

**RESEARCH PACKET
AND
BONNEVILLE PROJECT IMPACTS DOCUMENT**

**NOAA FISHERIES RESEARCH ACTIVITIES
2016**

EVALUATION OF CORNER COLLECTOR PIT-TAG DETECTION EFFICIENCY

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EVALUATION OF CORNER COLLECTOR PIT-TAG DETECTION EFFICIENCY

BACKGROUND

Over the past decade BPA, NOAA Fisheries, and U.S. Army Corps of Engineers have been developing a PIT-tag system for spillways with the help of Biomark and Pacific States Marine Fisheries Commission. This development has had to address a variety of technical challenges which include the need for a relatively large detection field, a short transit time within the detection field, shielding designs that minimize impacts from ferrous rebar as well as adjacent antennas, and synchronization of multiple antennas.

The Bonneville Dam corner-collector PIT-tag system (BCC) has been the concept design and preliminary field testing location for PIT tag and detection system development. The BCC system is comprised of the largest functional FDX antenna (17' x 17') with a specialized transceiver designed specifically for this application. NOAA Fisheries has utilized this system to field test new PIT tag models and transceivers.

During the 2011 tag evaluation, we evaluated a prototype spillway transceiver that could detect standard ISO FDX-B tags that are detected in 32 msec as well as faster non-ISO tags that are detected in 16 msec. A similar fish test was conducted in April 2014 after additional modifications were made to the spillway transceiver (FS3001) being developed by Biomark, with NOAA Fisheries and PSMFC.

During the 2011 evaluation, the prototype spillway transceiver detected approximately 2% more of the 32-msec SST-1 tags compared to the BCC transceiver. PT300 9-mm tags were detected at twice the rate when using the prototype transceiver. More interestingly, 9% more of the 16-msec tags were detected compared to the 32-msec SST-1 tags. The faster 16-msec tags were developed to help with detection of PIT tags transiting spillways where water velocities range from 60-75 fps. Over the years, the original BCC transceiver consistently yielded detection rates in the 75-80% range for 32-msec SST-1 12-mm tags. The 2014 evaluation showed further increases in detection rates with additional modifications to the spillway transceiver (Figure 1). Detection of the 32-msec SST-1 12-mm tags improved from 80.2% to 85.1% and from 24.5% to 68.8% for the 32-msec PT300 9-mm tags. The 16-msec tags yielded even higher detection rates; 86.9% to 93.3% (16-msec SST-1 tags in 2011 vs. 2014) and 76.0% for 16-msec PT300 tags, which were not previously evaluated.

This work is critical to the region for several reasons. For one, BCC has proven over the last couple of years to be our most reliable PIT tag detection site and any boost in coverage through the development of the FS3001 will help with better precision for survival estimation. This evaluation would allow us to test the sensitivity settings to determine how to operate the system

under varying fish passage densities to increase detection probabilities throughout the season. The region is supporting the development of a PIT-tag detection system for spillways and 16msec tags may well be essential for collecting tag data in water that is moving at 60-70 fps. This test under water moving at ~35 fps will provide some solid data to help us move forward with the development work.

OBJECTIVES

We will use 5,000 fish tagged with full and half telegram PIT tags to evaluate the modified BCC transceiver. With a detection rate of 75-80%, fish will yield an accurate estimate of reading efficiencies within $\pm 3\%$.

METHODS

We plan to run the fish tests in April 2016 (soon after the corner collector is opened full time for the year) because the hatchery will be releasing its fish around that same time. We are planning on using fall Chinook salmon that we will collect from Spring Creek National Fish Hatchery or whichever hatchery USFWS grants us fish from for our evaluation. The fish will be picked up by NOAA Fisheries and trucked to Bonneville Dam. We will then tag them in the juvenile fish facility.

SCHEDULE

Work would be scheduled as follows:

<u>Completion date</u>	<u>Task</u>
April 25, 2016	Transport fish from Spring Creek NFH to JFMF for holding.
April 25, 2016	Install fish release hose on intake deck at BCC.
April 26, 2016	Tag fish at JFMF.
April 27, 2016	Begin fish releases at Second Powerhouse Corner Collector.
April 28, 2016	Complete fish releases at Second Powerhouse Corner Collector and remove research gear.

PIT-TAGGING JUVENILE HATCHERY FALL CHINOOK FOR BCC TRANSCEIVER TEST

Juvenile hatchery fall Chinook salmon will be provided by Spring Creek National Fish Hatchery and held at the JFMF. Fish will be anesthetized, weighed, measured, and PIT-tagged at the JFMF, and then allowed to recover prior to release to the river.

FACILITIES AND EQUIPMENT REQUIREMENTS

Holding and tagging of test fish will require use of existing JFMF facilities. Temporary provisions for holding fish, e.g., containers, water supply plumbing, and drainage piping, will be set up at the JFMF.

Release of test fish at the Second Powerhouse Corner Collector will require access to the Second Powerhouse intake deck. On the intake deck, use of the river water supply will be necessary to provide flushing water during morning fish releases and also to provide holding and release hose water.

PROJECT IMPACTS (ALL ACTIVITIES)

Project Services

No project services will be needed for this evaluation.

Security

Although most activities will occur during daylight hours, we anticipate study personnel may need to be on the Bonneville Project grounds outside of normal working hours. Since most tasks will take place in secure project locations, contact with the public will be limited to transit between the Second Powerhouse and the juvenile facility.

Partial lists of personnel and vehicles are shown in Tables 1 and 2. Other employees and vehicles may be added prior to start up. First aid and CPR certifications will be updated as necessary. Updated information will be communicated to the Bonneville POC. No boat work is involved with the project.

Table 1. Study personnel, affiliation, activity, and certifications.

NAME	AGENCY	ACTIVITY	FIRST AID	CPR
AXEL, GORDON	NOAA-F	Juv. Fish Facility, BCC	1/12/17	1/12/17
LAMB, JESSE	NOAA-F	Juv. Fish Facility, BCC	1/12/17	1/12/17
DOWNING, SANDY	NOAA-F	Juv. Fish Facility, BCC	1/12/17	1/12/17
SANDFORD, BEN	NOAA-F	Juv. Fish Facility, BCC	1/12/17	1/12/17
MARR, RON	NOAA-F	Juv. Fish Facility, BCC	1/12/17	1/12/17
NESBIT, MATTHEW	NOAA-F	Juv. Fish Facility, BCC	1/12/17	1/12/17
TULLOS, LOUIS	NOAA-F	Juv. Fish Facility, BCC	1/12/17	1/12/17

Table 2. Vehicles.

LICENSE	ST	DESCRIPTION	COLOR	AGENCY	OWNER	POC/CREW
G63-1459M	US	12 CHEVY PU	WHITE	NOAA-F	US GOV'T	LAMB, JESSE
G63-2107G	US	08 FORD PU	WHITE	NOAA-F	US GOV'T	MARR, RON
G63-0854M	US	12 FORD PU	WHITE	NOAA-F	US GOV'T	TULLOS, LOUIS
G41-1165G	US	08 CHEVY SUV	BROWN	NOAA-F	US GOV'T	DOWNING, SANDY
G63-1935H	US	09 CHEVY SUV	TAN	NOAA-F	US GOV'T	AXEL, GORDON

Safety

All personnel will be made aware of applicable provisions of the Safety Requirements Manual #385-1-1. The Activity Hazard Analysis and the Job Hazard Analyses are attached.

ACTIVITY HAZARD ANALYSIS

ACTIVITY: NOAA FISHERIES - RESEARCH

Gordon Axel

LOCATION: JFME, INTAKE DECK BCC

ANALYZED BY/DATE: 18 February 2016

REVIEWED BY/DATE: _____

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS (FROM EM 385-1-1)
1. Setup equipment at work sites. 2. Conduct the work. 3. Removal equipment.	• Foot injury • Hand injury • Eye or face injury • Noise exposure • Head injury • Hazardous substances • Material handling • Housekeeping • Fire	• Steel-toed safety shoes (05.A.08) • Appropriate hand protection (05.A.10) • Protective equipment (05.B.01, 02, 06) • Hearing protection (05.C.01, 04, 07) • Protective headgear (05.D.01, 02, 04) • Material Safety Data Sheets to be maintained on site (06.B.01) • Use of lifting devices and handling aids (14D.A.01-06) • Safe and orderly work areas (14.C.01-04, 08) • Flammable liquids handling and storage (09.b.01-04, 08, 10, 12, 14, 16, 21) - Fire extinguishers (09.3.01-04)

JOB HAZARD ANALYSIS

JOB TITLE: PIT Tag Juvenile Salmonids

Gordon Axel

LOCATION: PH2 Juvenile Fish Facility

ANALYZED BY/DATE: 18 February 2016

REVIEWED BY/DATE: _____

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS (FROM EM 385-1-1)
1. Inject tags	• Minor personal injury • Blood-borne pathogens	• Care with injector and awareness of surroundings. • Designated, responsible employees know location and use of clean-up kit (03.A.06).

JOB HAZARD ANALYSIS

JOB TITLE: Release test fish

Gordon Axel

LOCATION: PH2 BCC, Intake deck

ANALYZED BY/DATE: 18 February 2016

REVIEWED BY/DATE: _____

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS (FROM EM 385-1-1)
1. Load fish for transport	Personal injuries	- Foot injury. Steel-toed safety shoes (05.A.08). - Hand injury. Appropriate hand protection (05.A.10). - Noise exposure. Hearing protection (05.C.01, 04, 07). - Head injury. Protective headgear (05.D.01, 02, 04). - Lifting injury. Use of lifting devices and handling aids (14D.A.01-06).
2. Vehicle operation	Accident	- Seat belt use (18.B.09). - Backing (08.C.04). - Vehicle inspection (18.A.03) - Operation (18.C).
3. Release fish	Personal injuries	- Foot injury. Steel-toed safety shoes (05.A.08). - Hand injury. Appropriate hand protection (05.A.10). - Noise exposure. Hearing protection (05.C.01, 04, 07). - Head injury. Protective headgear (05.D.01, 02, 04). - Lifting injury. Use of lifting devices and handling aids (14D.A.01-06).