Lower Snake River – New Adult Detection Efficiencies

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Background

Percent conversion target for adult salmonids required by NOAA Fisheries has not been met for several stocks since the 2008 FCRPS BiOp set the standards in 2008 partially due to potential undercounting and over-counting of fish at individual dams.

Objective

- Implement FDX-B PIT-tag detection at The Dalles, Lower Monumental, and Little Goose dams adult ladder count stations and Ice Harbor adult trap.
- Estimate detection efficiency.
- Enumerate fallback or passage events at each location.
- Estimate conversion rate.

Methods – PIT Systems

- Construct & Install PIT Tag Detection systems
  - Use of thin wall antennas allows installation without the need for removing concrete due to approximately 2-1/8” wall thickness.
  - Antenna design allows it to be placed against metal.
  - Biomark FS2020 single-channel reader.

Standard vs. Thin Wall Antenna

7” vs. 2-1/8” wall thickness

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The Dalles Dam

- Visit each site to determine counting window dimensions, conduit placement, reader enclosure location, and cable length.

The Dalles Dam

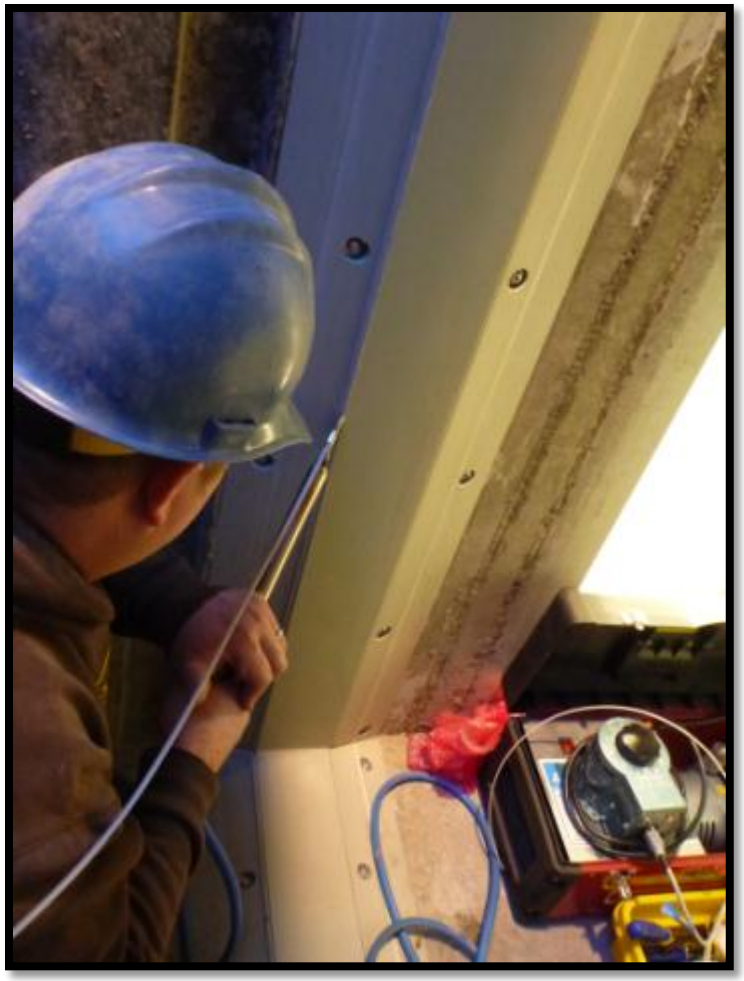
- Test fixtures constructed to capture irregularities in walls.

The Dalles Dam

- Antennas secured using lead-in/lead-out ramps with countersunk anchor holes.

The Dalles Dam

- Ramps welded to antennas in place resulting in a smooth transition between components.



The Dalles Dam

- Completed installation
- 31” x 88” ID and 35” OD

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Lower Monumental Dam – North

Entrance

Exit

Lower Monumental Dam – North-Entrance

- 18” x 68” ID

Lower Monumental Dam – North-Exit

- 18” x 75” ID

Lower Monumental Dam – South-Entrance

- Two antennas placed in the entrance of the south ladder counting window slot.

Lower Monumental Dam – South-Entrance

- Modify entrance location to accept two thin wall antennas and false floor.
- 18-3/4” x 69” ID

Lower Monumental Dam – South-Entrance

- Integrated antennas into new wall construction to maintain channel width.

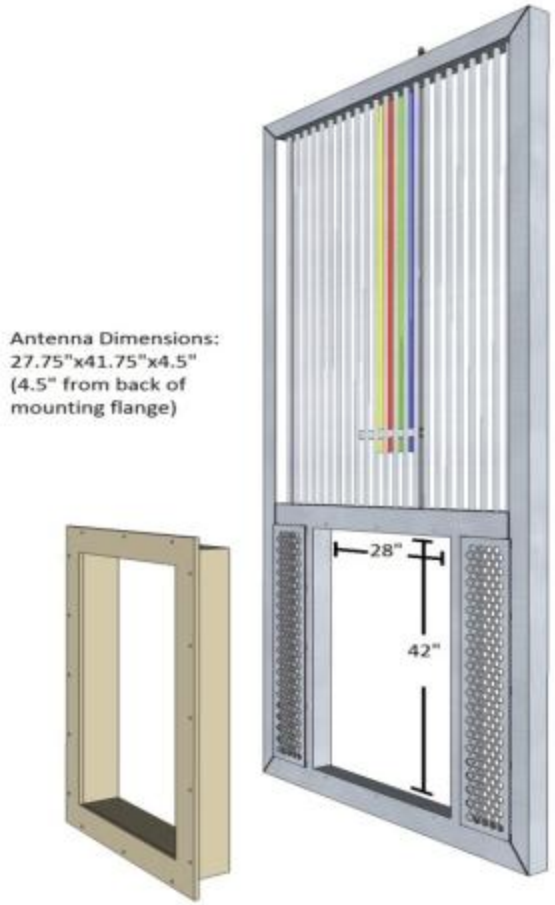
Little Goose Dam

- Allow for movement of window cleaner mechanism.
- Secure to crowder.

Little Goose Dam

- Fiberglass Flume
  - Two antennas
    - 18-1/4”x51” ID
  - White background for counting window
  - Bull nose to smooth water flow

Ice Harbor – Adult Trap



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Ice Harbor – Adult Trap

- Completed installation
- Intent is to monitor tags detected for target fish and provide immediate information to trap operators to reduce handling or delay of non-target fish.
- 27-3/4” x 41-3/4” ID

Methods – Data Analyses

- Query PTAGIS for detections at:
  - The Dalles Dam (TD1 and TD2)
  - Ice Harbor Dam (IHR)
  - Lower Monumental Dam (LMA)
  - Little Goose Dam (GOA)
  - Lower Granite Dam (GRA)
- Data parsed by Species and Run Timing specific to each location.

Methods – Data Analyses

- Detection Efficiency based on detection history (e.g., 11, 01, 10) of each tag at each location.
  - USER 4.7.0 Two-weir model used to calculate detection efficiency
- Number of passage events determined for each unique tag based on 6-hr between detections.
- Conversion rates are proportion of tags detected at next upstream location for IHR, LMA, and GOA sites.

Results – Detection Efficiency – TDA

TD1

Coil	Unique Tags	Detection Efficiency
01	24,688	0.997
02	24,705	0.997
Overall	24,758	1.000

TD2

Coil	Unique Tags	Detection Efficiency
01	4,102	0.998
02	4,105	0.999
Overall	4,108	1.000

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Results – Detection Efficiency – LMA

South

Coil	Unique Tags	Detection Efficiency
01	3,439	0.990
02	3,466	0.998
Overall	3,472	1.000

North

Coil	Unique Tags	Detection Efficiency
01	8,460	0.987
02	9,054	0.998
Overall	9,072	1.000

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Results – Detection Efficiency – GOA

Coil	Unique Tags	Detection Efficiency
01	11,452	0.997
02	11,442	0.996
Overall	11,478	1.000

Results – Passage Events

Spring Chinook salmon

Passage Events	IHR	LMA	GOA	GRA
1	97.2	96.5	95.2	89.1
2	2.7	3.3	4.3	9.5
3	0.0	0.2	0.4	1.3
4	0.0	0.0	0.1	0.2

- Majority of fish passed project in single event.
- Number of multiple events increased moving upstream.

Results – Passage Events

Summer Chinook salmon

Passage Events	IHR	LMA	GOA	GRA
1	93.9	92.1	95.4	88.7
2	5.8	7.2	4.3	8.7
3	0.2	0.5	0.2	1.9
4	0.2	0.1	0.0	0.6

- Majority of fish passed project in single event.

Results – Passage Events

Sockeye salmon

Passage Events	IHR	LMA	GOA	GRA
1	88.3	87.8	90.7	65.7
2	10.7	9.5	7.4	26.0
3	0.9	1.8	1.4	4.9
4	0.0	0.9	0.5	3.4

- Majority of fish passed in single event, but lower than Chinook stocks.
- 26% of the fish had two passage events at GRA.

Results – Conversion Rates: IHR to LMA

SRRT	ICH	LMA	ICH-LMA
Spring Chinook	2,960	2,961	1.00
Summer Chinook	1,173	1,091	0.93
Fall Chinook	3,876	3,774	0.97
Steelhead	5,147	4,863	0.94
Sockeye	214	222	1.04

- Enumerated unique tag codes, did not follow specific fish.
- Conversion rate exceeded 93% for all stocks.

Results – Conversion Rates: LMA to GOA

SRRT	LMA	GOA	LMA-GOA
Spring Chinook	2,961	2,832	0.96
Summer Chinook	1,091	1,123	1.03
Fall Chinook	3,774	3,518	0.93
Steelhead	4,863	3,137	0.65
Sockeye	222	215	0.97

- Conversion rate exceeded 96% for all salmon stocks.
- Steelhead conversion lower (Lyons Ferry Hatchery and Tucannon River).

Future Activities

- Censor adult fish tagged and released at GRA to estimate conversion rate from GOA to GRA.
- Complete Fall Chinook salmon and steelhead queries.
- Provide summary of where and when fish were detected out of lower Snake River mainstem.
- Inspect detections at Lower Tucannon River (LTR) array and incorporate into steelhead conversion if possible.

Acknowledgments

Corps Project Personnel

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- Lower Monumental Dam: Sarah Wilson, Bill Spurgeon, Jack Henson
- Little Goose Dam: Marcus Smith, George Melanson

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