

# **X-Fit Project: PIT Crew**

*FY 2012 Annual Report*

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***On the cover:** Salt Creek Summit antenna array in the Imnaha Basin. Photograph by Michael Hudson.*

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*Abstract* –With the ever increasing use of PIT technology to study fish biology and ecology, there is a need to design efficient PIT antenna arrays to meet research goals. Individual teams within the CRFPO work in diverse environments and have developed innovative approaches to address common problems using unique construction design and installation techniques. Work schedules seldom allow for regular communication and dissemination of information with other teams. The X-Fit PIT Crew was created to set aside specific time where teams could share their collective knowledge and expertise with the goal to develop more efficient PIT tag antenna arrays. The outcome of this collaborative effort included one site visit and a formal X-Fit PIT Crew meeting held in October. By combining our knowledge, all projects have the means to develop the best possible antennas for data collection. Innovation leads to cost effective solutions as well as savings of materials and labor by building antennas properly and installing sites in less time.

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## **Introduction**

The CRFPO uses PIT tag technology to address research needs and objectives defined in the Bull Trout Draft Recovery Plan (USFWS 2002), Coastal Cutthroat Trout Conservation Initiative (Griswold 2006), Columbia River salmonid populations, and Eagle Creek ecological interactions. PIT antenna arrays monitor movement, passage, migration rates and routes of bull trout, Chinook, coho, steelhead, and coastal cutthroat trout. Currently, the CRFPO has PIT arrays in the Walla Walla and Imnaha subbasins, Eagle Creek, Tryon Creek, Deer Island, and Julia Butler Hansen NWR.

With increased use of PIT technology to study fish biology and ecology, there is a need to design efficient PIT antenna arrays to meet research goals of all teams at CRFPO. Although individual teams have developed specific design techniques and innovative ways to address common construction problems, there is rarely time to distribute this information to other groups. The X-Fit PIT Crew was created in 2012 as a collaborative effort among Conservation Assessment (CAT), Hatchery Assessment (HAT), and Water Management (WMT) teams to provide a time and place where teams could meet to discuss PIT antenna design, installation, and maintenance techniques. As technology and antenna design is continuously updated and antenna arrays are subjected to various environmental influences (i.e., high flows, debris, tides, vandalism, and power fluctuations), the need for collaboration becomes even more important. By combining our knowledge all projects have the means to develop the most reliable antennas for data collection. Working collaboratively may also provide additional benefits such as savings on materials (if purchased in bulk), finding new or more cost effective materials, shared equipment (e.g., tools, vehicles, and trailers), shared labor, and more innovative and efficient design and installation techniques. Improved antenna design reduces data gaps due to off-line antennas and may provide more reliable data that may lead to a better understanding of population dynamics and better management decisions.

The objectives for the first year of the X-Fit PIT Crew were to 1) Collaborate across teams on antenna design and construction, 2) Meet with other teams to learn about array design, address problems, and discuss new techniques, 3) Coordinate site visits to install, troubleshoot, and maintain PIT antenna arrays.

## **Study Area**

Columbia River Fisheries Program Office PIT antenna arrays are located throughout Oregon and Washington. The CAT Team operates arrays at four sites in the Imnaha Basin and three sites in Tryon Creek. The WMT Team has six sites in the Walla Walla River and four sites in Mill Creek. The HAT Team has two sites in Eagle Creek and one site at Warm Springs.

## **Methods**

A site visit was conducted in August where a member from the WMT Team accompanied the CAT Team to four PIT array sites in Northeast Oregon to assist with routine maintenance. A formal meeting was held in October to learn about arrays built by other teams, address problems, and discuss new techniques.

## Results

### *Site Visit*

Ryan Koch accompanied Brook Silver to antenna sites in Northeast Oregon August 27-31. He was shown the diversions and barriers faced by bull trout in the Innaha Core Area. He suggested additional placement for antennas at existing sites and design modifications. He helped troubleshoot the Big Sheep Creek site where solar power went off, drained the batteries, and needed to be replaced with new ones because they would no longer take a charge.

### *Meeting*

Held October 9, 2012 (Appendix B)

#### *a) Team Antenna Status*

#### *b) New techniques and designs*

1. The CAT Team is purchasing capacitors (10000 pF - 1600 V - Metal Polypro - P10507-ND) from Digi-Key Corporation for over 90% less than previous capacitors (\$0.85 ea.).
2. The HAT Team is using “CAT-6 ethernet cable” instead of ribbon wire with good results
3. The WMT Team discovered that grounding the laptop can also reduce noise

#### *c) Software Updates*

1. Update all computers to Minimon v1.7.0
2. Update all MUX firmware to 1.7

#### *d) Folder on the common drive to hold PIT antenna information*

1. M:\PIT Crew Antenna Information

#### *e) Troubleshooting guide*

1. M:\PIT Crew Antenna Information\ Gear Lists and SOPs\ PIT Array Troubleshooting

#### *f) Future direction*

## Conclusions

The FY2012 X-Fit PIT Crew created a channel of communication among teams to benefit current CRFPO projects and future programs using PIT tag technology. The X-Fit PIT Crew will be pursued in FY2013 to continue disseminating information among the teams. Formal meetings will be held on a quarterly basis and information will be updated and maintained on the common drive for all to share. Opportunities for site visits among teams will remain available as needs arise and schedules permit. In the future, the PIT Crew would like to broaden its scope to include PIT tagging methods and will explore a comparative materials study that will further improve antenna efficiency.

## Acknowledgements

CRFPO project funding to promote collaboration and communication across teams.

## Literature Cited

Griswold, K. 2006. Report on the Coastal Cutthroat Trout Science Workshop: Compilation of Research and Monitoring Needs for Coastal Cutthroat Trout Throughout Their Distributional Range, June 6-7, 2006, Portland, Oregon, final report submitted to PSMFC, Portland, Oregon.

USFWS. 2002. Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. US Fish and Wildlife Service, Region 1, Portland, Oregon.

## Appendix A: Capacitor Configuration Handout

20000 pF		7142 pF		4800 pF		4000 pF	
15200 pF						3750 pF	
13050 pF		6667 pF		4666 pF			
11900 pF		6250 pF		4616 pF		3636 pF	
8710 pF		6000 pF		4545 pF		3571 pF	
8700 pF		5714 pF		4444 pF		3333 pF	
8490 pF		5556 pF		4286 pF		3000 pF	
8135 pF				4167 pF		2857 pF	
7600 pF		5000 pF				2500 pF	
7421 pF							

## Appendix B: Meeting Notes

### XFit PIT Crew Meeting October 9, 2012

(Meeting notes M:\PIT Crew Antenna Information\Meetings)

Attending: Ryan Koch, Brook Silver, Brian Davis, Jennifer Poirier, Tim Whitesel, Mike Hudson

#### o Existing Antennas

##### • Native trout

- o NEO: 4 sites, total of 14 antennas
  - a. LSC has high flows in spring
  - b. BSC is difficult to get to in winter
- o Tryon: 3 sites, total of 7 antennas
  - a. TCM has “dirty power” and lots of sediment washing in and out.
  - b. TCL has high flows and loading issues, some vandalism

##### • Water Management- Sites have been in for many years and data is shared with other agencies (ODFW, Tribes). When there are gaps in the data from blown out antennas their long-term sampling gives an idea as to what could be missing.

- o Walla Walla: 6 sites, total of 10 antennas-trouble with loading and high flows.
  - a. Bear Creek is difficult to get to

- o Mill Creek: 4 sites

##### • Hatchery Assessment

- o Eagle Creek: 2 sites
  - a. One antenna operates off a cheeseblock (works great), has had problems with loading and grounding but used a wooden frame to protect antenna. Problems with vandalism
  - b. Need to direct fish to better flow.
  - c. Stopped using Lower Mainstem Eagle Creek site because antennas were being blown out. Decided to focus on areas that work well.

- o Warm Springs: Not currently in use

#### o New Techniques

##### • Designs

- o Lower Inductance to prevent using too many capacitors. Ryan removes loops in the antenna at the site before gluing the cap on.
- o Plug protected in a PVC sleeve with cap (Brian)
- o 10,000 capacitor on one wire, rest of the capacitor pack on the other wire (Jen and Brian are using this method).

- Anchor antenna above water line with rope and use zip ties designed to break away at the bottom. (Brook and Mike are testing at Tryon)
- Use the cheeseblock tuner to find the capacitance needed for optimal tuning before making capacitor pack (Brian).
- 4.7pF capacitors help fine tune capacitor packs (Jen and Brian)
- Running cable through perforated pipe fills with mud but helps bundle cables.
- Lower prices on materials
  - 10,000pF Capacitors from Mike's source
  - Ethernet grade cable CAT6 (\$20/50 feet) instead of ribbon wire
- **Site Visits**
  - Pinhead: Half duplex system is in use and a visit can be arranged if anyone is interested (Contact Mike).
  - Tryon: First Thursday of each month site is downloaded, e-fishing and PIT tagging takes place (~5 hours). Anyone is welcome (Contact Brook).
  - Eagle Creek: Every Wednesday and can help brainstorm a fish diversion (Contact Jen and Brian).
  - Walla Walla: Sites are easy to drive to, and many have auto uploads (sat. cell, phone) except Bear Creek is a 5 mile hike in (Contact Ryan).
- **Software**
  - MiniMon Version 1.5.3 (and lower) is not capable of recording PIT tags with a 384 manufacturer's code.
  - Update all computers to Minimon v1.7.0
  - Update all MUX firmware to 1.7

### **Future Objectives**

- Create folder on the common drive for group information and resources M:PIT Crew Antenna Information (Brook)
  - Add to troubleshooting guide (all)
  - Add to antenna supplies list (all)
  - SOPs from all teams (all)
  - Vendor list (all)
- Meeting notes on Common Drive (Brook).
- Annual Report- put together for comment using Conservation Assessment template (Brook).
- Email team with site visit opportunities and schedule next meeting
- Next meeting. January?
  - PIT Tag conferences/meetings
    - When/Where
    - Attendee

- If none, CRFPO hosting?
- New Information
- Has Tryon been vandalized or blown out yet?
- FY13 Proposal
  - Comparative study of antenna designs in varying habitats?
    - a. Think of study design, particularly a control.
    - b. All antennas behave differently, even if they are made identically-how will be able to compare with these differences.
  - Tagging methods

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