Pacific Northwest
NATIONAL LABORATORY
Proudly Operated by Battelle Since 1965

Effectiveness of a Channel Habitat Reconnection in Tidal Freshwater of the Columbia River: Sandy River Delta

GARY E. JOHNSON AND NICHOLE K. SATHER

Pacific Northwest National Laboratory, Coastal Ecosystems Research Team

Columbia River Estuary Conference, Astoria, Oregon May 2016

U.S. DEPARTMENT OF ENERGY

Stella Pearl Good

Born on Saturday
May 21, 0352 h
7 lbs, 8 oz
21.5 inches

Photo courtesy
Nikki Sather

Background

At the Sandy River delta, a dam was installed in the 1930s to concentrate flows of two main distributaries into one to enhance smelt and salmon migrations upstream into the Sandy River.

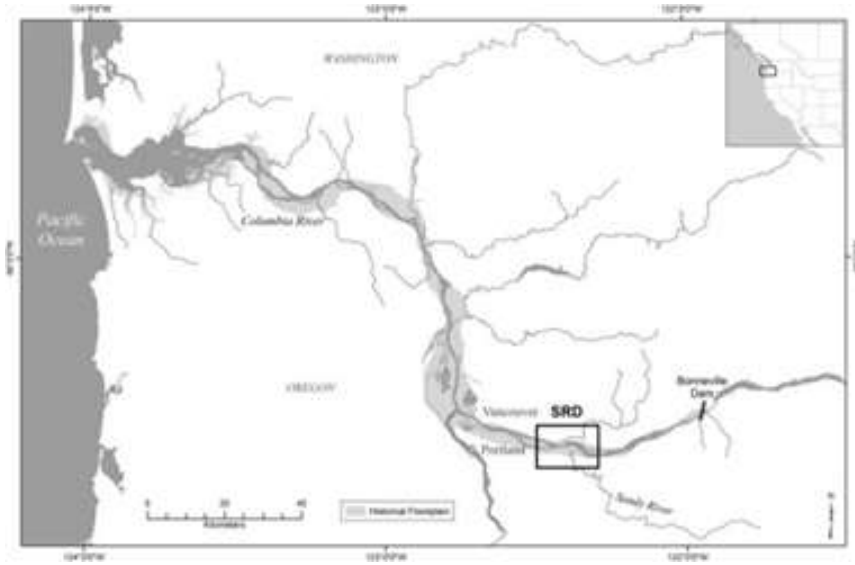


Photo courtesy of USACE

Effects of the Dam

The dam altered the flow regime and reduced the quantity and quality of rearing habitat for juvenile salmon migrating down the Columbia and Sandy rivers to the ocean.

Aerial View -- Pre-Restoration

Photo courtesy of USACE

Juvenile Salmon

Restoration Action

The restoration action involved removing the dam to return the river to its natural channel form, processes, and connection to the Columbia River.

Graphic courtesy of USACE

Monitored Indicators

Pacific Northwest NATIONAL LABORATORY
Proudly Operated by Battelle Since 1965

We conducted effectiveness monitoring of habitat and fish pre-restoration (2007-2013) and post-restoration (2014 to present).

Motored Indicator	Pre-Restoration	Post-Restoration
Water surface elevation	Nearly continuously (2007-2012)	Nov 2013 thru Oct 2014
Water temperature	Ibid	Ibid
Fish comm. composition	Monthly 2007 thru 2012	July 15, Mar 16, May 16
Juvenile salmon density	Ibid	Ibid
Non-native fish density	Ibid	Ibid
Channel cross-sections	October 2012	October 2016

Study Design

Pacific Northwest NATIONAL LABORATORY
Proudly Operated by Battelle Since 1965

We implemented a before-after-control-impact design with two pairs of control/impact sampling sites.

This presentation includes data from **Sites C** and **N**.

Physical Changes from the Restoration

Pacific Northwest
NATIONAL LABORATORY
Proudly Operated by Battelle *Since 1965*

The rechannelization produced dramatic physical changes to the historical river channel at the confluence with the Columbia River, changing from backwater to riverine habitat.

Pre-construction, Oct 2012

Post-construction, Nov 2014

Photo courtesy of C. Corbett

Physical Changes Cont’

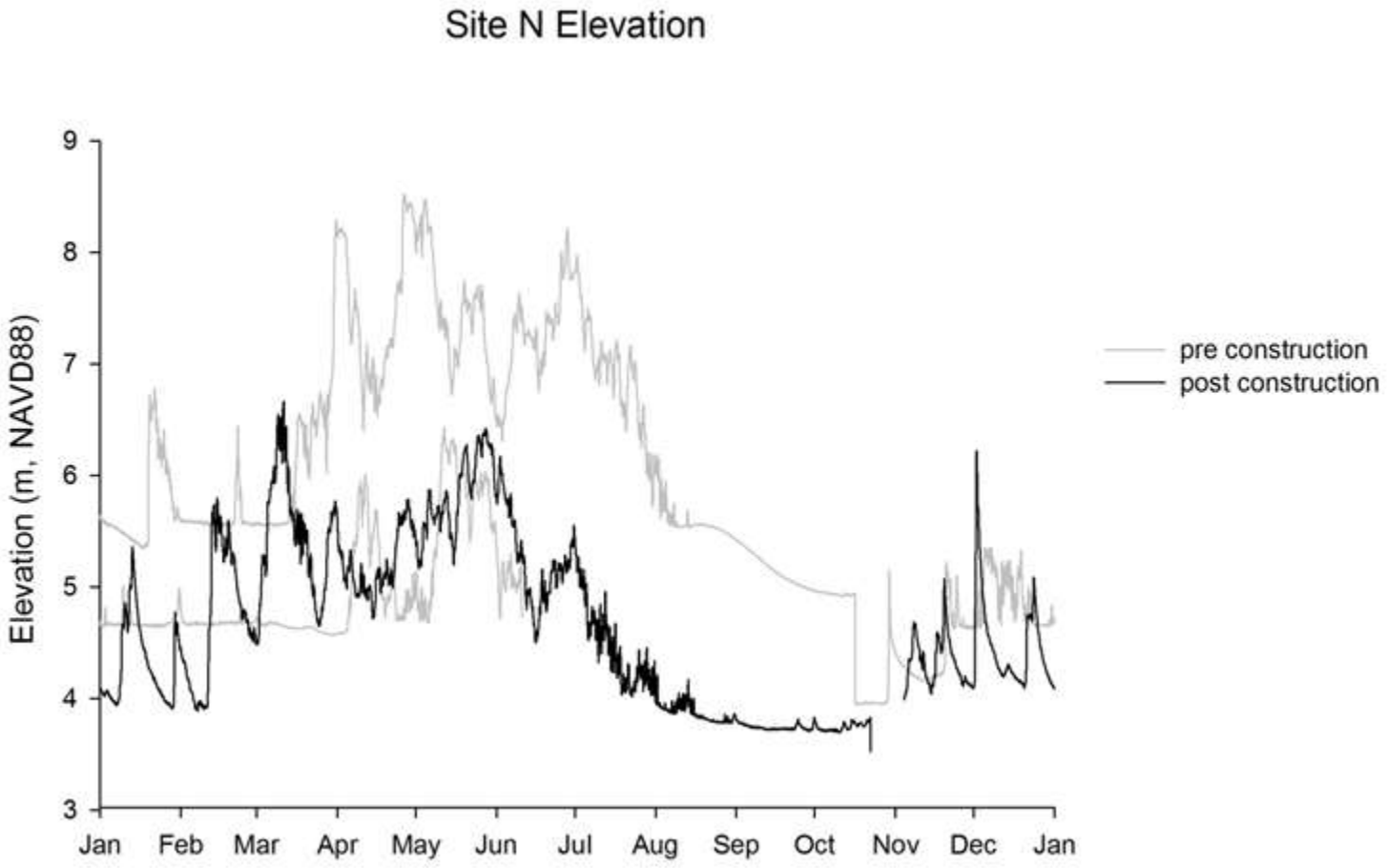
Pacific Northwest NATIONAL LABORATORY
Proudly Operated by Battelle Since 1965

Physical changes caused by the dam removal are evident in satellite photos.

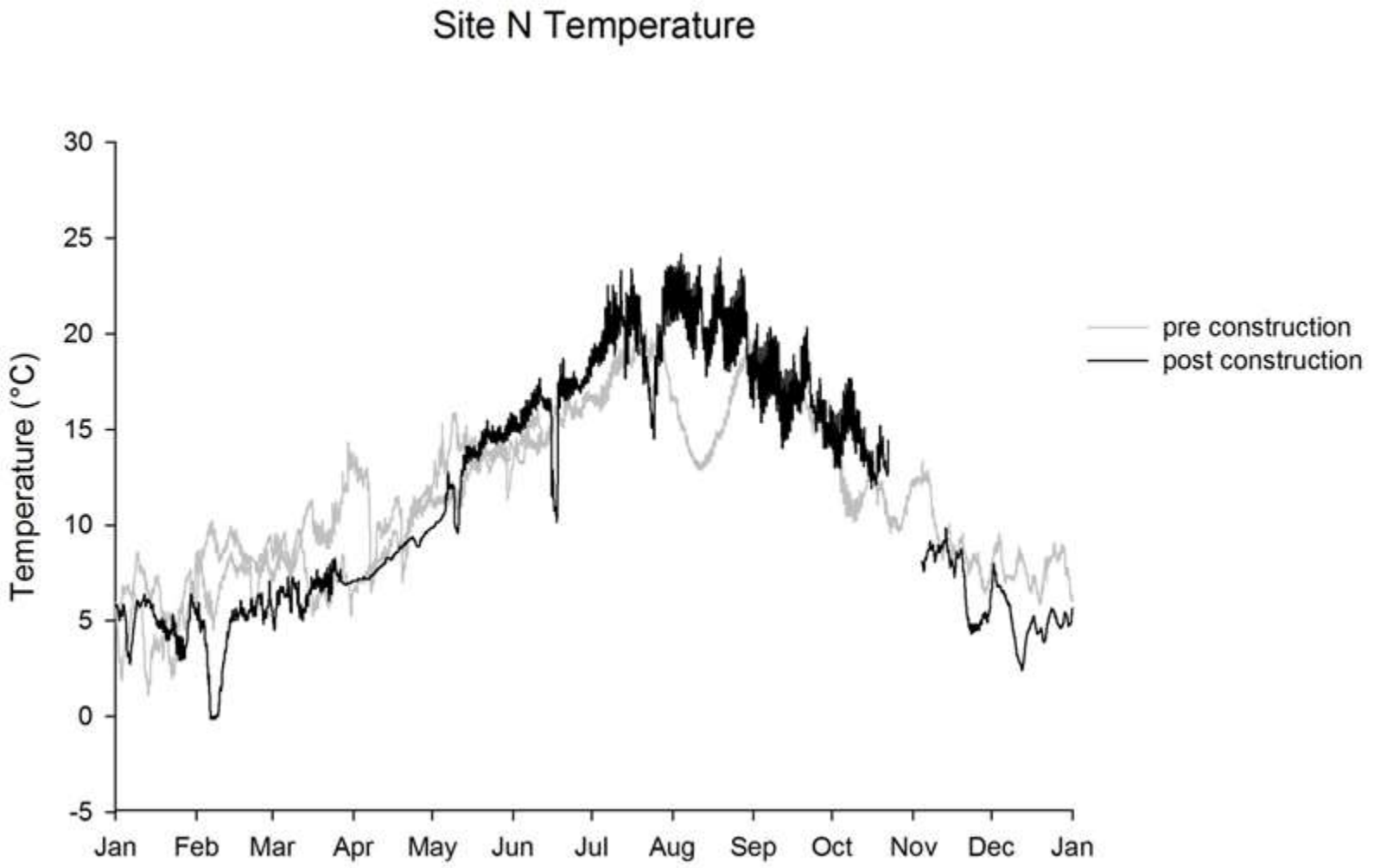
Pre-restoration July 2013

Post-restoration July 2014

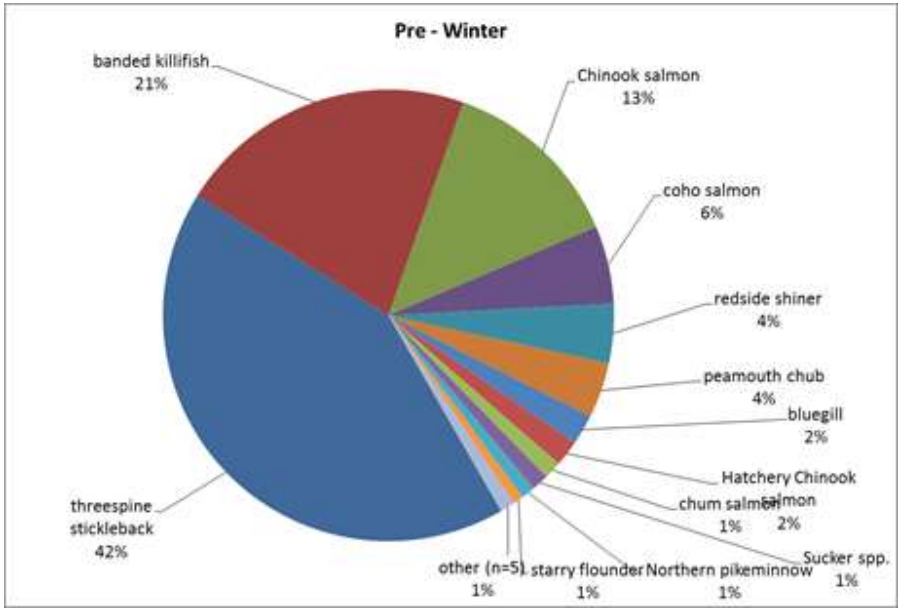
Water Surface Elevation

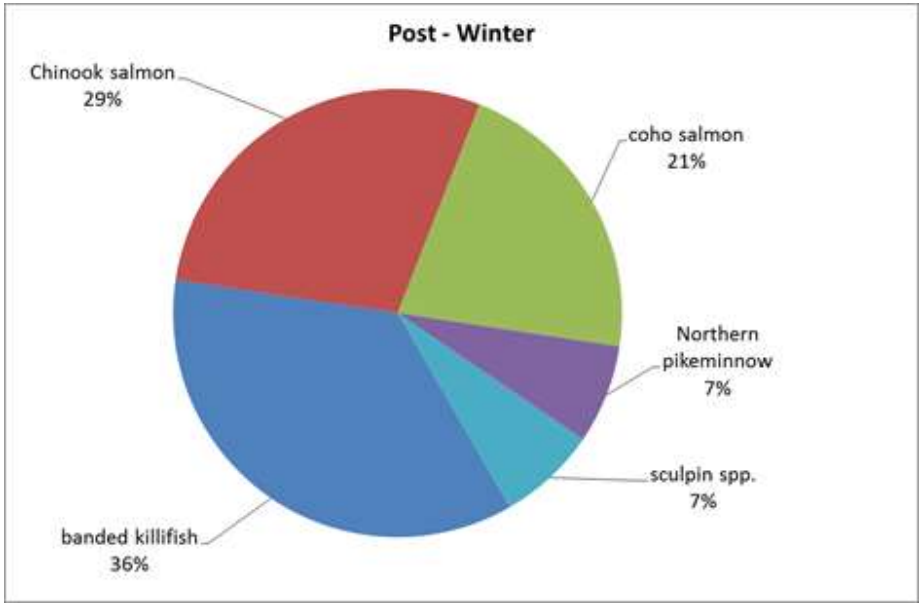


Water Temperature

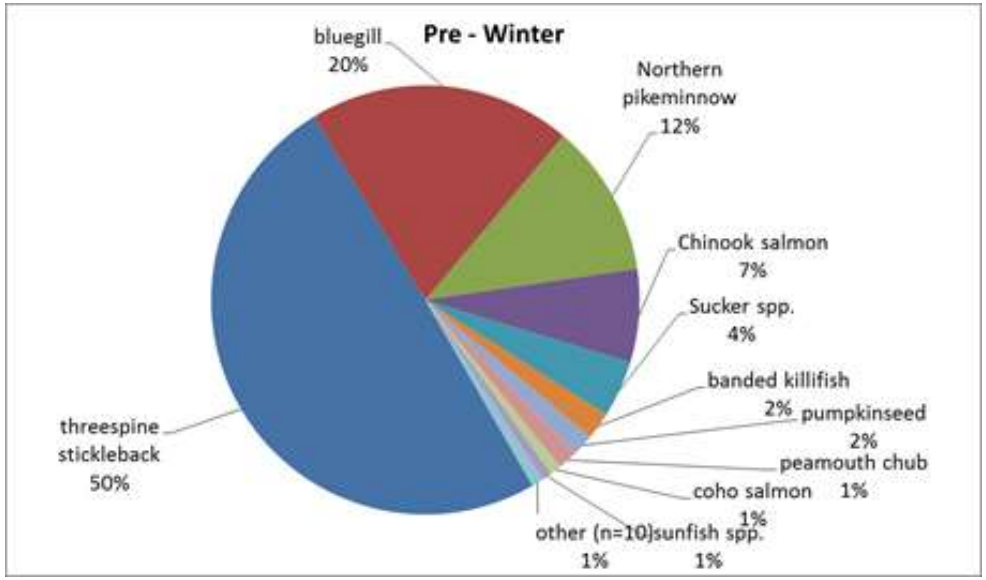


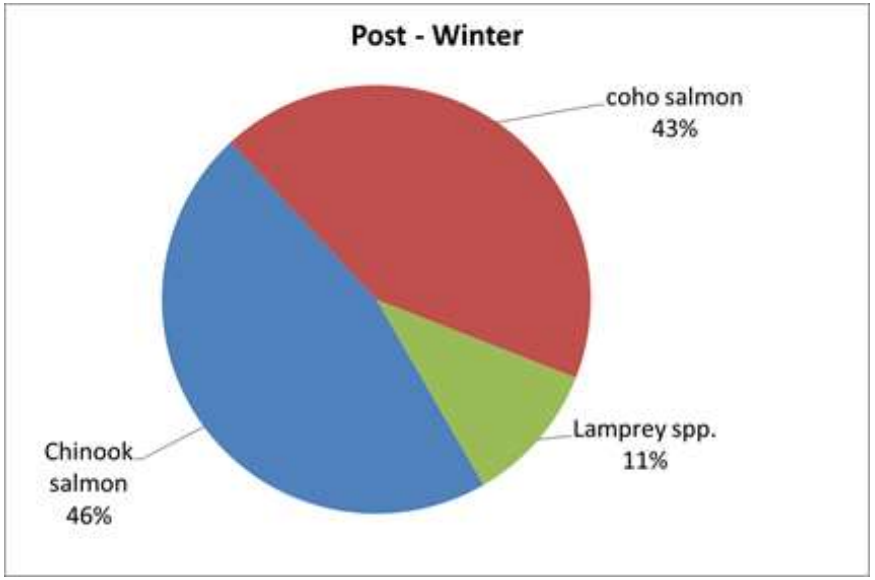
Fish Community Composition – Site C





Fish Community Composition – Site N

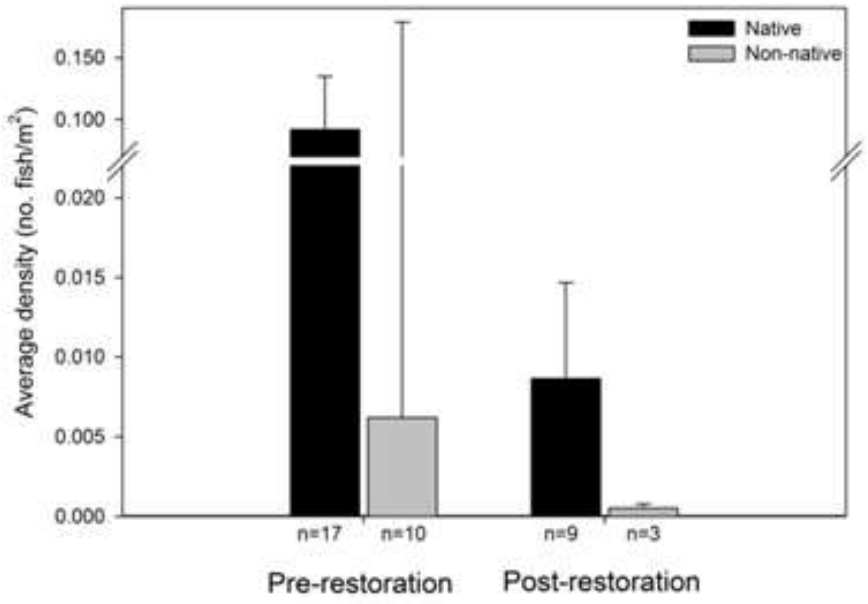




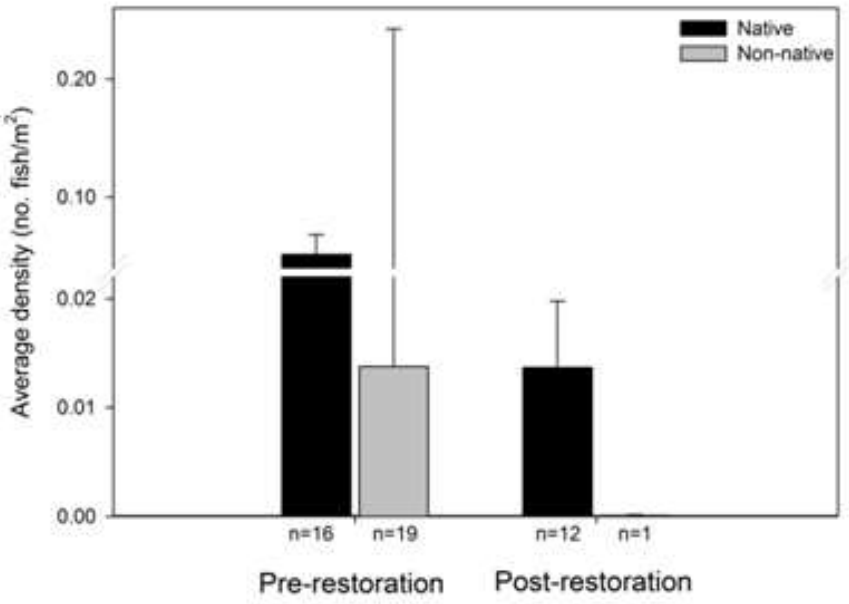
Native vs Non-native Species

Pacific Northwest NATIONAL LABORATORY
Proudly Operated by Battelle Since 1965

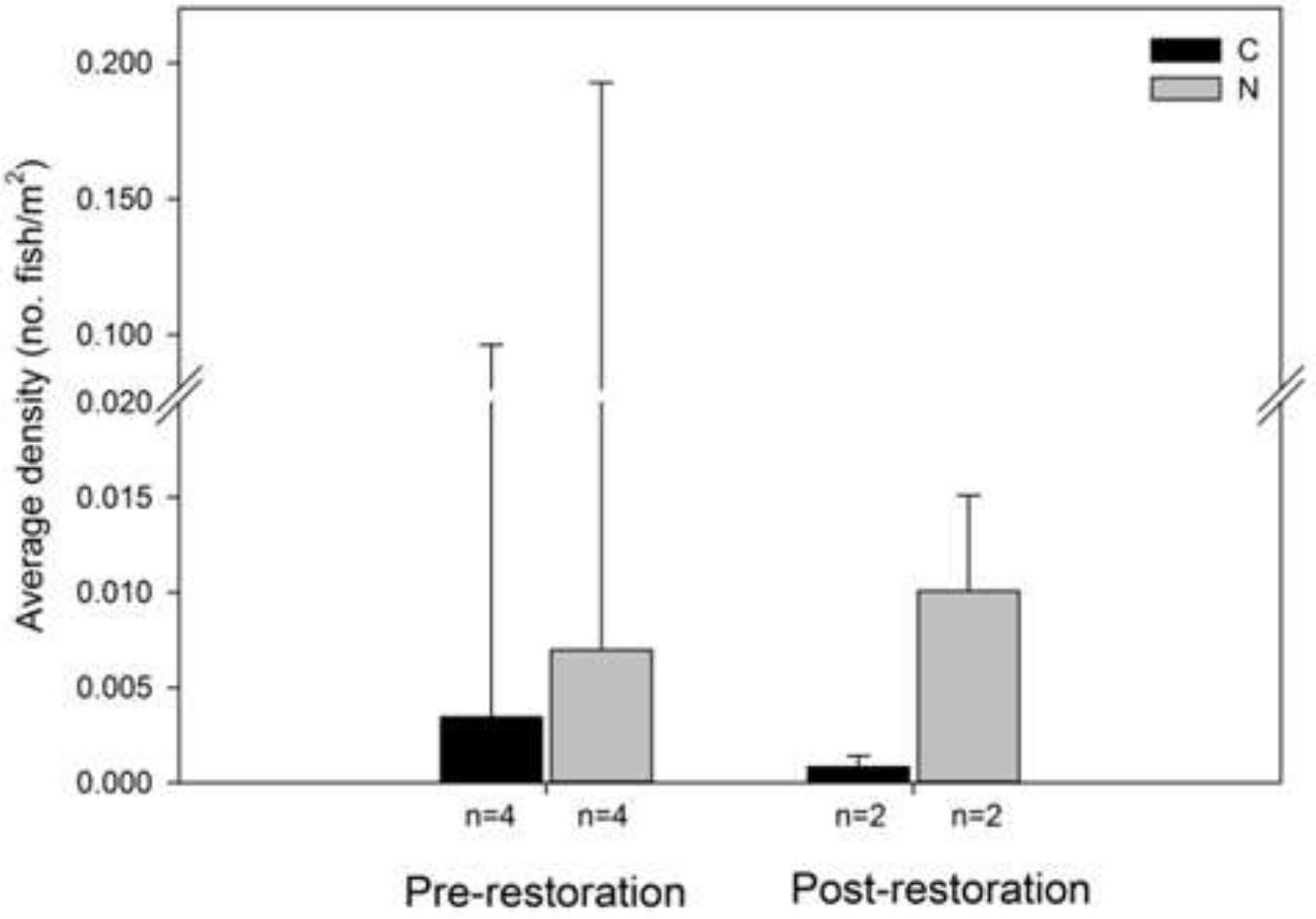
Site C



Site N



Juvenile Salmon Density



Logistical Lessons

- Theft and vandalism of equipment
- Site has multiple purposes: hiking, fishing, hunting.
  - Need to engage curious and sometimes very opinionated individuals and explain restoration and research
  - Dogs swimming and playing fetch at our sites moments before we are set to sample has been less than ideal
  - Learned to avoid particularly busy times (weekends/holidays)

Photo from http://thoroughlythriving.com/tiff-corner/moxies-first-ridgeback-romp/.

Next Steps

- Fish – seine sampling
- Channel cross-section – field measurements
- Water surface elevation and temperature – logger retrieval
- Statistical analysis
- Action effectiveness publication

Thank You

Pacific Northwest
NATIONAL LABORATORY
Proudly Operated by **Battelle** *Since 1965*