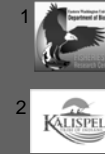


# Bull trout migratory and passage-seeking behavior in the Pend Oreille Basin, Idaho

Brian J. Bellgraph<sup>1</sup>, Mark Paluch<sup>1</sup>, Jason Olson<sup>2</sup>, Holly McLellan<sup>1</sup>, Allan Scholz<sup>1</sup>, and Lori Ortega



Pacific Northwest  
NATIONAL LABORATORY  
Proudly Operated by Battelle Since 1965

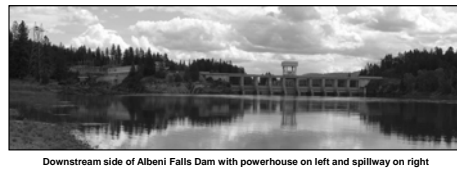
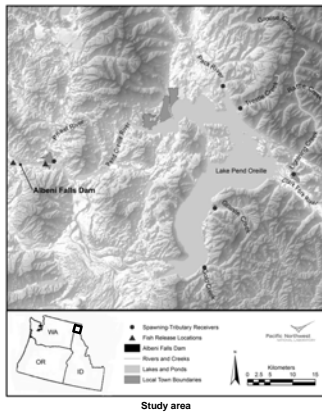
## Background

- Large-scale movements of threatened bull trout *Salvelinus confluentus* in the Pend Oreille basin, Idaho leads to entrainment by Albeni Falls Dam, an upstream passage barrier.
- A temporary restoration program relocates entrained bull trout to the upstream side of the dam, allowing access to potential spawning tributaries.
- Ongoing research is identifying solutions for a permanent fish passage structure, the feasibility of which has been mandated for bull trout under the Biological Opinion of the Endangered Species Act.

## Objectives

- Verify the origins of bull trout entrained by Albeni Falls Dam, and
- Quantify the movements of entrained fish at Albeni Falls Dam to investigate passage options.

## Methods

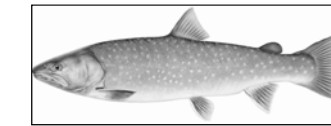


### Objective 1 methods:

- 6 bull trout captured downstream of Albeni Falls Dam and implanted with 3-year-life transmitters in 2008 and 2010.
  - Genetic samples taken to determine natal origin.
- Released *upstream* of dam near mouth of Priest River.
- Located using aerial, boat, and vehicle mobile tracking; and by fixed receivers located at the mouths of 6 major spawning tributaries.

### Objective 2 methods:

- 12 bull trout implanted with transmitters in 2008 and 2009.
  - 6 captured downstream of Albeni Falls Dam.
  - 6 transported from Lake Pend Oreille (to improve sample size).
  - Genetic samples taken to determine natal origin.
- Released *downstream* of Albeni Falls Dam.
- Located by fixed receivers at Albeni Falls Dam.
  - Locations classified in 6 spatial zones (macro and/or micro).
  - Micro zones are where passage structure entrance could be feasibly constructed.



## Results

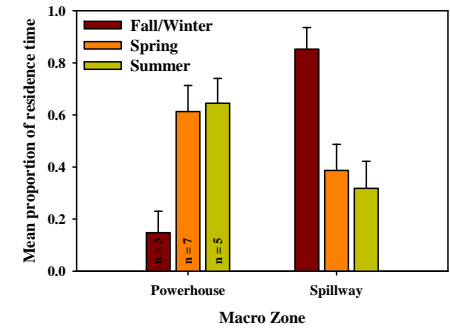
### Objective 1:

- Genetically, all bull trout (6 of 6) captured downstream of Albeni Falls Dam were from upstream tributaries.
- 5 bull trout migrated to Lake Pend Oreille within 3 days after release.
- Tributary detections:
  - 3 detected in genetically-assigned tributary.
    - i.e., Grouse Creek, Pack River, Rattle Creek
  - 2 detected in Pend Oreille River or Lake Pend Oreille.
  - 1 never detected (transmitter battery expired)
- 3 strayed and were detected in tributaries other than their genetically-assigned tributary; 2 of the 3 entered their assigned tributary within the following year.

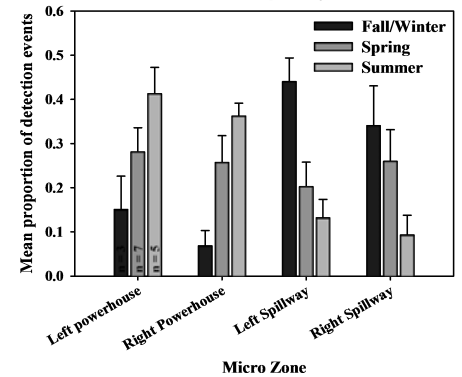
### Objective 2:

- Bull trout detected in both macro zones and all 4 micro zones.
- Greater proportion of time spent in powerhouse macro zone during spring and summer than in fall/winter.
- No residence time differences between seasons in spillway macro zone.
- Within seasons, no residence time differences between macro zones.
- More detection events at powerhouse micro zones during summer than spillway.
- More detections in fall/winter at left spillway than in spring or summer.

### Seasonal residence time in macro zones



### Seasonal detection frequency in micro zones



## Conclusions

- Bull trout downstream of Albeni Falls Dam are likely from upstream tributaries based on genetic determinations and telemetry re-locations.
- Bull trout can swim throughout all areas of the dam tailrace and were detected in all 4 micro zones (potential passage structure locations).
- During summer, bull trout located more frequently in the powerhouse micro zones; in fall and winter, located most frequently in spillway micro zones.
- A passage structure located at any of the 4 micro zones would likely be discovered by entrained bull trout; however, most detections during the summer migration season were at the powerhouse micro zones.
- Based on previous dam-construction feasibility study (not reported here), the left powerhouse is the most economical option; behavioral data confirm bull trout use of this area during the summer migration season.

Macro and micro spatial zones at Albeni Falls Dam: Powerhouse macro zone (A), Spillway macro zone (B), Right powerhouse micro zone (1), Left powerhouse micro zone (2), Right spillway micro zone (3), and Left spillway micro zone (4).

Funded by:



For more information contact:

Brian J. Bellgraph  
(509) 371-7185  
brian.bellgraph@pnl.gov

Pacific Northwest National Laboratory  
P.O. Box 999, MSIN K6-85  
Richland, Washington 99352

www.pnl.gov