AFEP Estuary Studies Updates

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2024 AFEP Annual Review

USACE – Portland District

U.S. ARMY

US Army Corps of Engineers®

Acknowledgements

Multiple agencies support CEERP adaptive management, monitoring and research.

US Army Corps of Engineers®
Portland District

Est. 1802

Bonneville
POWER ADMINISTRATION

Est. 1937

NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

Est. 1970

crest
COLUMBIA RIVER ESTUARY STUDY TASKFORCE

Lower Columbia Estuary Partnership

COWLITZ INDIAN TRIBE
The Forever People

Pacific Northwest
NATIONAL LABORATORY

YAKAMA NEZ PERCE WARM SPRINGS UMATILLA

Columbia Land Trust
CONSERVING THE NATURE YOU LOVE

Washington Department of FISH & WILDLIFE

U.S. FISH & WILDLIFE SERVICE

W2

USGS
science for a changing world

Overview

- Program adaptive management
- Pending studies addressing uncertainties identified by the Expert Regional Technical Group (ERTG) in 2022
  - Acoustic telemetry in lower estuary
  - Expanded flux study to expand on indirect benefits of restoration
- Progress toward meeting goal of greater transparency, data sharing, and reporting

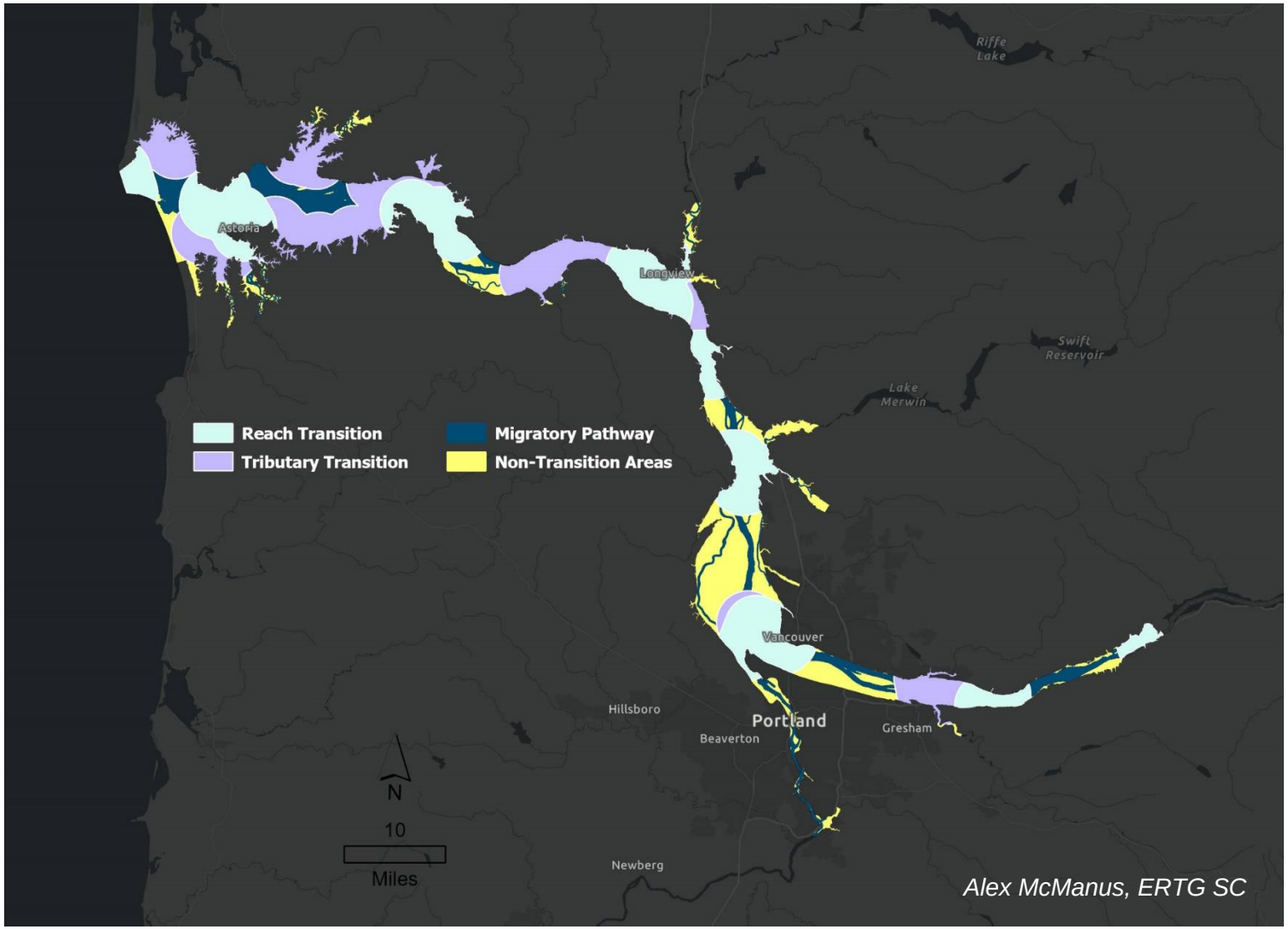
CEERP Adaptive Management

Ebberts et al. 2017, https://doi.org/10.1111/rec.12562
Littles et al. 2022, https://doi.org/10.1111/rec.13634

Uncertainties Identified by the ERTG

How do transitional habitats in the designated priority areas (e.g., priority reaches, tributary junctions) compare in importance to other salmonid rearing habitats in the estuary?

Are sediment placement actions detrimental or beneficial to juvenile salmonids and their food sources and habitats in the short or long-term or both?



ERTG (Expert Regional Technical Group). 2022. Uncertainties. ERTG #2022-02, prepared for the Bonneville Power Administration, National Marine Fisheries Service, and the U.S. Army Corps of Engineers. Portland, Oregon. Available from https://www.cbfish.org/EstuaryAction.mvc/Documents

Hood et al. 2021. *Using landscape ecology principles to prioritize habitat restoration projects across the Columbia River Estuary*. Restoration Ecology 30(3): e13519. https://doi.org/10.1111/rec.13519

Utilization of Off-Channel and Dredge Placement Sites by Migrating Juvenile Salmonids

Study Leads: Summer Burdick, Collin Smith, and Tobias Kock – USGS

H_o: Yearling juvenile Chinook do not utilize off-channel areas of the lower estuary when migrating downstream.

Study Objectives:

1. Collect data on distribution of juvenile salmon in the lower estuary.
2. Determine array density necessary to track fish behavior in and around the Woody Island Channel (WIC).
3. Evaluate behavior and movement of juvenile salmon in WIC area. Document and quantify behaviors (e.g., transit, milling, etc.) to the extent possible.

Proposed JSATS autonomous hydrophones arrays near Woody Island Channel.

Evaluating Prey Export Across Habitat Types and Hydrogeomorphic Reaches

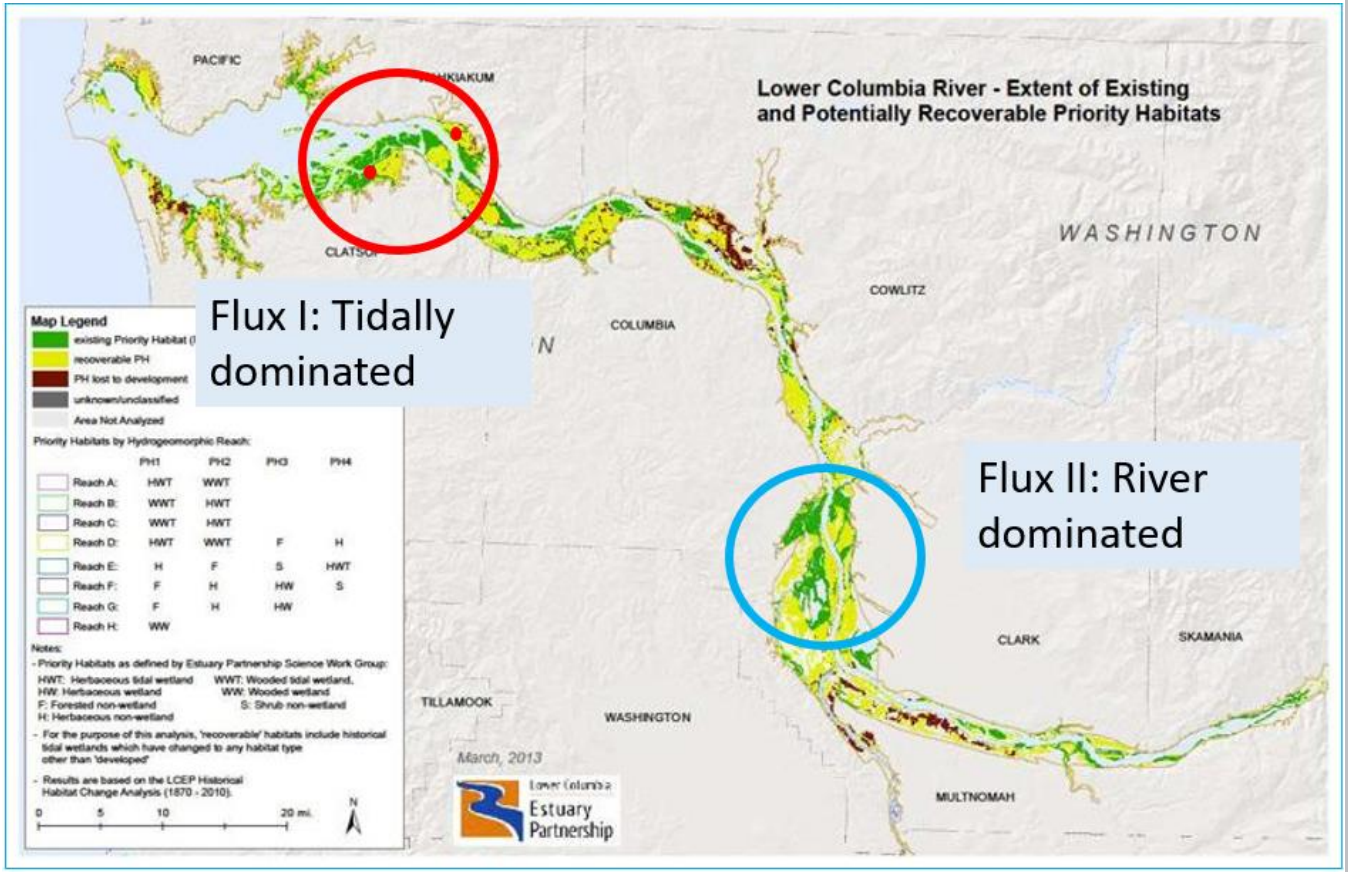
Study Lead: Curtis Roegner – NOAA

H_0 #1: There is no significant difference in the quality or quantity of prey exported from sites of varying restoration trajectory.

H_0 #2: There is no difference in the quality or quantity of prey exported from sites across ecohydrological zones.

Study Objectives:

1. Characterize transport, diversity, and energy density of prey from reference and restored wetland systems.
2. Compare salmon benefits (energy equivalents) at target hydrogeomorphic reaches. *Do river-dominated reaches have similar salmon prey subsidies as tidally dominated sites.*

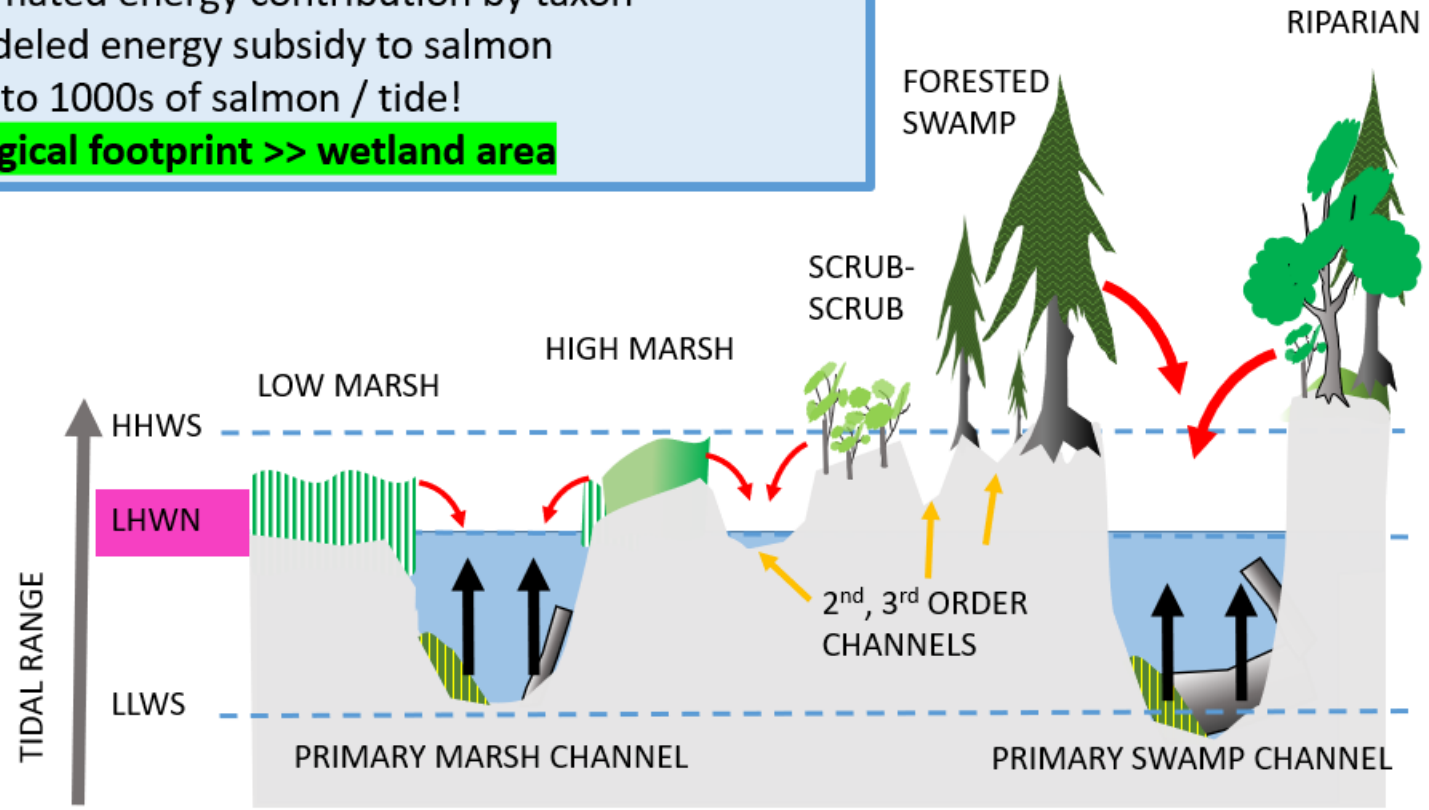


Expanding on the former Flux Study

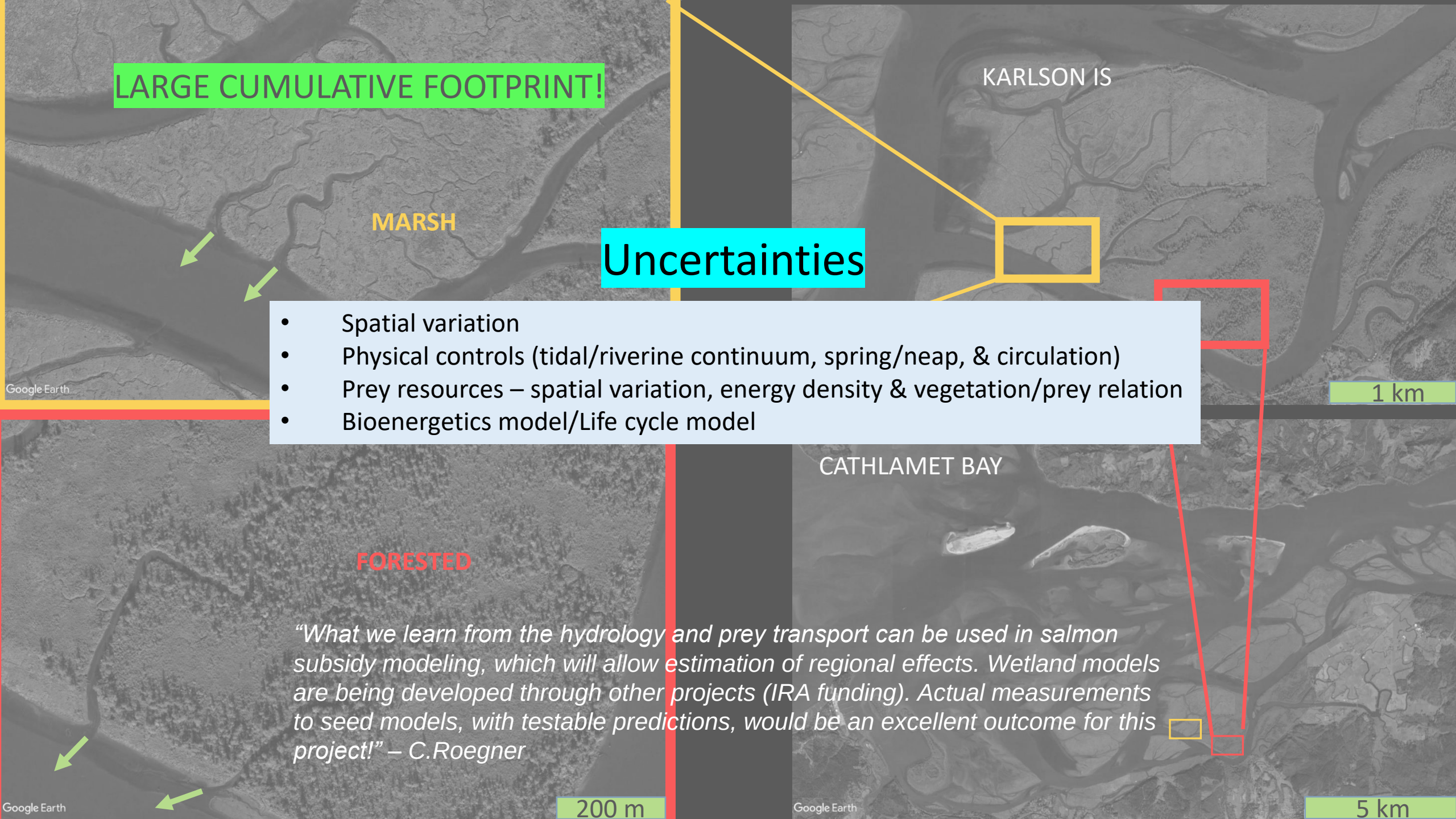
Curtis Roegner
Gary Johnson

1. Sampled mouths of tidal creeks (11 sites over 2 yr) & quantified prey transport
2. Estimated energy contribution by taxon
3. Modeled energy subsidy to salmon
4. 10s to 1000s of salmon / tide!

➔ **Ecological footprint >> wetland area**

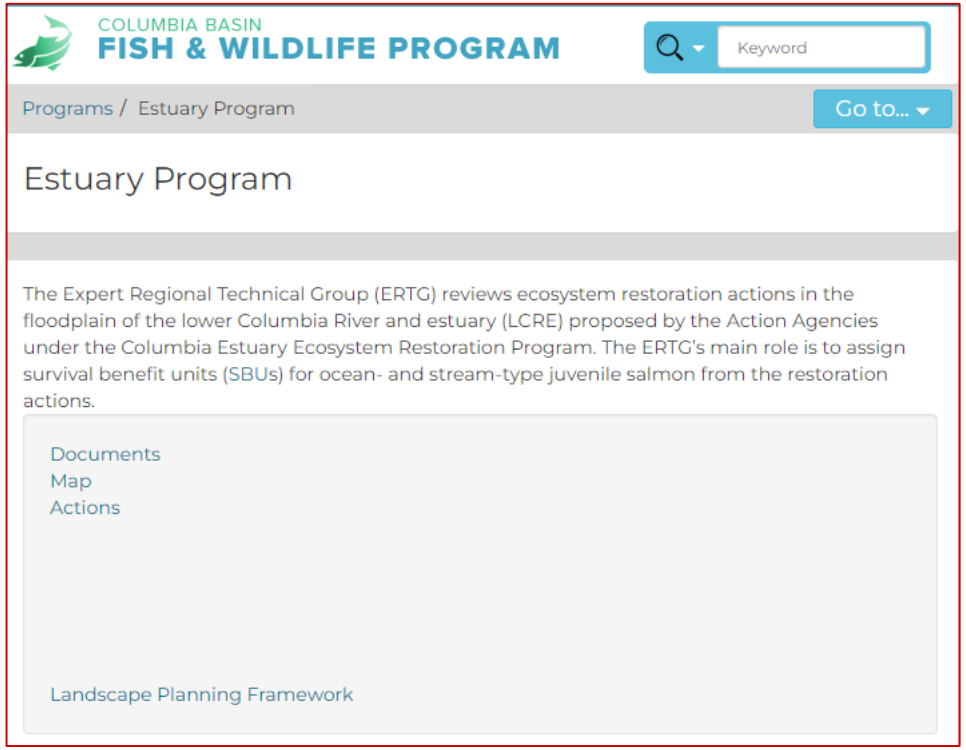


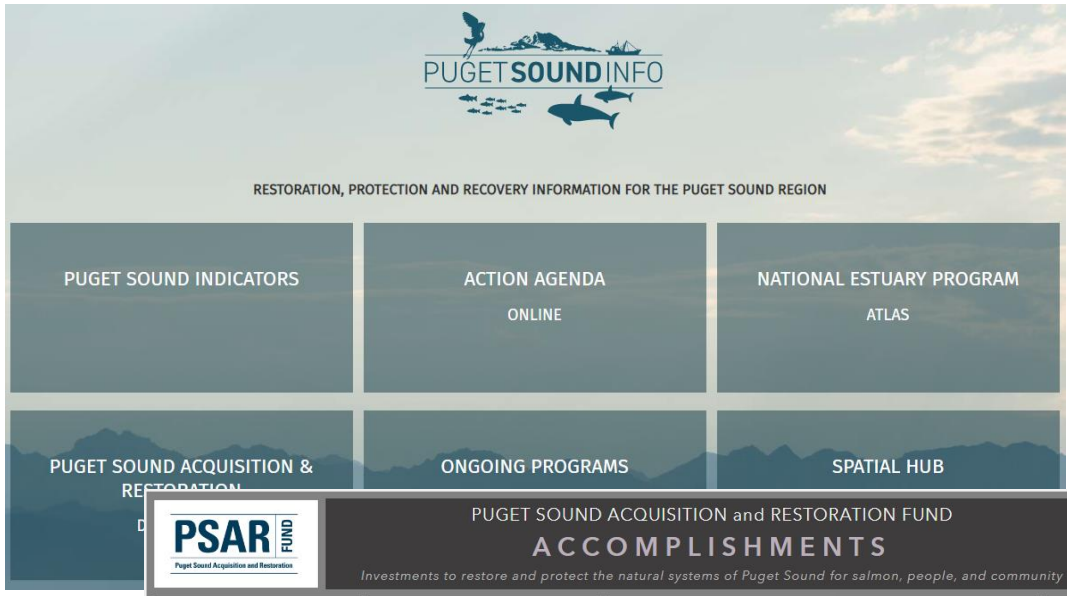
AEMR finat report; Roegner & Johnson 2023 PLoS ONE 0282655

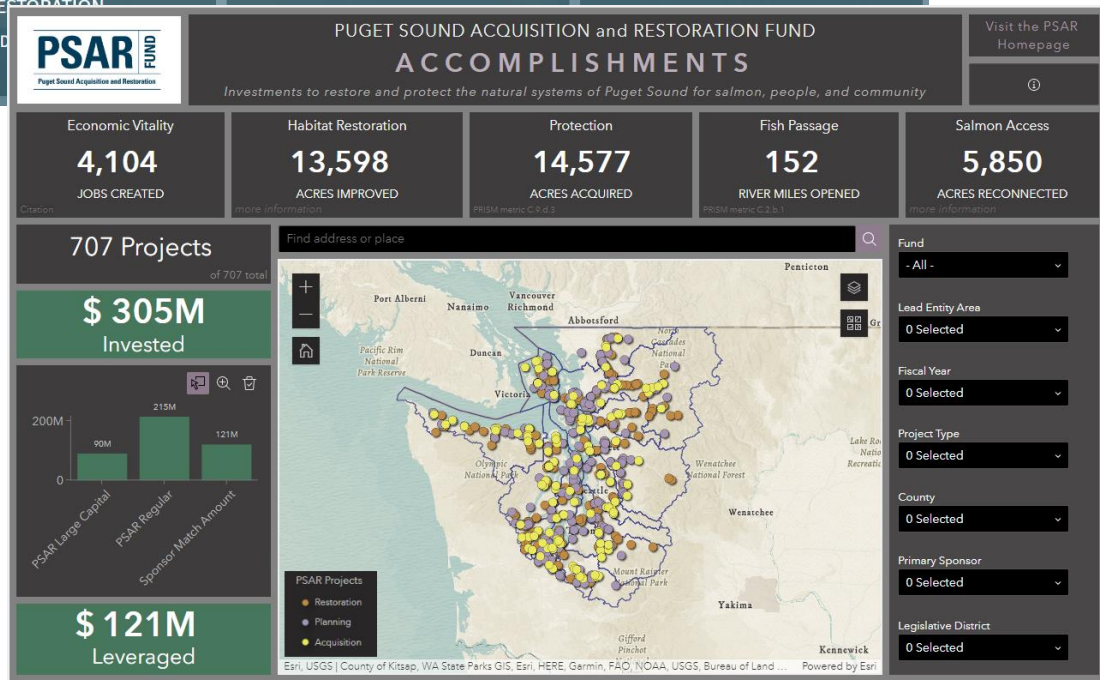

LARGE CUMULATIVE FOOTPRINT!
KARLSON IS
MARSH
Uncertainties
Spatial variation
Physical controls (tidal/riverine continuum, spring/neap, & circulation)
Prey resources – spatial variation, energy density & vegetation/prey relation
Bioenergetics model/Life cycle model
1 km
CATHLAMET BAY
FORESTED
"What we learn from the hydrology and prey transport can be used in salmon subsidy modeling, which will allow estimation of regional effects. Wetland models are being developed through other projects (IRA funding). Actual measurements to seed models, with testable predictions, would be an excellent outcome for this project!" – C.Roegner
Google Earth
200 m
Google Earth
5 km

CEERP Data Sharing and Transparency

Managers began a process to make CEERP data more accessible in 2012 (*Oncor*, Coleman et al. 2018), but that system's O&M was not pursued. We are now evaluating options for streamlined data sharing among program affiliates.

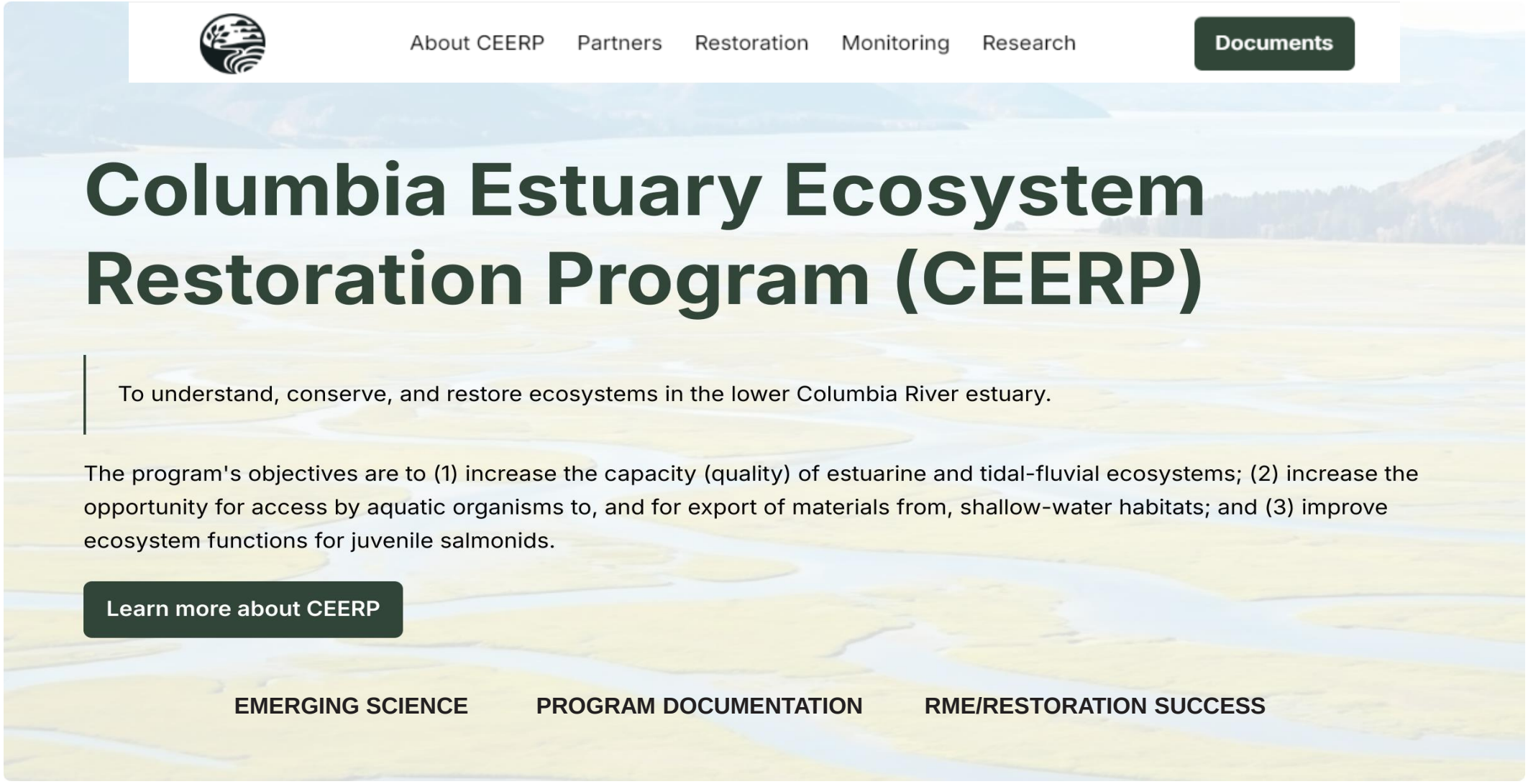






CEERP Website Preview (*draft*)

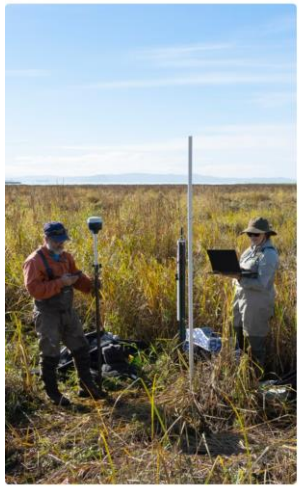
Project Leads: Heida Diefenderfer and Cailene Gunn (PNNL); Alex McManus (BPA)



Synthesis Memo 3

CEERP is developing a new Synthesis Memo! Distilling the last 5 years of learning, this document will help guide the program into the future. Learn about how the monitoring and research community came together to share their thoughts on the future of science in the estuary.

1. **Community Engagement**
   Gathering input from diverse stakeholders and researchers.
2. **Data Analysis**
   Synthesizing 5 years of monitoring and research data.
3. **Future Planning**
   Developing recommendations for future estuary science and management.
4. **Memo Publication**
   Releasing the comprehensive Synthesis Memo 3 to guide CEERP's future efforts.



Incorporating Climate Change

The Expert Regional Technical Group (ERTG) has new guidance on incorporating climate resilience into CEERP. Read the ERTG work product here.

1. **Climate Data Analysis**
   ERTG experts analyze climate trends and projections specific to the Columbia River estuary region.
2. **Resilience Strategies**
   Develop tailored strategies to enhance ecosystem resilience in the face of climate change.
3. **CEERP Integration**
   Incorporate climate resilience guidance into CEERP's restoration planning and implementation processes.

Ecosystem Restoration

Restoring estuary habitat can be complex. CEERP Program sponsors are well versed in planning and implementing projects that benefit the ecosystem and the estuary community.

Wetland Restoration
Reconnecting floodplain and restoring native plant communities to improve habitat quality.

Fish Passage Improvement
Enhancing connectivity for aquatic species throughout the estuary.

Beneficial Use of Dredged Material
Optimizing sediment distribution to support natural ecosystem processes.

Learn More | Experimental Projects

Monitoring

As part of CEERP's Adaptive Management structure, monitoring is critical to understanding our impact on the ecosystem. Over the past 20 years, we have paired our Action Effectiveness Monitoring & Research with long term status and trends data from our Ecosystem Monitoring Program to better understand the complex physical and biological processes of the estuary.

Action Effectiveness Monitoring & Research

Evaluating the impact of specific restoration actions on ecosystem health.

View Dashboard

Ecosystem Monitoring Program

Tracking long-term trends in ecosystem health and function.

Access Data

Research

Some of the best and brightest estuarine researchers have chosen the Columbia River estuary as their focus - for good reason! The CRE is a complex place that balances intricate environmental systems with navigation, flood control, and commerce. Several research institutions are hard at work uncovering how the estuary functions - sediment, hydrology, macroinvertebrates, vegetation - our research community is investigating all angles to better understand a complex system.

Sediment Analysis
Studying sediment composition and transport.

Hydrology
Investigating water flow patterns and dynamics.

Macroinvertebrates
Examining aquatic insect populations and diversity.

Vegetation
Analyzing plant communities and their roles.

New publication alert! Flux paper just published in PlosONE.

Community and Resources

We are a community that shares resources and information. We want to be transparent about our work because feedback makes us better. Want to learn more about who we are and what we've learned?

Learn more about our Partners | Visit our resources page for more documents and data

*PNNL's Shon Zimmerman is featured in the lower left panel conducting Critical Uncertainties Research using PNNL's BPA-funded Sediment Sentinel System with Surface Elevation Table (SET) devices. The current standard for AEMR and Ecosystem Monitoring is *not* SETs, but rather Sediment Stakes.

QUESTIONS

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