

Evaluating Cumulative Ecosystem Response to Restoration Projects in the Columbia River Estuary

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Summary of 2008 Accomplishments

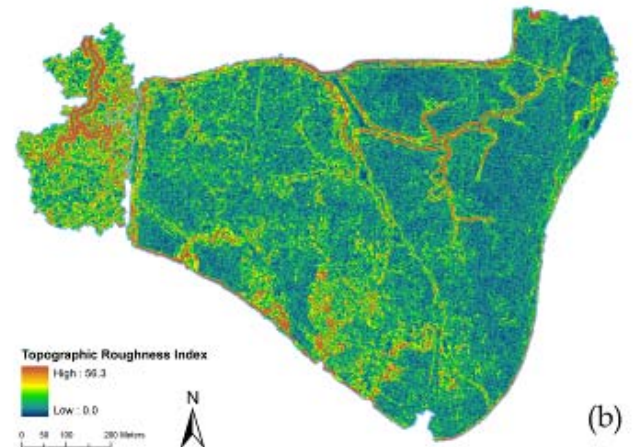
- 1-D Hydrological Modeling: Predicting Wetted Area Outcomes
- Natural Breach Rapid Assessment: Predicting Fish & Habitat Quality Outcomes
- Julia Butler Hansen NWR: Baseline Study of Alternative Hydrological Reconnection Methods
- 2-D Hydrodynamic Modeling of Cumulative Effects: Dike Breach Connectivity Scenarios
- Adaptive Management through Applied Research

Salmon Habitat Opportunity: Wetted Area Modeling

1. Land Elevation & Microtopography from LiDAR Data

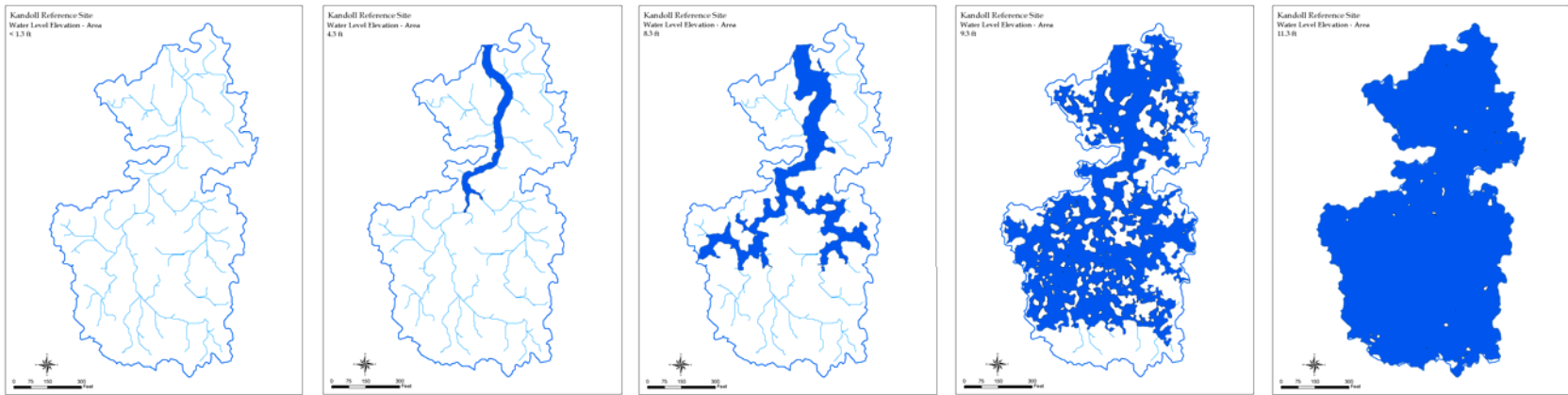


2. Water Level Data

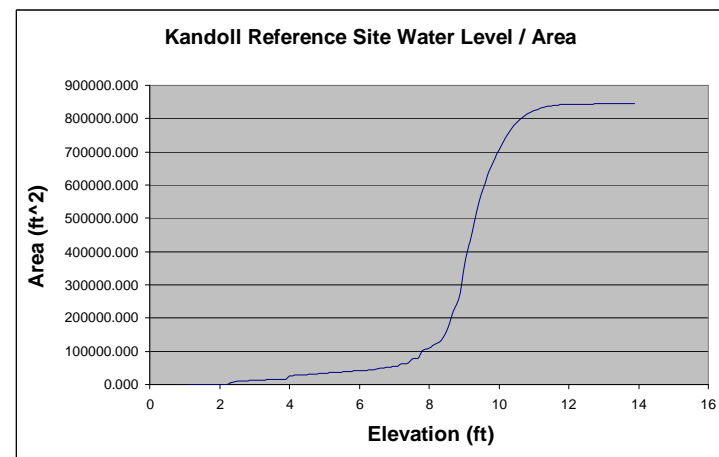
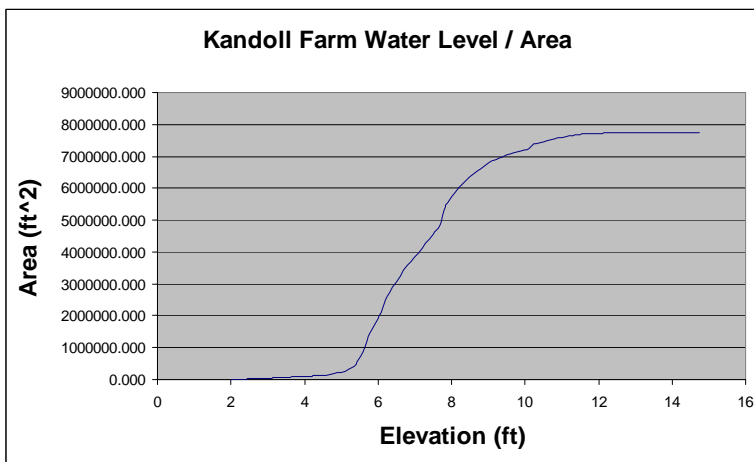


Salmon Habitat Opportunity

3. Area-Time Inundation Index



4. Hypsographic Curves: Restoration & Reference



Predicting Restoration Outcomes for Fish and Habitat Capacity: “Natural” Dike Breach Dates

2008: Began Time Series



Karlson Island, prior to 1981



Fort Clatsop, ~1960



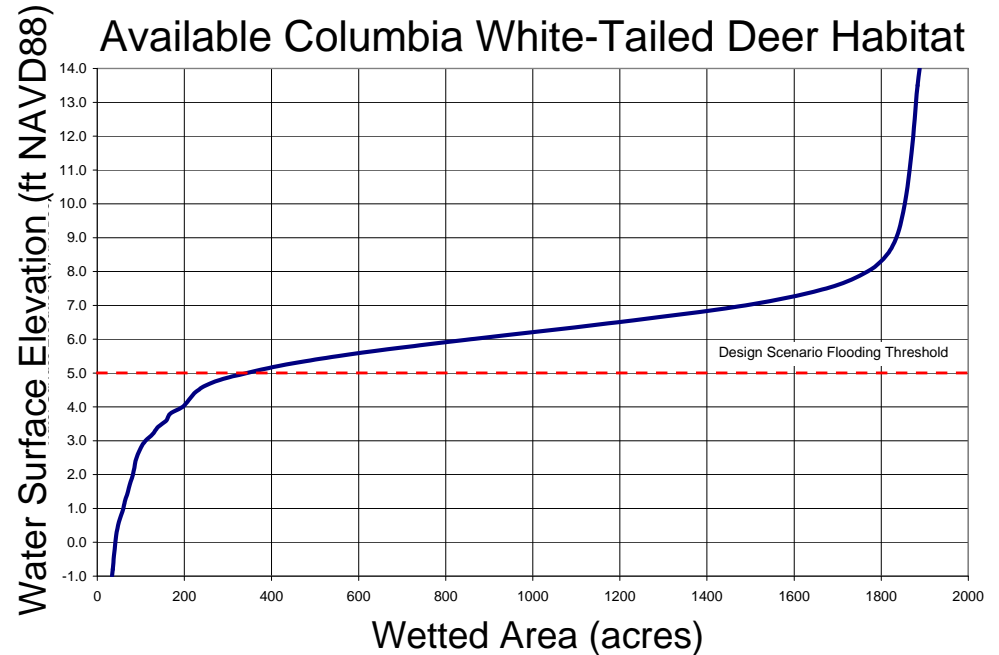
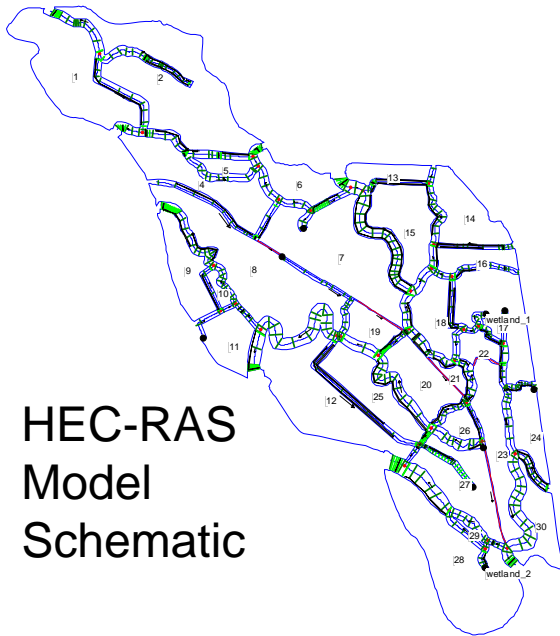
Trestle Bay, 1995

Natural Breach Rapid Assessment

- Vegetation
- Channel Morphology
- Sediment Accretion
- Water Levels
- Elevation
- Fish

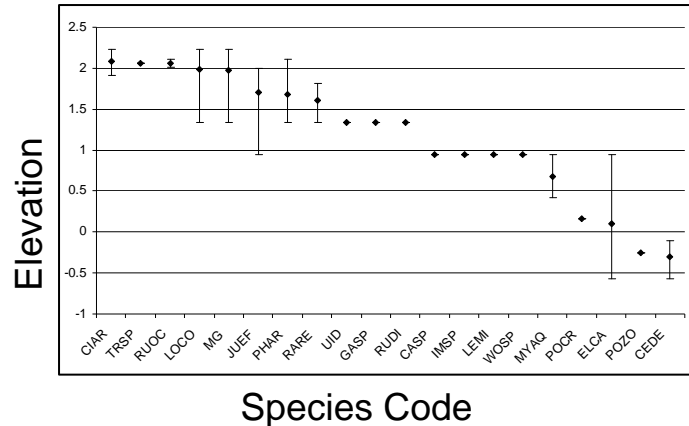


Julia Butler Hansen NWR, Alternative Methods for Hydrological Reconnection



Courtesy of
Mike Ott, USACE
Portland District

Julia Butler Hansen NWR Tidegate Replacement Baseline Monitoring



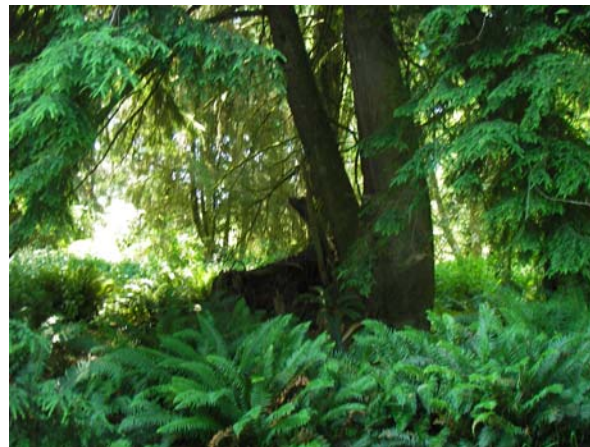
Elevation of Plant Species and Landscape Features



Nutrient and Chlorophyll Flux between Blocked Channels and the Main Stem Columbia River

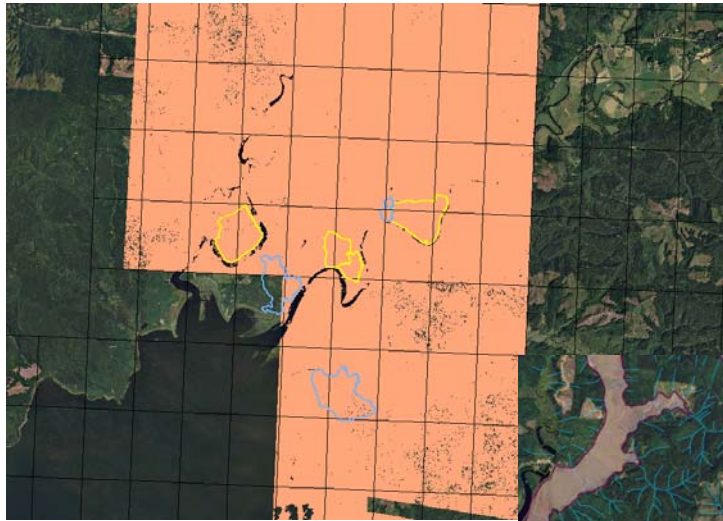


Aquatic Vegetation

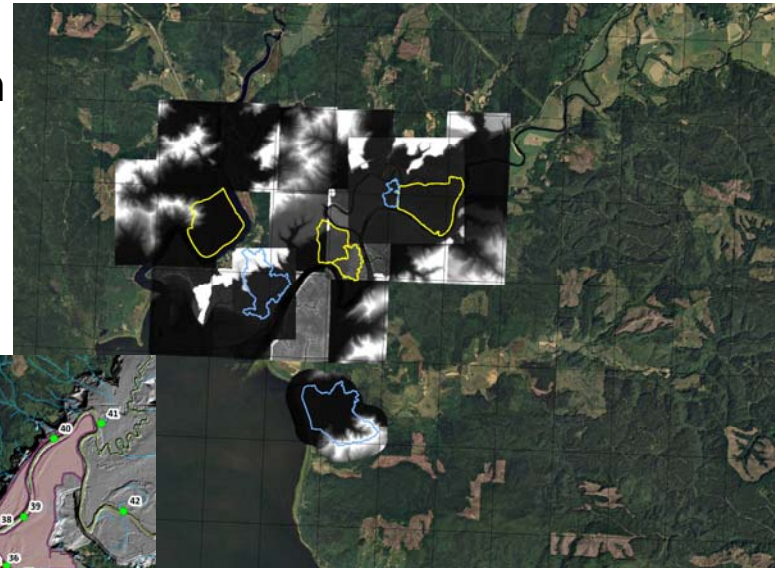


Forested areas

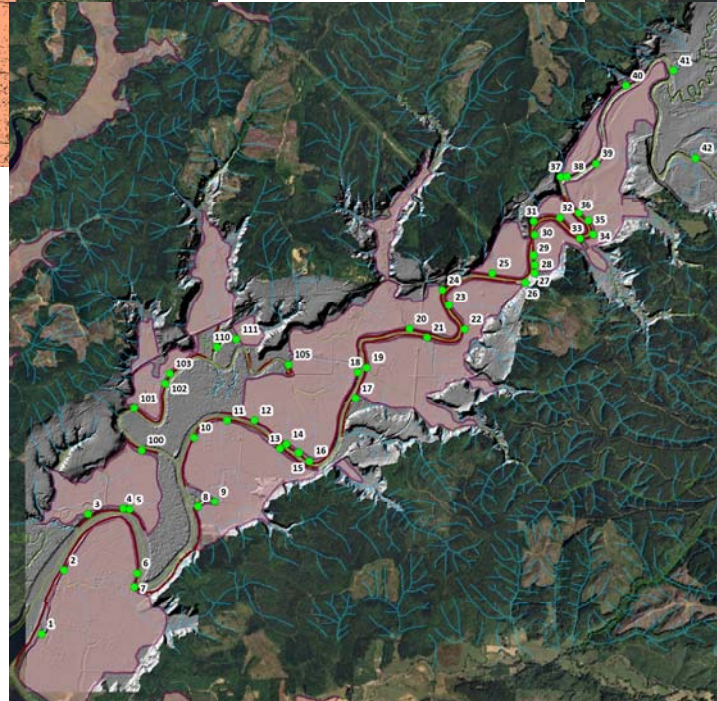
Cumulative Effects Testing: Grays River Study Area



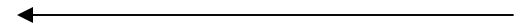
LiDAR and
Dike Breach
Restoration
Sites →



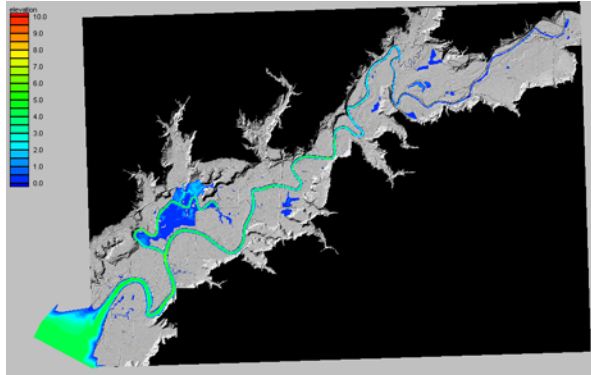
Grays River
and Deep River
on Grays Bay,
Washington State



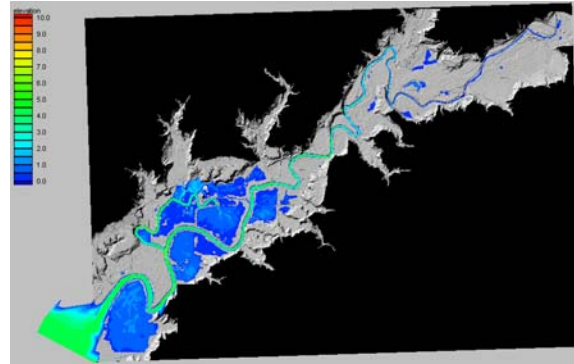
Historical and current
tidal channels identified
on the lower Grays R.;
effects of randomized sets
of dike breaches (scenarios)
were modeled.



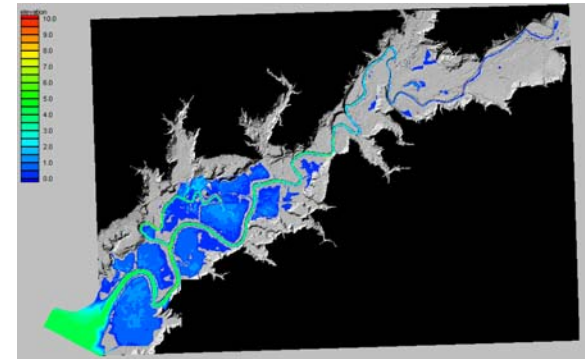
Hydrodynamic Modeling of Random Dike Breach Patterns



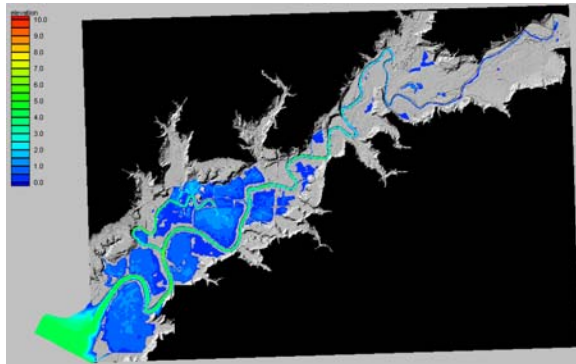
No breaches



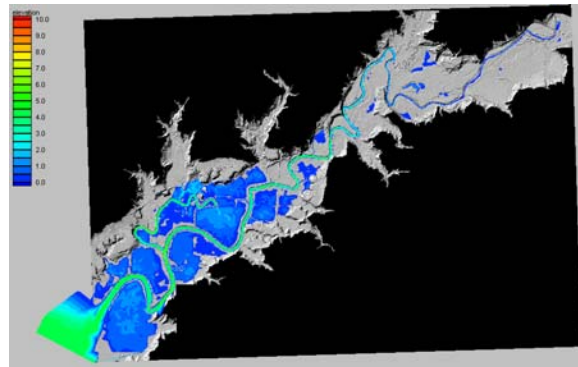
25th percentile



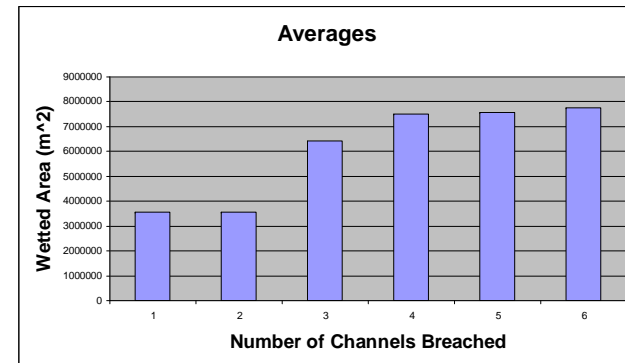
50th percentile



75th percentile

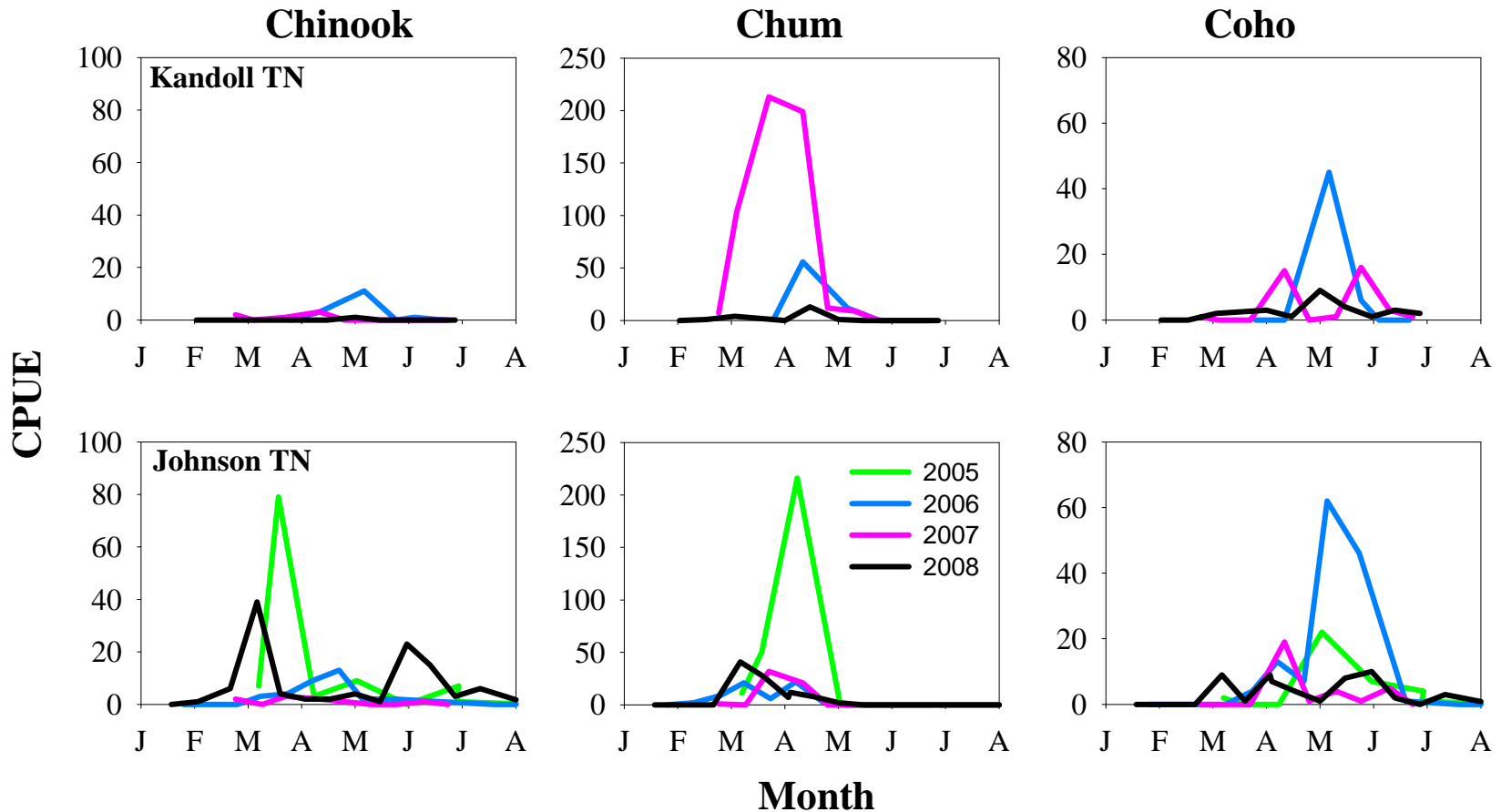


All



Run Averages

Salmon Use of Restoring Estuarine Habitats (“Realized Function”)



Time Series of Salmon Abundance in Restoring Wetlands on the Grays River.

Monitoring Protocols for Salmon Habitat Restoration Projects



PNNL-15793

Protocols for Monitoring Habitat Restoration Projects in the Lower Columbia River and Estuary

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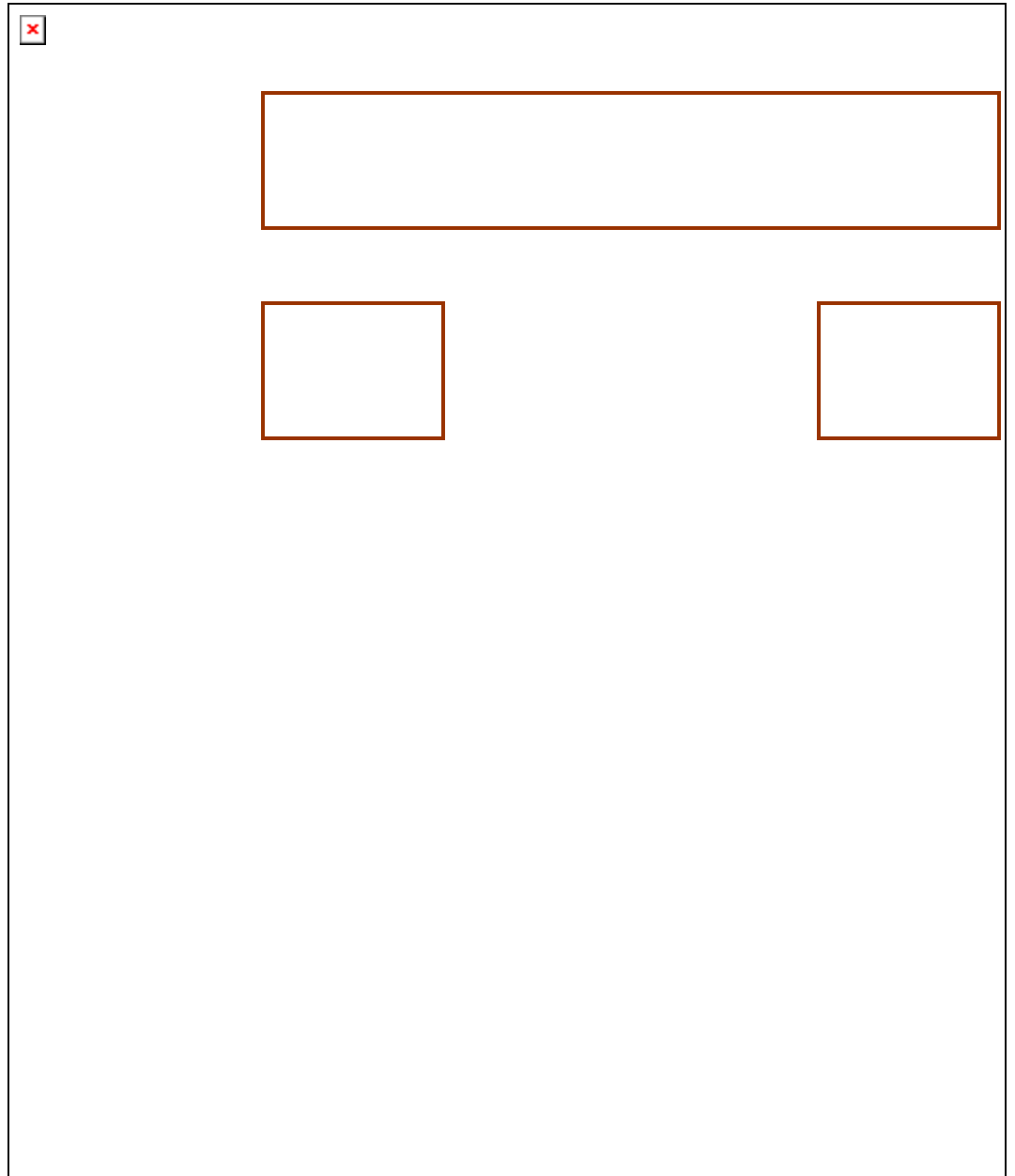
US Army Corps of Engineers Pacific Northwest National Laboratory CREST



Available URL: http://www.lcrep.org/lib_other_reports.htm

Summary of Applied Research for Adaptive Management: A Levels-of- Evidence Assessment Approach

Baird and Burton (2001)
Downes et al. (2002)





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