

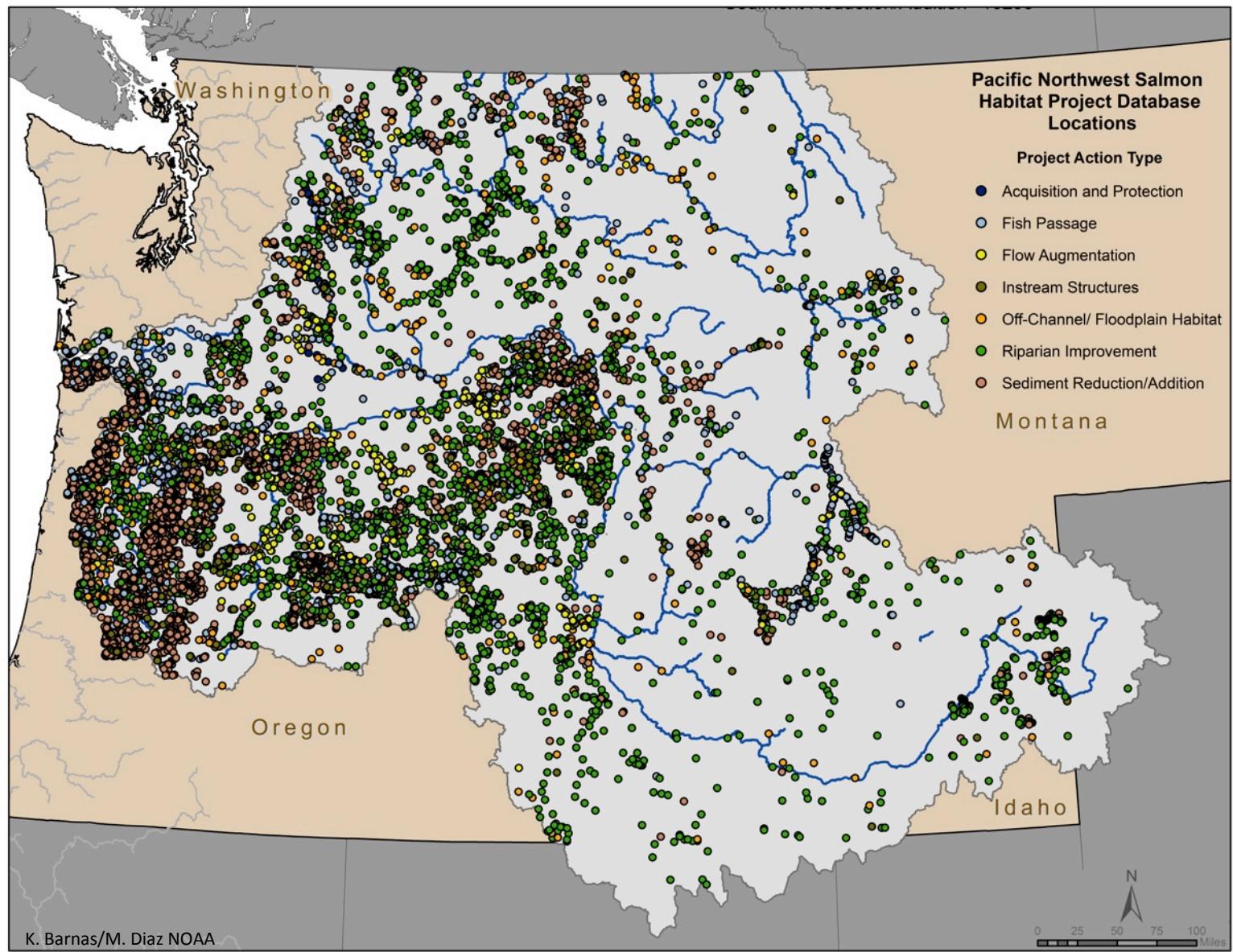
Fish Response To Instream Wood Placement Projects In Columbia River Basin

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How do you evaluate a program?



AEM Program Categories

LWD/ELJ/Boulders

Complete Barriers

Riparian Planting

Invasive Plant
Removal

Floodplain
Reconnection

Partial Barriers

Bank Stabilization

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In-stream LWD Questions

- Are juvenile salmon and steelhead abundance different between treatment and control reaches?
- What is the effect of LWD placement on the physical habitat (# of channel units, % pool area)?
- Is fish response to LWD placement related to differences in habitat quality (e.g., amount of functional LWD) or other factors (e.g., length of time post project)?



Monitoring/Study Design

Extensive Post-treatment (EPT)

Control

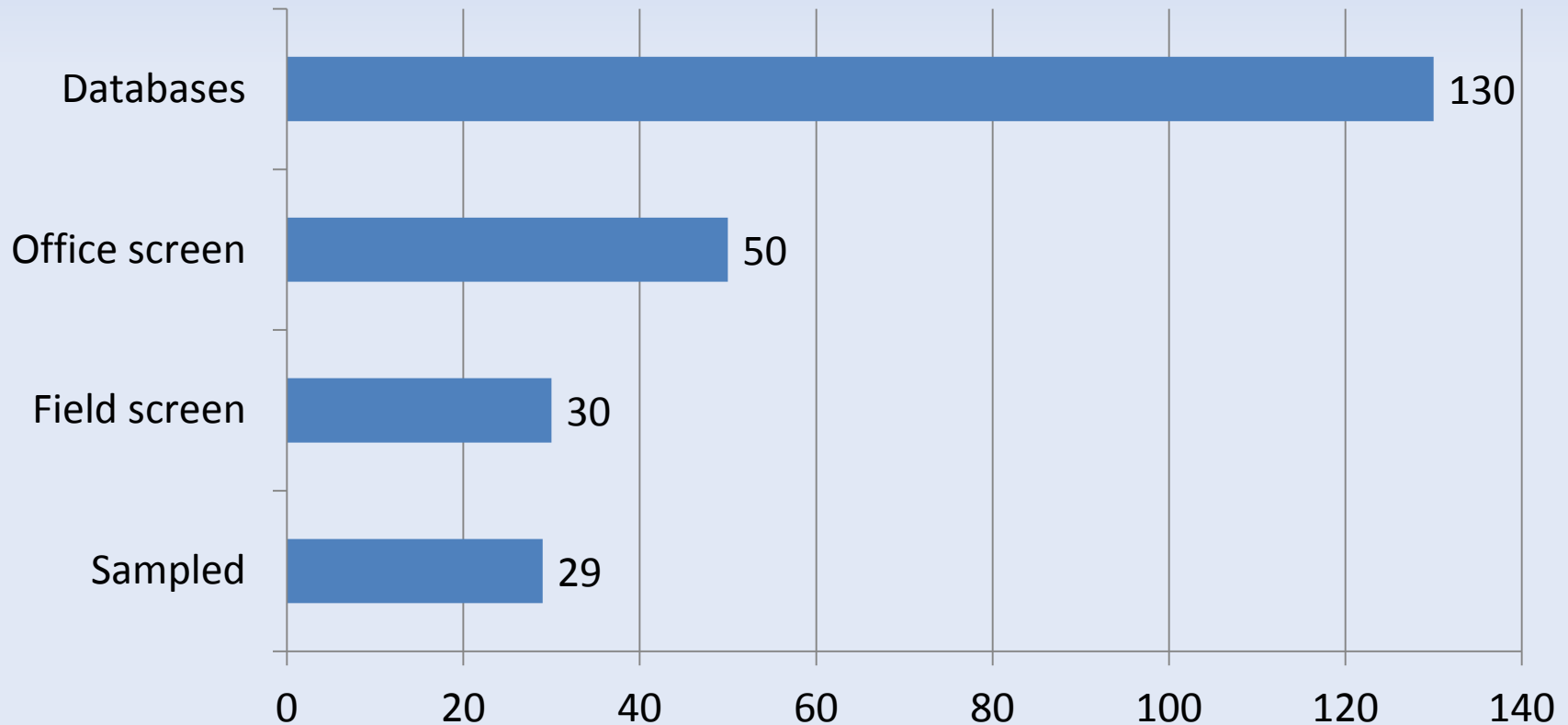


Treatment

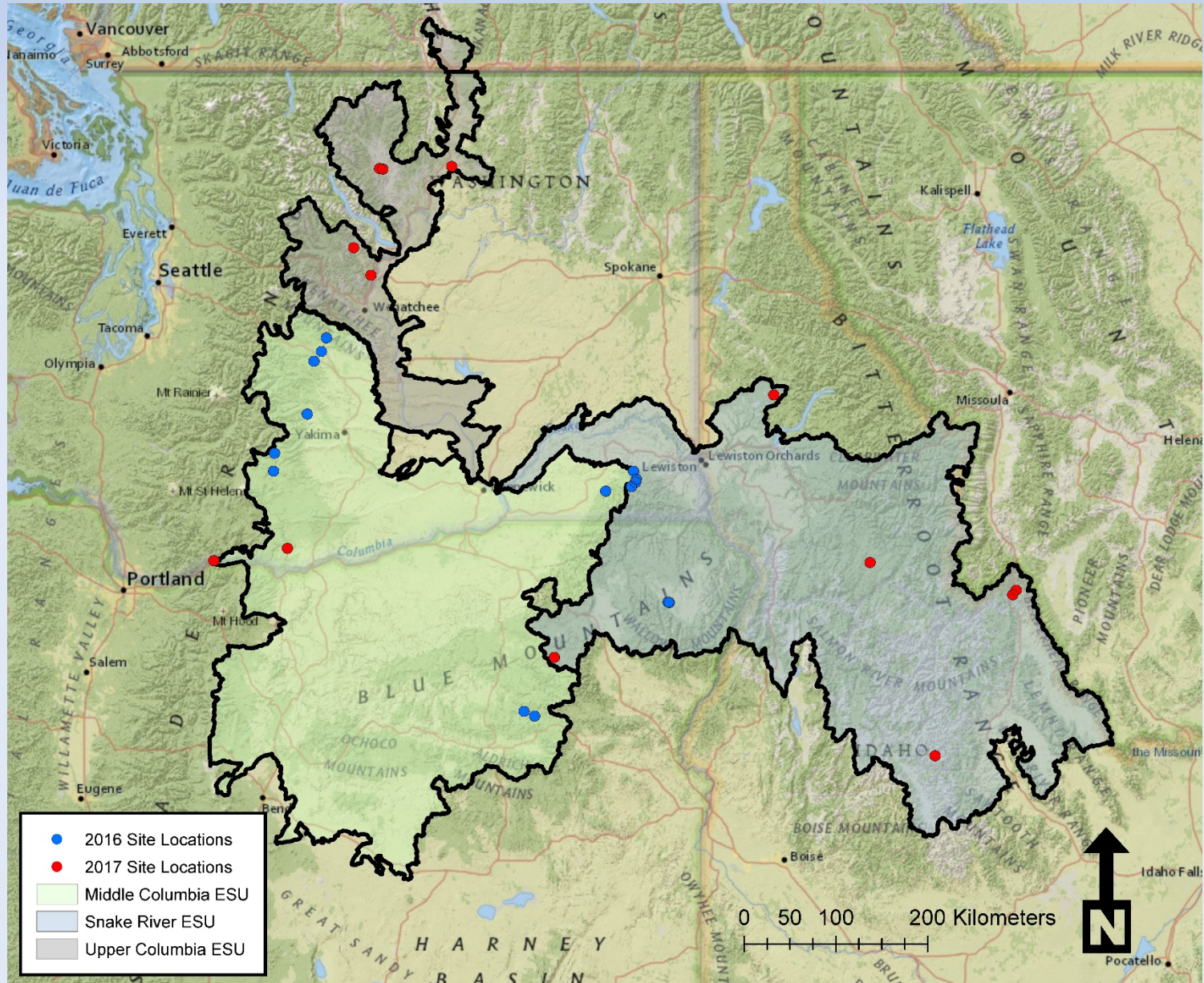


Identifying EPT Sites Not Always Easy!

Number of LWD Sites



In-stream LWD Projects



Methods

- Habitat Survey

- Geomorphic unit, Lengths, Widths, Depths, Gradient, LWD, Long profile (Mossop & Bradford 2006)

- Snorkel Survey

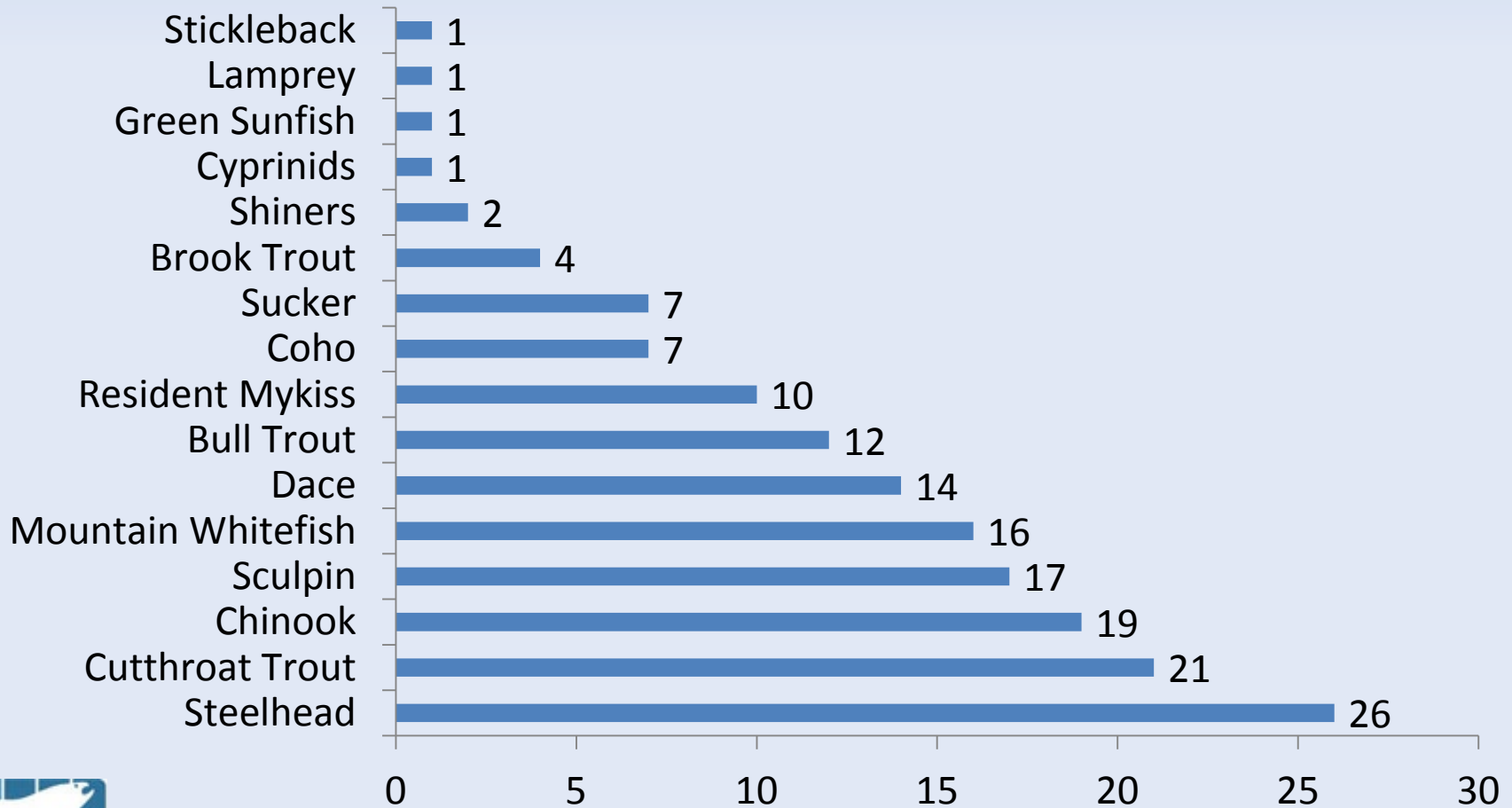
- Species, Length, Habitat Unit



Species Observed

- Of 29 sites

Number of LWD Sites

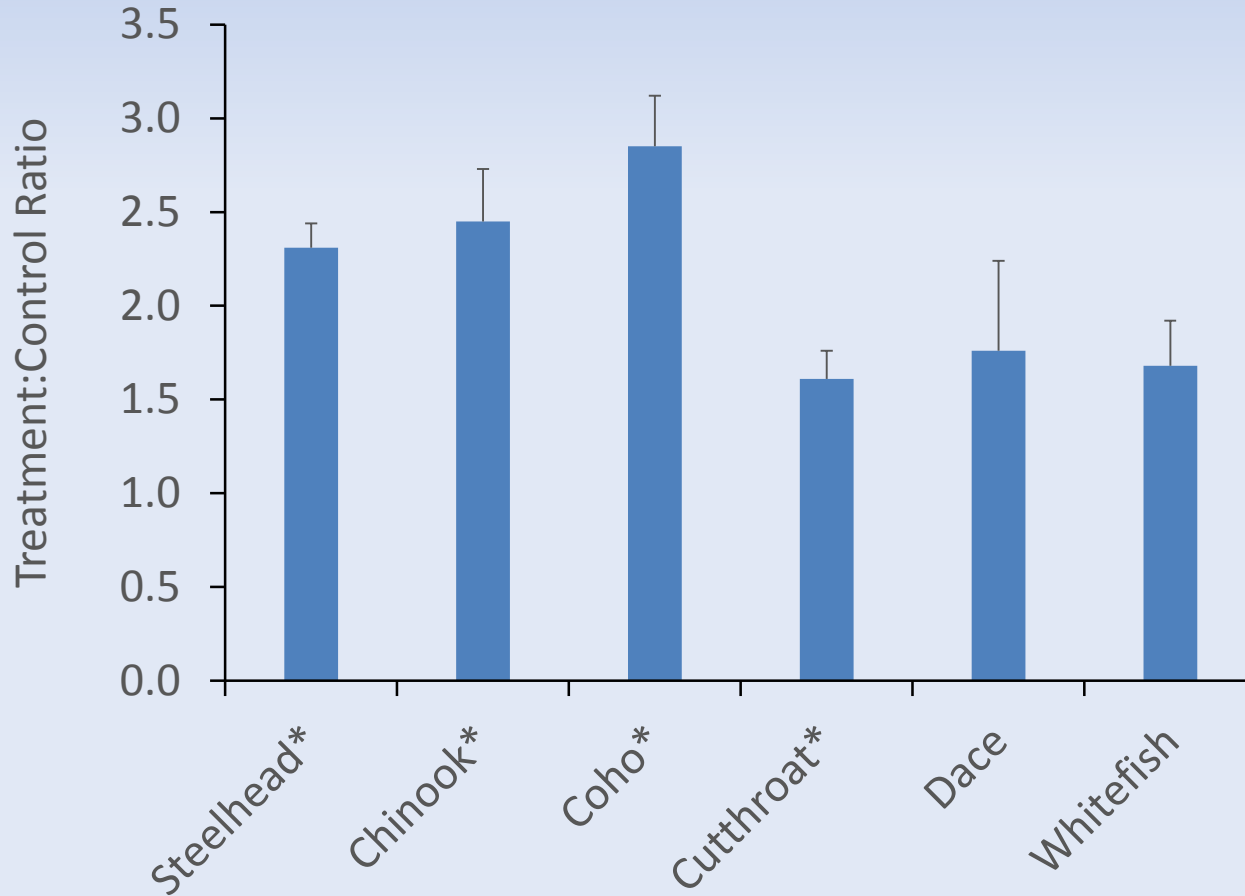


Differences in Physical Habitat

- 40% ↑ in Pool Area
- 40% ↑ Pool Number
- 450% ↑ in LWD

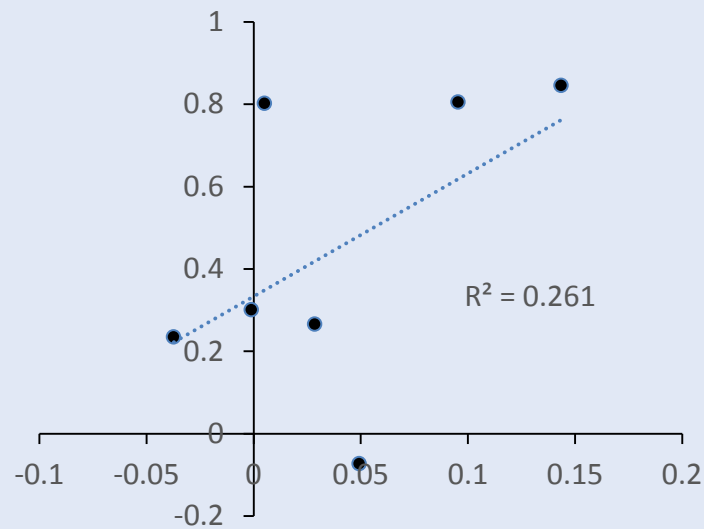
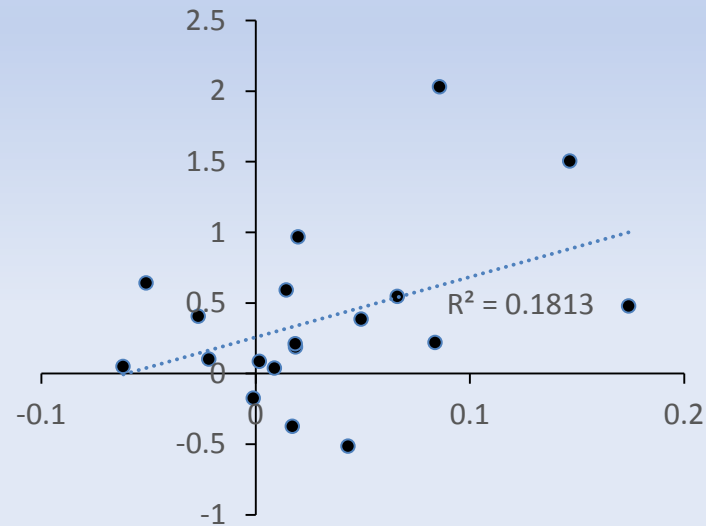


Differences in Abundance



Correlated Factors

Pool Area (log T/C)



Abundance(log T/C)

Summary In-stream LWD Projects

- LWD projects are resulting in
 - >2-fold increase in anadromous species abundance
 - Reach-scale habitat improvements in LWD and Pools
 - Correlations between habitat quality and fish response
- More wood* = habitat response = fish response



AEM Summary and Next Step

√ Full barrier removal M & E

- Completed
- Results indicate successful passage (Clark et al. 2016)

√ In-stream LWD M & E

- Completed
- Positive response in fish abundance and habitat (Clark et al. 2018)

Riparian M & E

- Planned 2018 & 2019

MBACI M & E

- Floodplain 2018-2022
- Partial Barrier 2018-2022



Acknowledgments

- BPA Contract # 2012-011, 2016-001-00
- Numerous staff including but not limited to NOAA, BPA, WDFW, DOT, ODFW, IDFG, TetraTech, Natural Systems Design, land owners, and numerous project sponsors throughout the Columbia Basin including Nez Perce, Yakama, Warm Springs, Umatilla and other tribes.

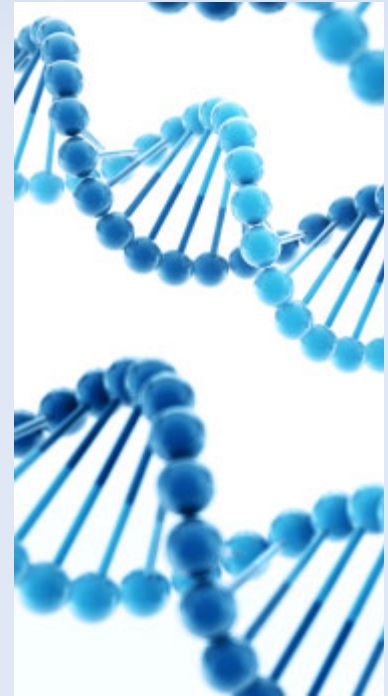


Resident or anadromous *O. mykiss*?

Genetic Sampling

Three lines of evidence:

- Introgression with resident westslope Cutthroat trout?
- *O. mykiss* genetic diversity above and below culvert?
- Families related above and below culvert?



*Analysis courtesy of Mike Ackerman, IDFG Eagle Fish Genetics Lab.

Resident or anadromous *O. mykiss*?

Genetic Sampling

Fin clips from 202 juvenile steelhead collected above and below barriers at 10 sites indicated:

- no introgression with Cutthroat trout
- no differences in genetic diversity above and below culvert
- Sibship reconstruction fish from at least one family were above and below the culvert at 8/10 sites

*Analysis courtesy of Mike Ackerman, IDFG Eagle Fish Genetics Lab.



Ongoing and Completed Actions

Action Category	Common Sub-categories	PICES Database
Barriers	Culvert removal, diversions screening	887
Instream structures	LWD and boulder addition, logjams, remeandering	613
Off-channel/Floodplain	Levee removal, Floodplain reconnection, Wetland rest., remeandering,	231
Riparian	Planting, fencing, removal	1428
Sediment reduction	Roads, agricultural improvements	348
Acquisition & Protection	Purchase, lease, easement	408
Flow Augmentation	Water lease, irrigation improvement	685



Completed Actions

Action Category	Common Sub-categories	PICES Database
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