



R & E Grant Application 13 Biennium

Project #:
13-080

LCM PIT Tag Antenna - Coho Monitoring

Project Information

R&E Project Request: \$4,943.50
Match Funding: \$15,750.00
Total Project: \$20,693.50
Start Date: 9/1/2014
End Date: 6/30/2015
Project Email: erik.suring@oregonstate.edu
Project Biennium: 13 Biennium
Organization: ODFW - Corvallis Research Lab

Applicant Information

Name: Erik Suring
Address: 28665 Highway 34
Corvallis, OR 97333
Telephone: 541-286-5328
Email: erik.suring@oregonstate.edu

Past Recommended or Completed Projects

This applicant has no previous projects that match criteria.

Project Summary

This project is NOT part of ODFW's 25 Year Angling Plan.

Activity Type: Monitoring

Summary: The ODFW Life Cycle Monitoring (LCM) Project monitors salmonid production and estimates marine and freshwater survival of coho salmon on the Oregon Coast. At the Mill Creek (Siletz) site we have tagged juvenile coho salmon parr in the late summer with Passive Integrated Transponder (PIT) tags since 2010 in an effort to gain information on additional life stages. PIT tags individually identify fish and are detected electronically when a tagged fish is scanned after trapping or passes an in-stream antenna. This project would add an antenna array at the trapping site to detect juveniles and adults that bypass our traps.

Objectives: Deployment of a PIT tag antenna array would increase the accuracy and precision of our fish production and survival data. It would improve the accuracy of our coho smolt production and freshwater survival estimates, increase the tag recoveries of adult spawners, and provide information on alternative life histories such as fall

juvenile migrants.

The antenna array would improve the accuracy of coho smolt production estimates in two ways: by providing information on juvenile out-migration during periods when the fish trap cannot be operated, usually during high flows, and as a secondary measure of trap efficiency. The juvenile fish traps cannot capture fish under all stream flow conditions and our smolt production estimates rely on the assumption that fish movement during the non-trapping periods is similar to the trapping periods. The antennas can give us information on fish movement during non-trapping periods. Our juvenile traps also do not catch all fish migrating from the system and we use a mark-recapture estimate to calculate what proportion our trap catches. The proportion of tagged fish detected by the antennas that are not caught in the trap will be a secondary method of determining trap efficiency.

PIT tags can remain operational for years and fish that were tagged as juveniles can be encountered when they return as adults. As our adult trap does not catch all spawners an antenna array will increase the detections of tagged adults. While sample sizes will be low this can provide validation of traditional marine survival estimates and allow for more detailed survival analysis, such as the affect of smolt or parr size and migration timing on survival in the ocean.

The antenna array can operate under conditions that a typical juvenile fish trap cannot, such as high fall stream flows. We have little information on juvenile coho migration in the fall or their contribution to adult returns at the LCM sites and having an in stream array will help fill this data gap.

Fishery Benefits: LCM data have recently been used to overhaul the system used to predict coho salmon marine survival, an important component used in management of wild coho salmon on the Oregon Coast, for both ocean and in-river fisheries (Amendment 13 of the Pacific Coast Salmon Fishery Management Plan). Previous predictors, based principally on Columbia River hatchery returns, were not responsive to actual conditions on the Oregon Coast. A more accurate predictor should allow increased fishing opportunities when returns will be high but also reduce conservation risk by reducing impacts in low return years. We are continually researching ways to make our productivity and survival estimates more accurate, which will feed into more accurate fisheries management.

Watershed Benefits: A large scale restoration project is proposed for the Mill Creek basin above the trapping site. More accurate production and survival data will allow for a better evaluation of restoration effects on juvenile coho salmon.

Current Situation: ODFW has trapped adult and juvenile coho salmon and steelhead trout at the Mill Creek (Siletz) site since 1997 as part of the LCM project. With these data we can estimate marine (smolt to adult) and freshwater (egg to smolt) survival for coho salmon. In 2010 we began PIT tagging juvenile coho in September and October which we then recapture the following spring as they migrate to the ocean as smolts. This allows us to partition the freshwater survival into egg to parr and parr to smolt, or overwinter, survival estimates. Overwinter survival has been determined to be the bottleneck life stage for coho salmon in most basins on the Oregon Coast. In addition, we can determine the characteristics of fish that survive, such as size and rearing location.

Currently we can only detect tagged juveniles when they are captured at the smolt trap, which on average captures half of the coho smolt migrants at Mill Creek. Similarly we can only detect tagged returning adults if they pass through the fish ladder and trap instead of jumping the falls, which are only a partial barrier. A PIT antenna array will allow for detections of fish not caught in the trap and increase the sample size for survival estimates. One aspect of overwinter survival we cannot currently evaluate is the number of fish that leave the system in the fall. We have attempted to operate a juvenile fish trap in the fall at this site but high stream flows and heavy debris loads made this impossible. An antenna array can operate during the fall to fill in this data gap.

Alternatives: PIT tag antenna reader systems are available from other companies, such as Biomark, but are much more expensive and may have features we do not need, like the ability to read alternative tag types that we are not using. Alternative funding sources may be available but would delay the deployment of the antenna array to the summer of 2015, causing us to miss a year of data collection. We would still be able to collect production and survival data if no action is taken but uncertainties and data gaps will remain.

Designer: The project will be designed by Erik Suring and Chris Lorion.

Methods:

The methods for building this project are based primarily on the report from the PIT tag antenna workshop, September 2013, (Ramirez et al. In Prep.), advice from other ODFW employees familiar with antenna construction, and support from Oregon RFID.

The principle electronics such as the reader, logger, multiplexer, and antenna tuning and testing tools would be purchased from Oregon RFID. Components of the DC-DC converter would be ordered from Newark element14 and assembled by Erik Suring. Other antenna components such as wire and structural components could be purchased from any hardware store.

With stream channel measurements from the study site Erik Suring would build and test antenna designs at the ODFW Corvallis Research Lab to determine the optimum antenna configurations. Once this has been done these antennas can be deployed and tested at the Mill Creek Siletz site. During operation batteries would be changed as needed and tag detection data downloaded regularly. The antennas would be inspected daily for damage. An electronic marker tag will be used as a monitor of array function. The antenna array will be removed in summer after coho out-migration is complete. It will be reinstalled in September of subsequent seasons to record additional years of data.

References:

Ramirez, Ben, Steve Starcevich & Patrick Barry. In Prep. PIT Tag Antenna Design and Construction. Oregon Department of Fish Wildlife, Salem, OR

Zydlewski, Gayle Barbin, Gregg Horton, Todd Dubreuil, Benjamin Letcher, Sean Casey & Joseph Zydlewski. 2006. Remote Monitoring of Fish in Small Streams, Fisheries, 31:10, 492-502

Oregon RFID. 2009. Installation guide.
<http://www.oregonrfid.biz/pdfdocs/Installation%20Guide.pdf>

Inspector: Erik Suring and Chris Lorion will test and inspect the antenna during deployment and operation.

Funding Elements: R&E funds will be used for all the components needed to build an PIT tag antenna array. The funding for the labor to build, deploy, and operate the array as well as the PIT tags used in the study will be provided from other sources.

Partners: Yes
The Plum Creek Timber Company is providing field technicians to assist with tagging juvenile coho in the summer.

Existing Plan: No

Affected Contacted: Yes

Affected Supportive: Yes

Affected Comments: We have a long term positive relationship with the landowner, Ken Rawlins, and have been operating a juvenile fish trap on his property since 1998. The antenna array can be removed when not in use.

Project Schedule/Participants/Funding

Activity	Date	Participants
R&E - Purchase equipment and test antenna designs.	9/1/2014	ODFW - Erik Suring
R&E - Install equipment and antenna array at Mill Creek	9/15/2014	ODFW - Erik Suring and Chris Lorion
Removal of antenna array and screw trap for the season (R&E project completion).	6/30/2015	ODFW
Tag juvenile coho with PIT tags	9/29/2014	ODFW
Operate the antenna array to detect tagged adults and juveniles in fall, winter, and spring.	10/2/2014	ODFW
Install array for a subsequent season of monitoring.	10/1/2015	ODFW
Operate adult trap for returning coho and steelhead through 6/1/15	10/1/2014	ODFW
Operate screw trap for out-migrating juvenile coho and steelhead through 6/29/15.	3/1/2015	ODFW

Affected Species: Coho Salmon

Project Permits

Name	Issued By	Secured?	Date Secured	Date Expected
2014 4d Scientific Take	NOAA	Yes	3/27/2014	3/1/2014
2015 4d Scientific Take	NOAA	No	1/1/0001	3/1/2015

Project Monitoring

Organization	Address	Activity	Frequency
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ODFW	28665 Highway 34 Corvallis, OR 97333	LCM base monitoring - Trap checks and antenna data downloads.	Daily from October through June
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Project Maintenance

Organization	Address	Activity	Frequency
ODFW	28655 Hwy 34 Corvallis, OR 97333	LCM base maintenance	Annual and as needed in-season

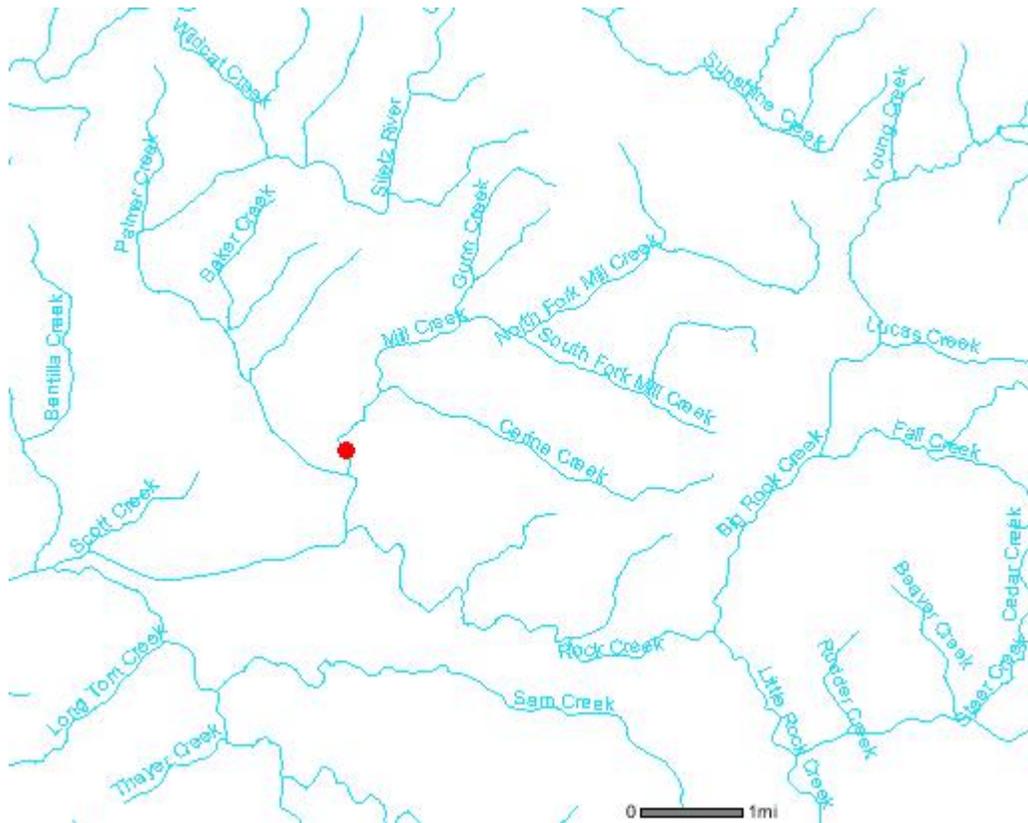
Project Match Funding

Funding Source	Cash	In-Kind	Other	Description	Total	Secured?	Conditions?	Comments
R&E Request	\$4,943.50	\$0.00	\$0.00		\$4,943.50	No	No	
Sport Fish Restoration	\$0.00	\$0.00	\$13,250.00	PIT tags	\$13,250.00	Yes	No	
Sport Fish Restoration	\$0.00	\$2,500.00	\$0.00		\$2,500.00	Yes	No	
				Total Match Funding:	\$20,693.50			

Project Budget

Item	Item Type	Units	Unit Cost	R&E Funds	Match Funds	Total
HDX Long Ranger Reader	Equipment	1	\$2,495.00	\$2,495.00	\$0.00	\$2,495.00
Storage Box	Equipment	1	\$200.00	\$200.00	\$0.00	\$200.00
Waterproof Marker Tag	Equipment	1	\$175.00	\$175.00	\$0.00	\$175.00
SFR Personnel - Array construction and deployment	Personnel	1	\$2,500.00	\$0.00	\$2,500.00	\$2,500.00
Antenna Tuning Tools	Supplies/Materials /Services	1	\$679.50	\$679.50	\$0.00	\$679.50
Antenna Wire and Structural Components	Supplies/Materials /Services	2	\$140.00	\$280.00	\$0.00	\$280.00
Batteries	Supplies/Materials /Services	4	\$166.00	\$664.00	\$0.00	\$664.00
DC-DC Regulator	Supplies/Materials /Services	1	\$150.00	\$150.00	\$0.00	\$150.00
SFR PIT Tags	Supplies/Materials /Services	5000	\$2.65	\$0.00	\$13,250.00	\$13,250.00
Twinax Connection Cable	Supplies/Materials /Services	40	\$7.50	\$300.00	\$0.00	\$300.00
					Total Budget:	\$20,693.50

Project Map



Additional Files

Click a link to view that particular file.

[ODFW Signature Page](#)

Applicant Signature Page
Fish Restoration and Enhancement Program
(Oregon Department of Fish and Wildlife Applicants)

I hereby make an application for financial assistance under the terms and conditions of the Fish Restoration and Enhancement Program as described in my project application. I acknowledge that:

- This proposal is an identified priority at the district, region, and/or state level and has been identified as such in the application (check box for appropriate level).
- This proposal is consistent with any applicable goals, policies, rules, species or basin management plans adopted by the F&W Commission and this has been explained in the application.
- This proposal will not be used to cover, back fill, or fund shift elements that have been cut or defunded as part of agency budget reductions. Approved deferred maintenance or projects with division approval are exceptions.

I understand that if my project proposal is approved for Restoration and Enhancement (R&E) Program funding, the following will apply:

- Applicants must sign an agreement containing the terms and conditions for the project implementation, release of funds, and documentation of completion. Non-compliance may impact future funding opportunities.
- The R&E Program will not pay for expenses which occur before the approved start date or after the end date.
- Funding is available one biennium only without prior authorization by the R&E Board.
- Applicant agrees to notify the R&E Program of all funds not needed for the project upon determination.
- Any inappropriate expenses using R&E funds will be corrected by the applicant immediately. By the close of the biennium any expenses exceeding, or not identified in, the grant approval will be reverted to a local cost code.
- Copies of all landowner, monitoring and maintenance agreements must be submitted to the R&E Program.
- Educational products resulting from projects are public domain.
- Information collected is subject to Oregon Public Records Law.
- As applicable, the project will be consistent with all federal, state, and local regulations, including the State Land Use Planning Goals & Local Land Use Plans, prior to any on the ground work.

By signing this application, I certify to the best of my knowledge that the information contained in the application are true, complete and accurate. If awarded funding the applicant agrees to follow all terms and conditions outlined in the agreement.

Project Title: Life Cycle Monitoring PIT Tag Antenna - Coho Monitoring

Applicant Name: Erik Suring Title: SFWB - LCM Project Leader

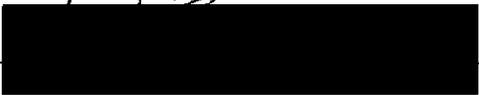
Applicant Signature:  Date: 4/2/14

Manager Certification:

To be completed by Watershed Manger, Hatchery Coordinator, Program Manager, or higher level manager.

- I concur with the statements above and the applicant has permission to request these funds.

Manger Name: Kelly Moore Title: PBM-B Fish Resource Prgn Mgr.

Manager Signature:  Date: 4/2/14