Modeling the Effects of Condit Dam Removal on Tule Fall Chinook Salmon Spawning Habitat

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Project Goal

 Evaluate the effects of Condit Dam removal on tule fall Chinook salmon spawning habitat

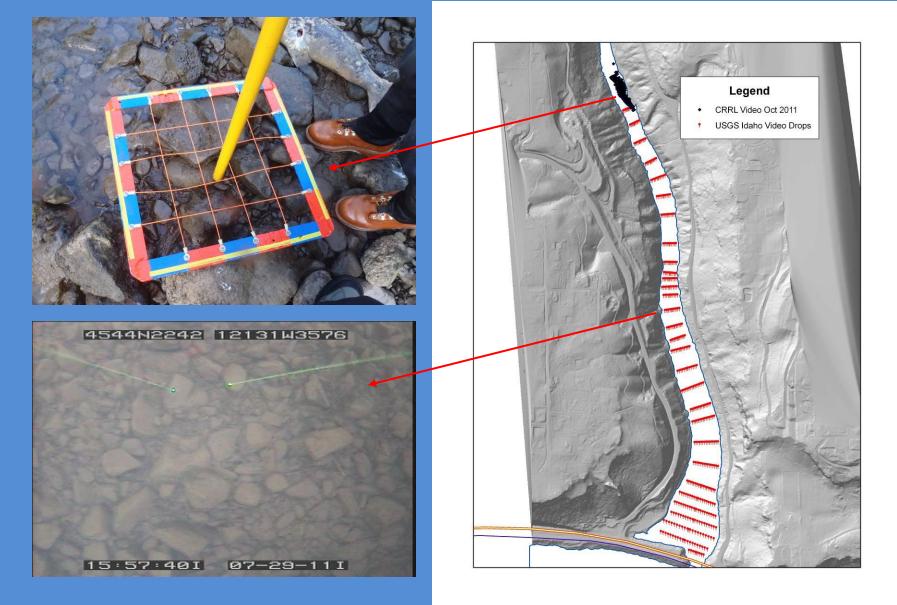
Project Objectives

Characterize spawning habitat of tule fall Chinook salmon spawning habitat

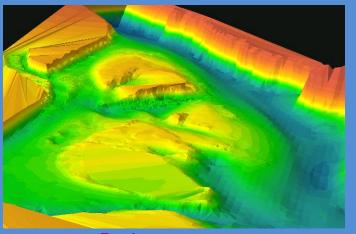
- ✓ characterize substrate composition and embeddedness
- \checkmark identify hydraulics associated with spawning habitat
- o two-dimensional (2D) hydrodynamic model
- o depth averaged velocities (max, min, ave)
- o water depth
- o Froude number (flow resistance; pool, riffle, glide)
- o create a predictive model of spawning habitat

Repeat methods and conduct change detection following dam removal

Bathymetry and Substrate

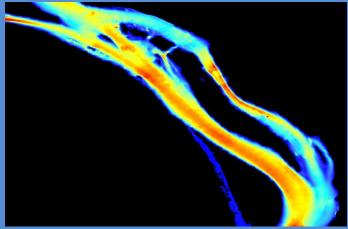


Developing Spatially Explicit Habitat Models by Integrating GIS, River2D, and Logistic Regression

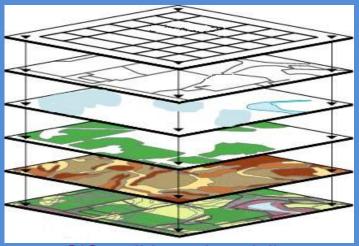


Bathymetry





Hydraulic Model Output



GIS: cell-based modeling



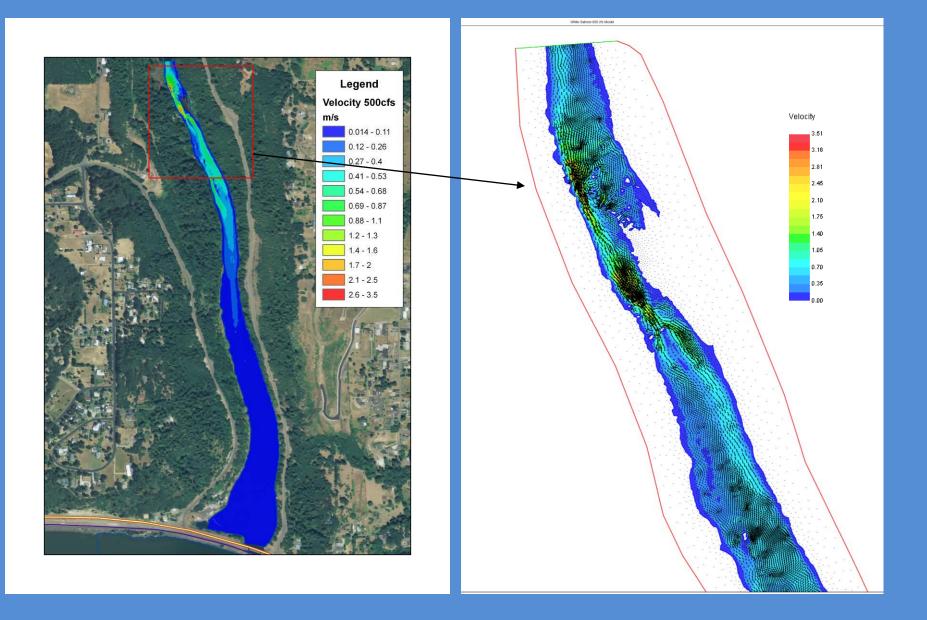
Presence/absence

Hydrodynamic Modeling

😂 a25_50d.cdg - River2D	
File Edit View Display Flow Mesh Edit Habitat Ice Cover Options Help	
and a loss	
About River2D	
OK River2D Version 0.90 September 30, 2002	
by: P. Steffler, A. Ghanem, and J. Blackburn	
University of Alberta Fisheries and Oceans, Canada United States Geological Survey	
This program is in the public domain and is freely distributable.	
The authors and above organizations assume no responsibility or liability for the use or appicability of this program, nor are they obliged to provide technical support.	
Copyright © 1999	
Ready	



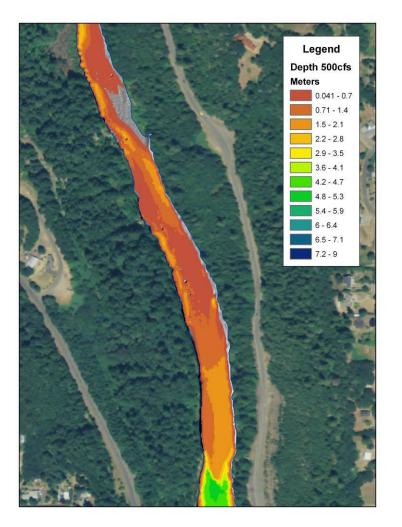
2D Hydrodynamic Modeling: velocities

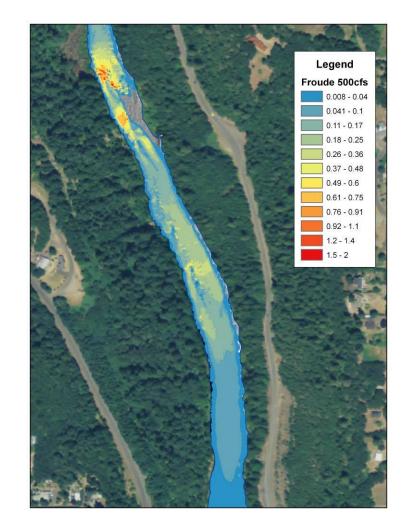


2D Hydrodynamic Modeling

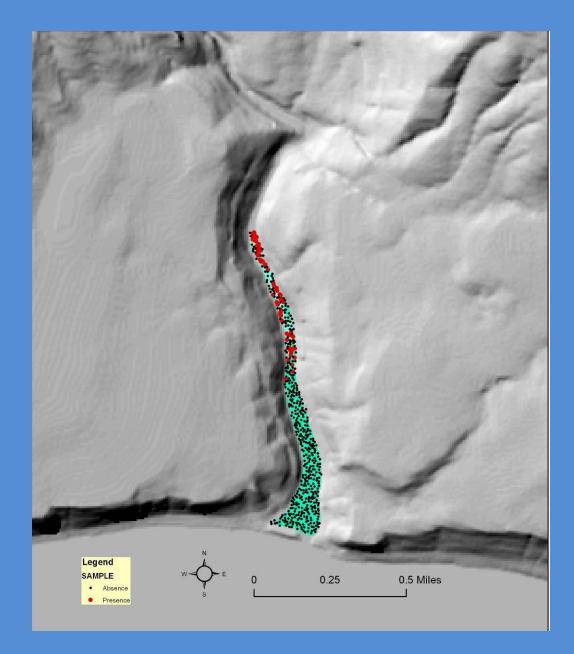
Depth

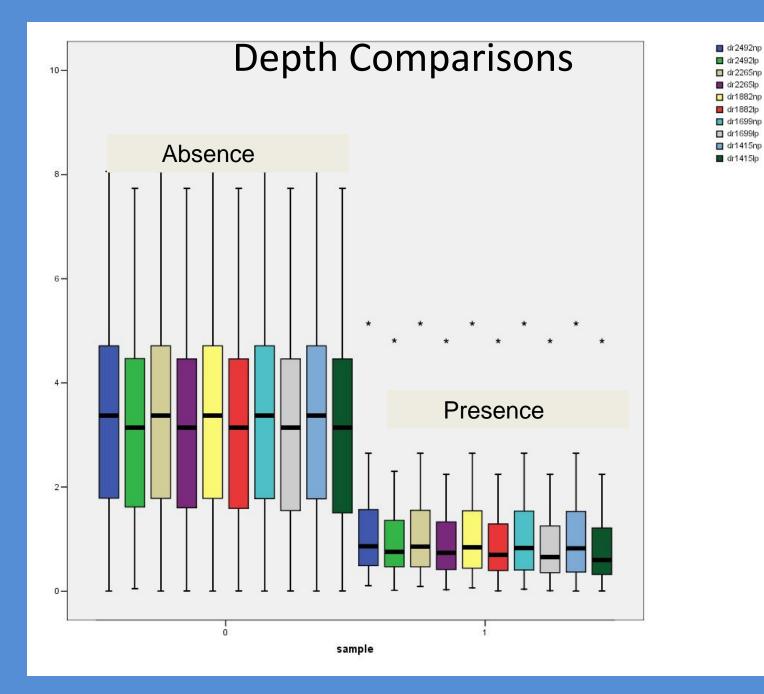
Froude



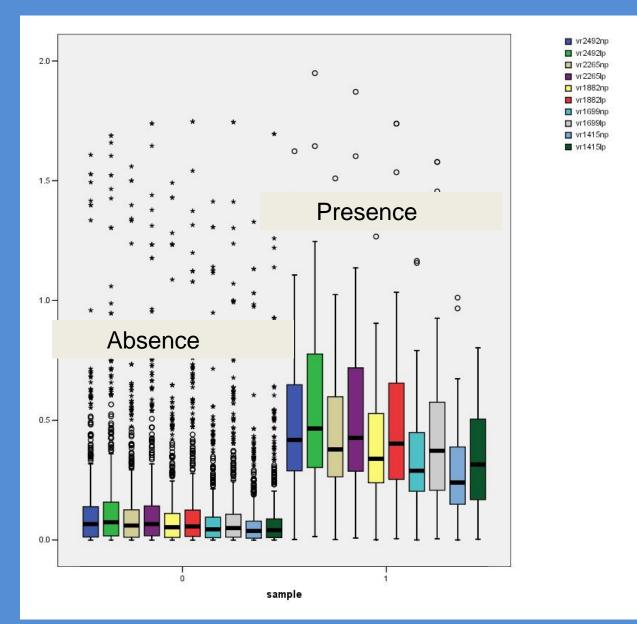


Habitat Modeling





Velocity Comparisons



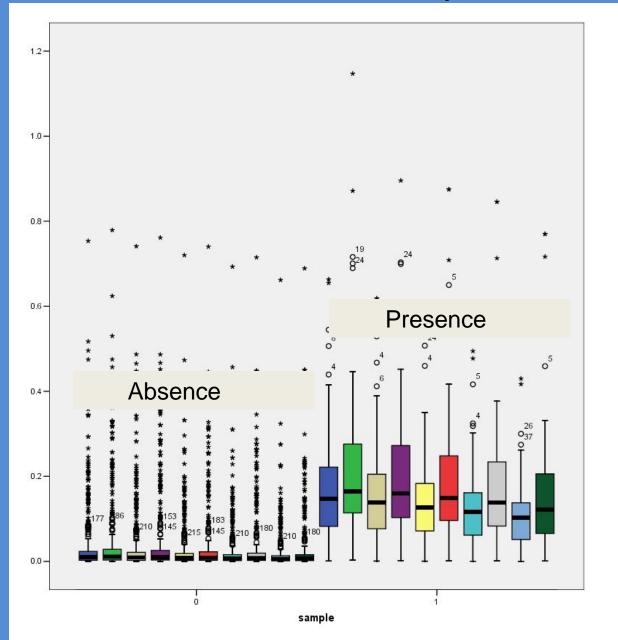
Froude Comparisons

frr2492np
frr2492lp

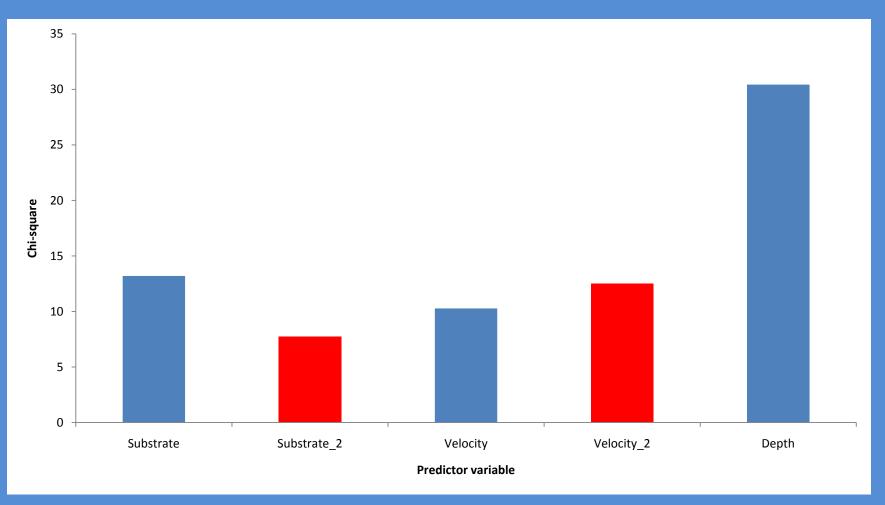
frr2265np
frr2265lp

frr1882np
frr1882lp
frr1699np
frr1699lp
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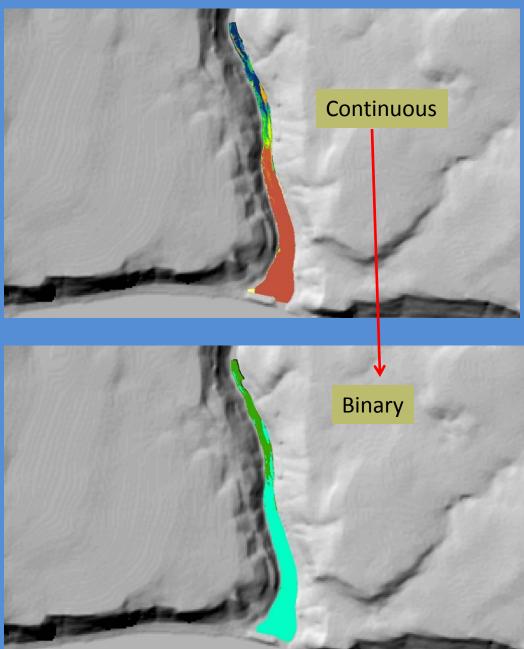
frr1415lp



Covariate Significance



Spawning Habitat Suitability



Fish-habitat Model Classification Accuracy



White Salmon In Lieu Fishing Site

June 2011

January 2012



Upstream from SR14

October 2011



December 2011



White Salmon River Delta

December 2011



Comparisons: before and after dam breach

Before

After



Comparison: before and after

Before







Comparisons: before and after dam breach

Before



After



Conclusions

- We successfully characterized tule fall Chinook salmon spawning habitat prior to dam breach
- Tule fall Chinook salmon show distinct preferences for flow, substrate, and water depth during spawning
- Our habitat model obtained > 90% classification accuracy
- Large changes have occurred to the lower White Salmon River and they will continue to change monthly for years?
- We will repeat our methods during upcoming years and conduct change detection to quantify effects of dam breaching on tule fall Chinook salmon spawning habitat