be grounded. No PIA components are permanent.

We propose to install the PIA in the winter of 2012-2013 when the canal is shut off for the winter and will inform Canal Company representatives when we will be on site to conduct the

installation and all other visits. We will operate and maintain the system for at least one full irrigation season prior to and one following commencement of electrical barrier operations. While the duration of PIA operation is contingent on the diversion dam rebuild schedule and electrical barrier installation, we anticipate the PIA will operate at a minimum of three irrigation seasons, perhaps more depending on the construction schedule and quality of the data.

While all data downloads and minor system adjustments can be done remotely via satellite uplink, we will visit the site to perform major repairs and maintenance as necessary and will coordinate with Canal Company representatives in advance. We will dismantle and remove all PIA components at the conclusion of the study.

PIA installation and construction will be done at no cost to the Canal Company. Personnel involved with installation are covered by workman's compensation and the Canal Company will not be held liable for any incidents or mishaps during installation, operation and dismantling.

Operation and maintenance: Data downloads and basic system troubleshooting and adjustment can be done remotely. However, should site visits become necessary (to complete repairs or remove debris, for example) we will make prior arrangements for access with GRCC representatives on an as-needed basis.

Data Analysis: PIT detection data from stationary systems typically consists of detected fish tag numbers and a date and time stamp for each detection that is specific to each antennae loop, plus frequent test-tag numbers resulting from the system's self testing procedure. We will edit and summarize this data for the entire study period, identify fish tag numbers and species, and interpret fish observations in relation to years, seasons, canal operations, and determine likelihood of entrainment during pre- and post-barrier study periods.

VII. Task Description and Schedule

2012:

Task 1: August 2012: Initial site visit to acquaint canal operators with project personnel and select antennae location.

Task 2: December 2012: Finalize Memorandum of Understanding between GRCC and UCRP granting permission to install and operate PIA.

2013:

Task 1: January-February 2013: Installation, testing and activation of PIA in GRC.

Task 2: April-November 2013 (irrigation season): Operate system; download antennae data, perform diagnostics, repair system if necessary; system shut-down.

Task 3: December 2013: Annual report.

2014:

Task 1: April-November 2014 (irrigation season): Activate and operate system; download antennae data, perform diagnostics, repair system if necessary; system shut-down.

Task 2: December 2014: Annual report.

2015 (pending Program approval):

Task 1: April-November 2015 (irrigation season): Activate and operate system; download antennae data, perform diagnostics, repair system if necessary; system shut-down.

Task 2: December 2015: Annual report

2016 (2015 if only 2 seasons of operation)

Task 1: March-August 2016: Draft final report, review and final report.

VIII. FY13 – FY16 work and budget

Deliverables/Due Dates:

- 1) PIT detection system installation and activation: Jan-Feb 2013
- 2) Annual report: December 2013

FY13 Budget

Task/item	Cost/unit	Units/days	Total
Task 1: Install and tune PIA			
Electrical Engineer Per diem	\$ 46.00	4	\$ 184.00
Lodging	\$ 77.00	4	\$ 308.00
Vehicle mileage	\$ 0.50	600	\$ 300.00
Trailer rental	\$ 50.00	4	\$ 200.00

Task/item	Cost/unit	Units/days	Total
Travel subtotal			\$ 992.00
USU Salary	\$ 35.00	65	\$ 2,275.00
USU Fringe	42.90%	\$2,275	\$ 975.98
USU Salary subtotal			\$ 3,250.98
Equipment (itemize):			
Antenna Tune up and repairs	\$ 250.00	1	\$ 250.00
Verizon Cell modem for uplink	\$ 600.00	1	\$ 600.00
Cam Straps, T-posts, install misc	\$ 300.00	1	\$ 300.00
Equipment Subtotal			\$ 1,150.00
Travel subtotal			\$ 992.00
Salary subtotal			\$ 3,250.98
Equipment subtotal			\$ 1,150.00
Task 1 total			\$5,392.98
Task 2: operate and maintain system, acquire data, etc			
Electrical Engineer (Contingency trip for repairs)			
Per diem	\$ 46.00	2	\$92.00
Lodging	\$ 77.00	1	\$77.00
Mileage	\$ 0.50	1200	\$600.00

Task/item	Cost/unit	Units/days	Total
Travel subtotal			\$769.00
Salary (System monitoring, repair and data download)	\$ 35.00	75	\$2,625.00
USU Fringe	42.90%	\$2,625	\$1,126.13
USU Salary subtotal			\$3,751.13
Travel subtotal			\$769.00
Salary subtotal			\$3,751.13
Task 2 total			\$4,520.13
Task 3: Annual Report (not included in total)	Hourly rate	Hours	Total
Principle investigator (GS12, USBR)*	\$34.00	8	\$272.00
Fringe benefits	108.80%	\$272.00	\$295.94
Task 3 total			\$567.94
Task 1-2 subtotal			\$9,913.10
CESU overhead	17.50%	\$9,913.10	\$1,734.79
Communications fee/month	\$50	7	\$350.00
FY13 Total			\$11,997.89

*Task covered under project 2, USBR program management; not included in total for FY13.

FY-2014 Work

Deliverables/due dates

- 1) April-November 2014: System activation and operation
- 2) December 2014: Annual report

FY14 Budget

Task/item	Cost/unit	Units/days	total
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Task/item	Cost/unit	Units/days	total
Task 1: operate and maintain system, acquire data, etc			
Electrical Engineer: Contingency trip for repairs, system activation/shutdown			
Per diem	\$46.00	3	\$138.00
Lodging	\$77.00	1	\$77.00
Mileage	\$0.50	1800	\$900.00
Travel subtotal			\$1,115.00
Salary (System monitoring, repair and data download)	\$35	85	\$2,975.00
USU Fringe	42.90%	\$2,975.00	\$1,276.28
Salary subtotal			\$4,251.28
Task 1 total			\$5,366.28
Task 2 Annual report (not included in total)			
Principle investigator (USBR)	\$34.00	8	\$272.00
Fringe benefits	108.80%	\$272.00	\$295.94
Task 2 total			\$567.94
Task 1			\$5,366.28
CESU overhead	17.50%	\$5,366.28	\$939.10
Subtotal FY14			\$6,305.37
Uplink communication fee	\$50	7	\$350
Total FY14			\$6,655.37

*Task covered under project 2, USBR program management; not included in total for FY14.

FY-2015 Work (if approved by Program)

Deliverables/due dates

- 1) April-November 2015: System activation and operation

2) December 2015: Annual report

FY15 Budget

Task/item	Cost/unit	Units/days	total
Task 1: operate and maintain system, acquire data, etc			
Electrical Engineer: Contingency trip for repairs, system activation/shutdown			
Per diem	\$46.00	3	\$138.00
Lodging	\$77.00	1	\$77.00
Mileage	\$0.50	1800	\$900.00
Travel subtotal			\$1,115.00
Salary (System monitoring, repair and data download)	\$35	85	\$2,975.00
USU Fringe	42.90%	\$2,975.00	\$1,276.28
Salary subtotal			\$4,251.28
Task 1 total			\$5,366.28
Task 2 Annual report (not included in total)			
Principle investigator (USBR)	\$34.00	8	\$272.00
Fringe benefits	108.80%	\$272.00	\$295.94
Task 2 total			\$567.94
Task 1			\$5,366.28
CESU overhead	17.50%	\$5,366.28	\$939.10
Subtotal FY15			\$6,305.37
Uplink communication fee	\$50	7	\$350
Total FY15			\$6,655.37

*Task covered under project 2, USBR program management; not included in total for FY15.

FY16 Work (FY15 if only two years of study).

Deliverables/due dates:

- 1) March 2016: Draft final report
- 2) April-June 2016: peer review
- 3) August 2016: final report

Task/item	Cost/unit	Units/days	total
Task 1 Final report			
Principle investigator (USBR)/hourly	\$34.00	60	\$2,040.00
Fringe benefits	108.80%	\$2,040.00	\$2,219.52
Total labor USBR			\$4,259.52
USU salary (day)	\$35	55	\$1,925.00
Fringe	42.90%	\$1,925.00	\$825.83
Total USU labor			\$2,750.83
Total FY16--USBR not included			\$2,750.83

*Tasks covered under project 2, USBR program management; not included in total for FY16.

IX. Budget Summary

FY	Total
FY13	\$11,997.89
FY14	\$6,655.37
FY15	\$6,655.37
FY16	\$2,750.83
Total	\$28,059.46

X. Reviewers:



Figure 1. Proposed Green River Canal PIA location (red circle) and ground view (inset). Antenna loops would be located just downstream of the concrete flume.



Figure 2. PIA system installed in the Maybell Ditch near Maybell, CO. Antenna loops are secured to t-posts at the edge of the canal and also to the canal streambed. Proposed PIA for the Green River Canal would very closely resemble this system.



Figure 3. PIA solar panel (background) and electronics job box (tan colored box in center). Components are protected by a wire enclosure.