Evaluation of An Instream PIT Detection System in the John Day River to Monitor Steelhead Movements and Straying

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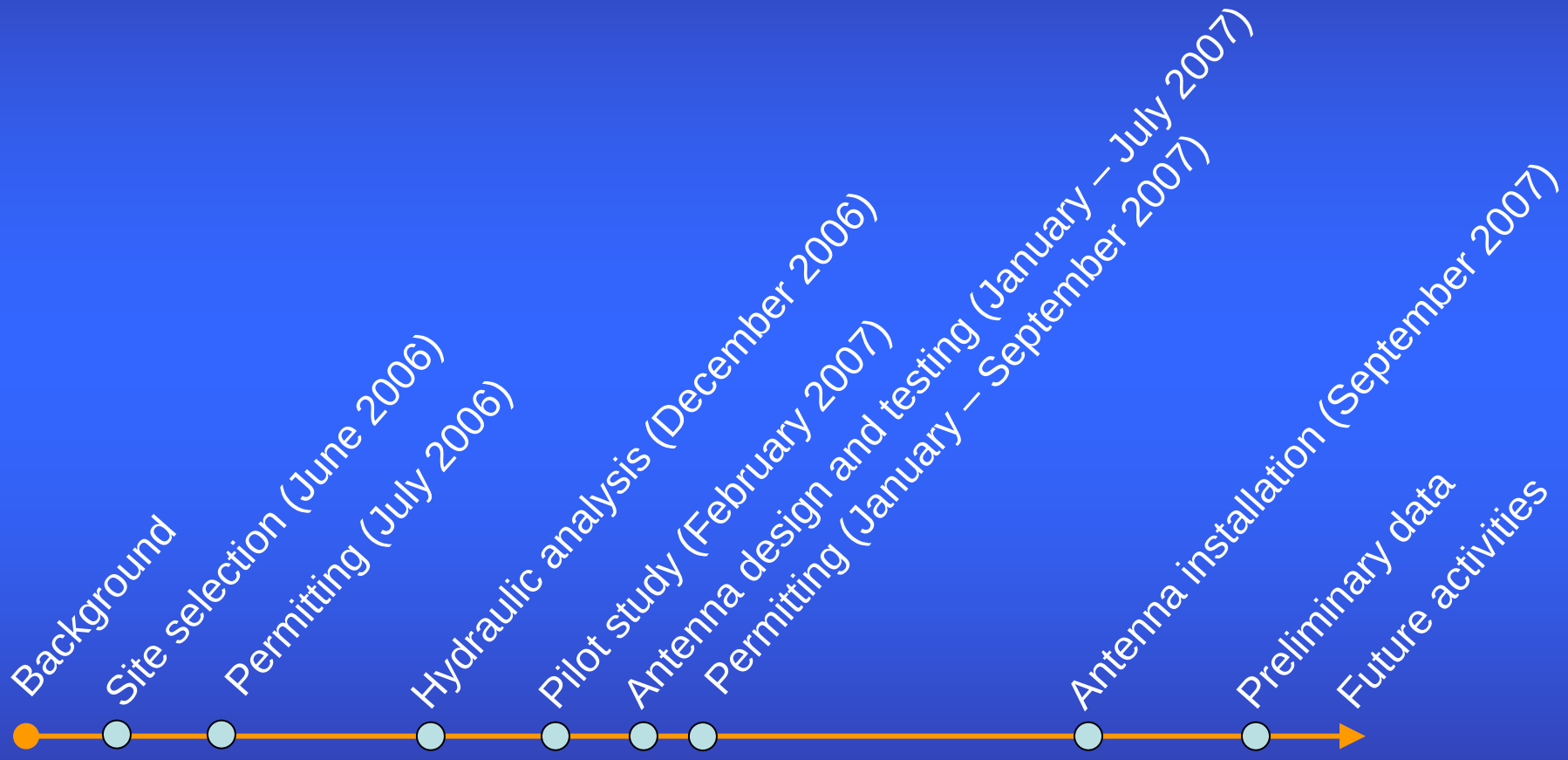
U.S. DEPARTMENT OF COMMERCE

Background

- Action Agencies monitor adult fallback and delays to help in estimating adult survival rates (RM&E).
- Straying is a key component in adjusting adult survival estimates.
- Investigate whether or not PIT-tag detection systems in tributaries with high rates of straying (Little White Salmon, White Salmon, Wind, Deschutes, and John Day Rivers) can yield annual estimates of straying in lieu of RT effort.
- Develop large-scale durable PIT-tag system.

Project/Presentation Timeline

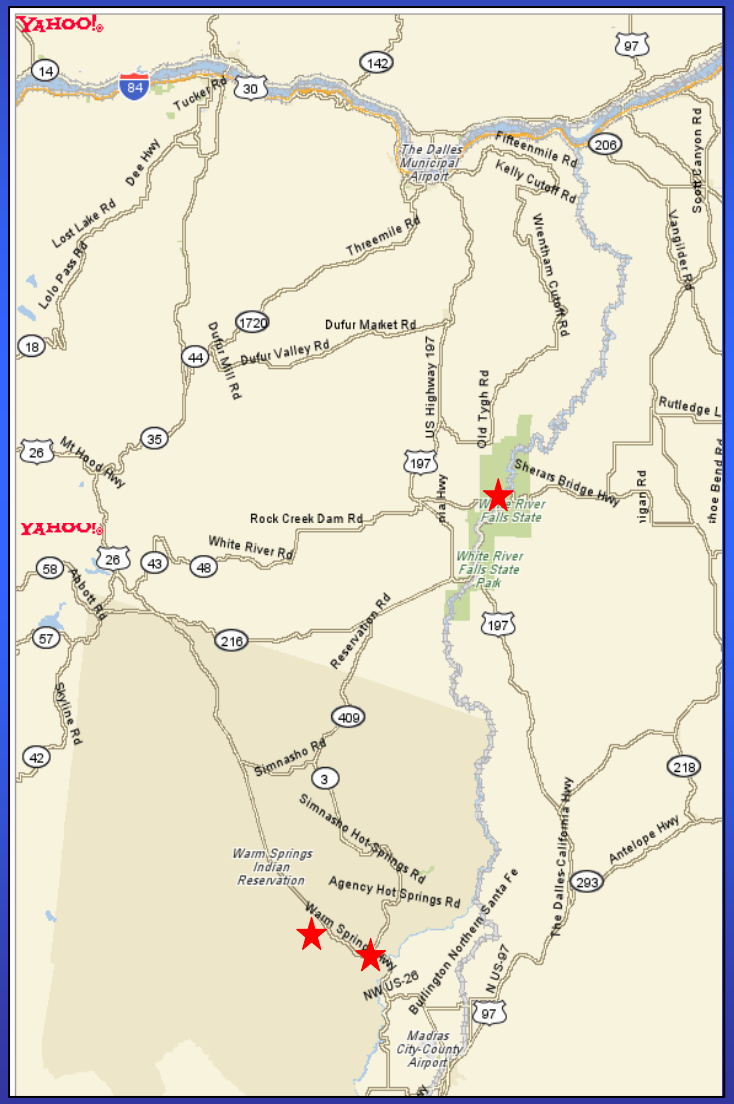


Site Selection Criteria

- Current straying data
- Spawning distribution
- Accessibility
- Channel morphology
- PIT-tagged population present
- Existing structures for antenna attachment
- EMI level
- Input from Federal, State, County, and Tribal fisheries biologists/managers

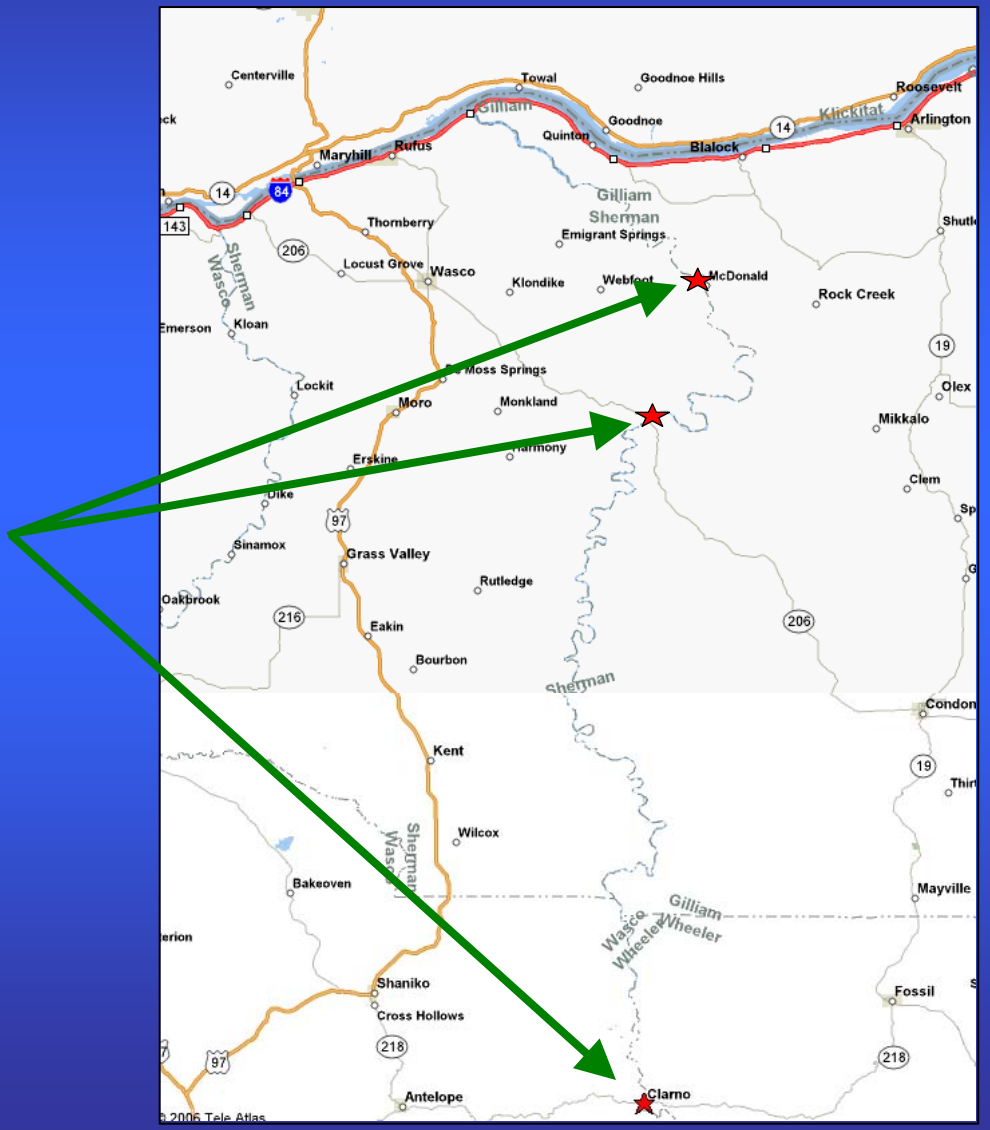
Site Selection – Deschutes River (June 2006)

- Sherars Falls (RM 43)
- Warm Spring NFH (RM 84, 10)
- Shitike Creek (RM 95)



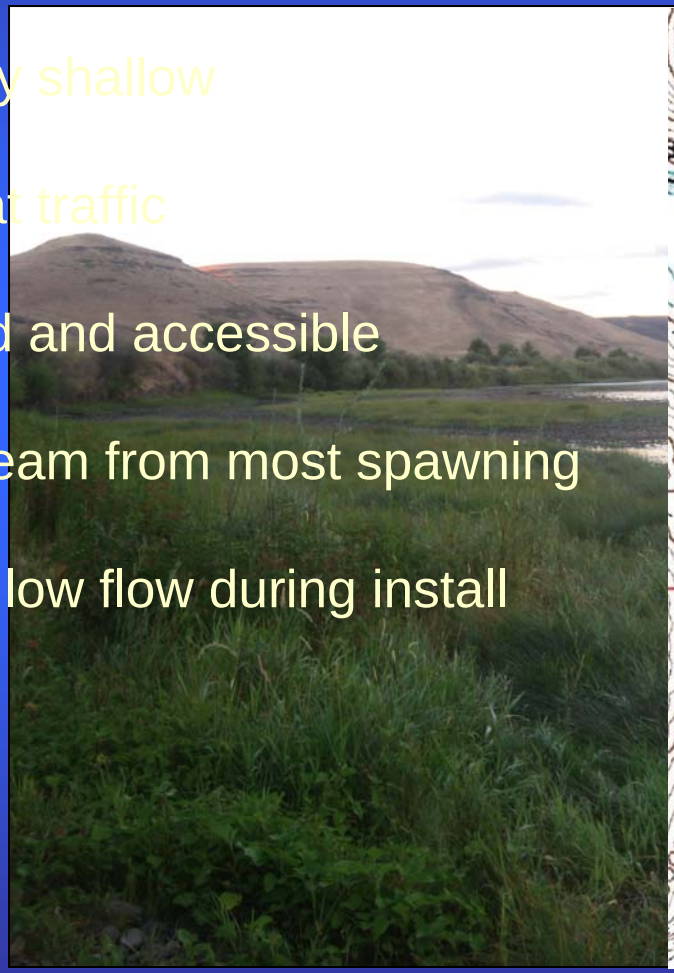
Site Selection – John Day River (June 2006)

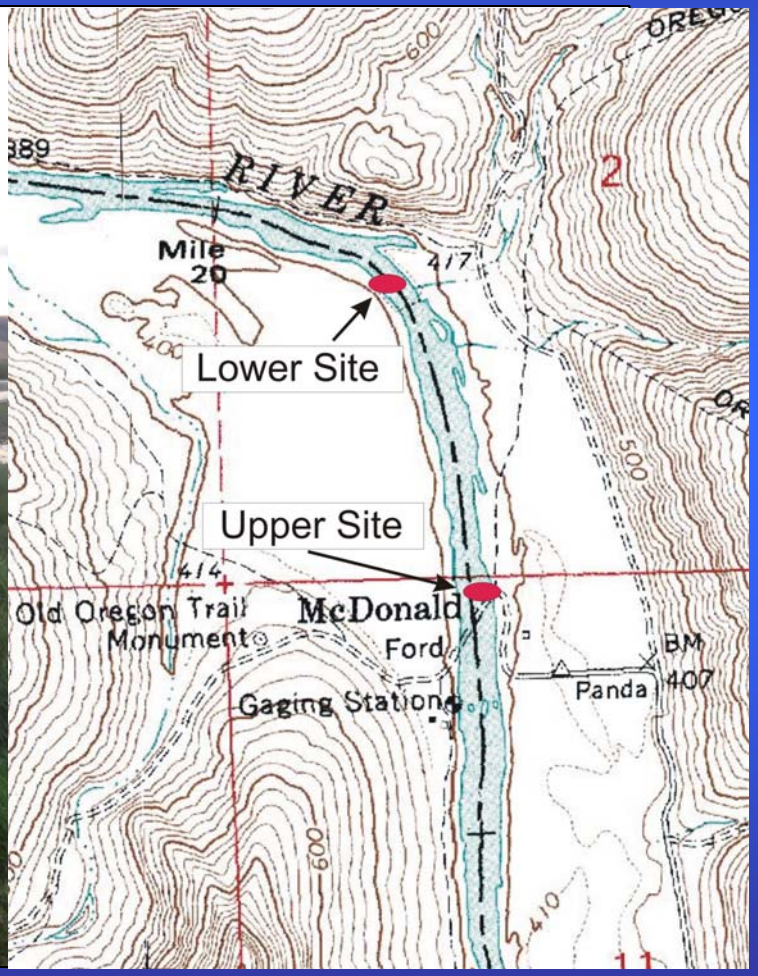
- McDonald Ferry (RM 21-23)
- Cottonwood Bridge (RM 39)
- Clarno Bridge (109)



McDonald Ferry

- Relatively shallow
- Little boat traffic
- Secluded and accessible
- Downstream from most spawning
- Extreme low flow during install





3,800 cfs

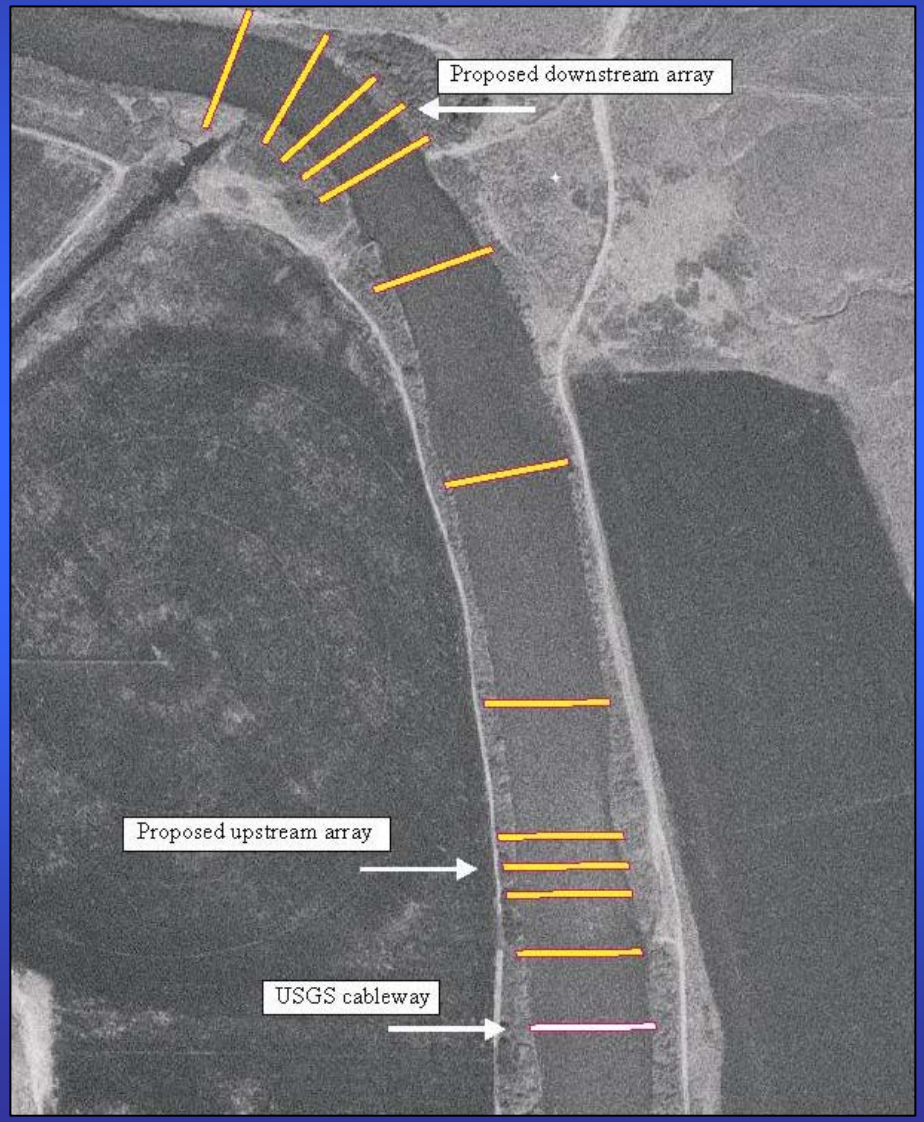
3,300 cfs

Hydraulic Analysis - Methods

- HDR and Inter-Fluve contracted to survey cross-sections (12)
- Wolman Pebble Count at proposed array cross-sections

- HDR analyzed potential antenna designs for:
  - Total hydraulic force (Lindeburg 2006)
  - Potential scour depth (Zimmerman and Maniak 1967)

- Modeled 20,000 cfs flow (5-year peak flow 19,100 cfs)



Hydraulic Analysis - Results

Antenna Design	Predicted Force (lb)	Potential Scour Depth (ft)
Flat Plate Weir	5,790	2.3
Crump Weir	62,950	2.5
PVC Antenna*	24,950	2.3
Hybrid PVC Antenna*	25,260	2.3

*HDR recommended these antenna not be installed due to the potential of material failure with surging flow and debris.

Pilot Study

- 26 February 2007 (2,280 cfs, cold)
  - Installed two non-functional 10’ flat plate weir antennas and two crump weir shells
  - Installed on left bank due to high water
  - Upstream flat plate weir was installed in substrate similar to proposed location

Pilot Study

- Inspected on 26 April 2007 with underwater video – no scour or antenna movement observed.

- Peak flow of ~7,000 cfs (less than expected).

Antenna/System Design Criteria

- Install two 3-antenna arrays separated by ~30 ft
- Extend out from right bank upstream from defined thalweg
- 20-25 ft antennas
- 18” read range for 12-mm SST tag

- Don’t alter river hydraulics
- “OUT OF THE WAY”

- Monitored proposed sample volume with DIDSON

Antenna Design and Testing

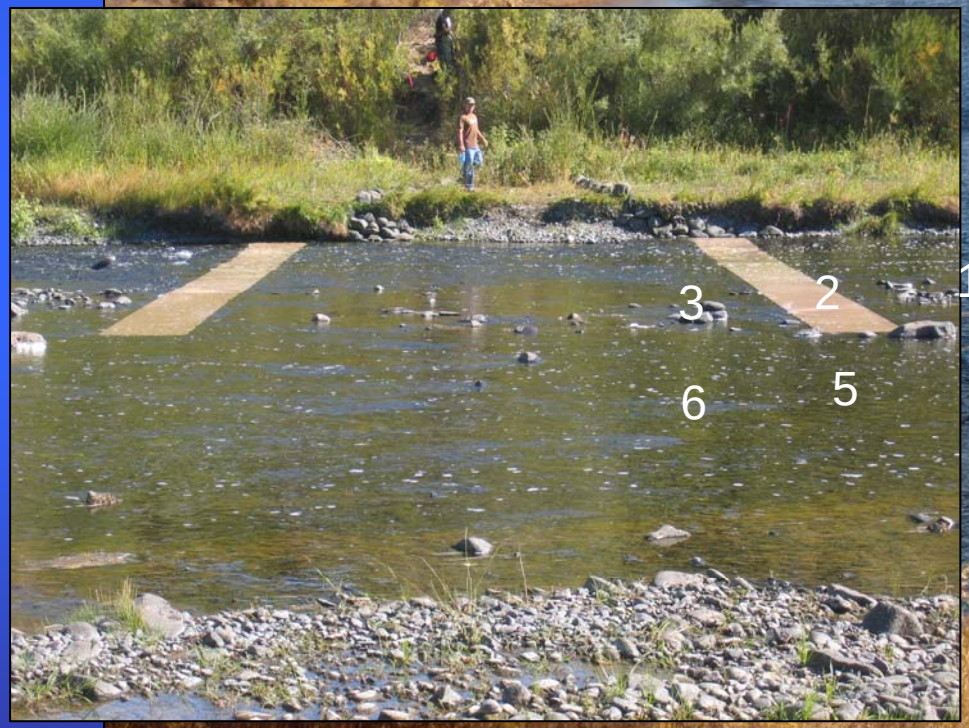
- Antenna designs tested in Biomark “RF Room”
- Prototype tested at site with various lengths and types of cable
- Confirm read range and push ahead with production

Antenna System Installation

- Trenches excavated in August 2007

Antenna System Installation

- Antennas installed in September 2007



Antenna Read Range

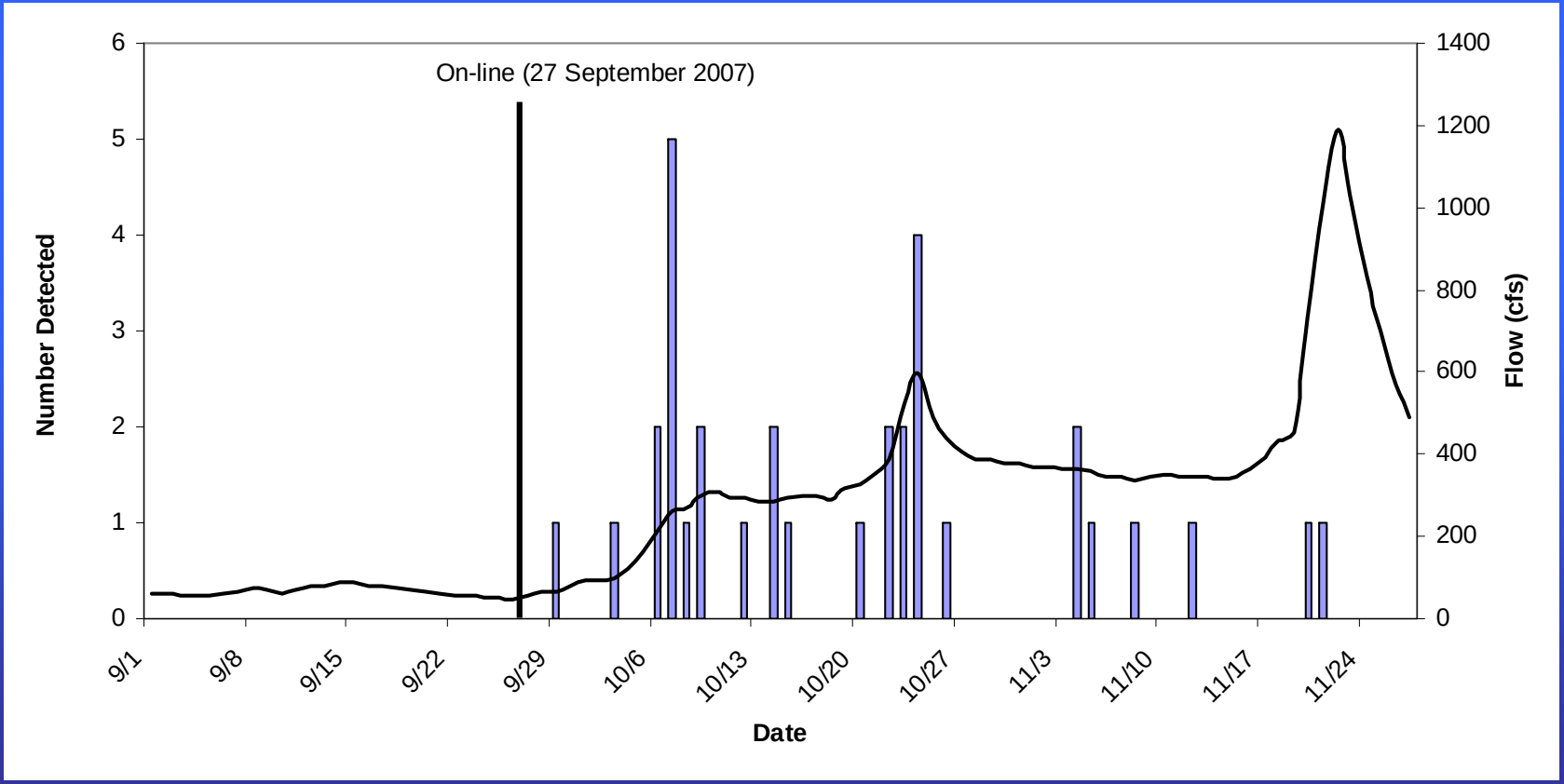
- 21-22” max. RR with 12-mm SST tag
- 13-15” max. RR with 12-mm ST tag

Site Power and Communication

- 24 VDC switching battery power supply
- Satellite communication with PTAGIS (JD1)
- Interpretive sign near river

Fish Detections

- 31 PIT-tagged steelhead detected as of 27 November 2007
- 17 released in John Day River
- 14 of Snake River origin: 1-LGRRRR (in-river) 13-LGRRBR (barged)



Detection History

- 27 fish exhibited upstream movement
- 4 fish detected only on downstream array

Detection Data

- 8 of 13 LGRRBR fish detected at McN prior JD1
- 3 of 17 John Day River fish detected at McN prior to JD1
- 14 of 162 (8.6%) DMM or BAR fish detected at BON (from same release files) were detected at JD1

3D9.1BF24F866D, LGRRBR

Date	B03	B04	JD1	MC1	MC2	MCJ
9/4/07	19	6				
9/9/07				21		
9/17/07					15	
10/09/07				22		
10/13/07						4
10/22/07			12			

Future Activities

- Continue to compile detection data and monitor mainstem sites for detections of JD1 fish.
- Monitor site for structural integrity during spring flow.
- Conduct double tag (PIT and RT) in fall 2008 to collect additional information on site detection probability.

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PTAGIS PIT Tag Information System Columbia Basin | ptagis.org

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