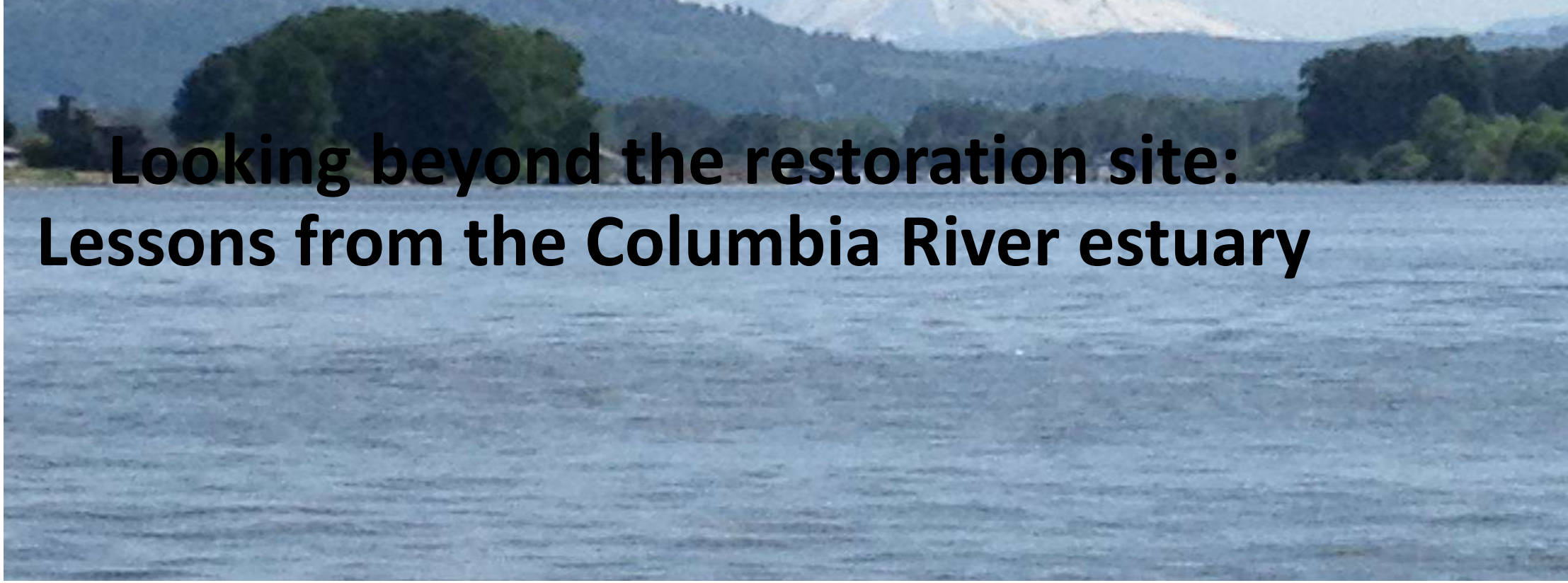

Looking beyond the restoration site: Lessons from the Columbia River estuary

Laurie Weitkamp[1], Nikki Sather[2], Curtis Roegner[1], Regan McNatt[1] and Gary Johnson[2]

[1]NOAA Fisheries, Northwest Fisheries Science Center
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POC: Cindy Studebaker

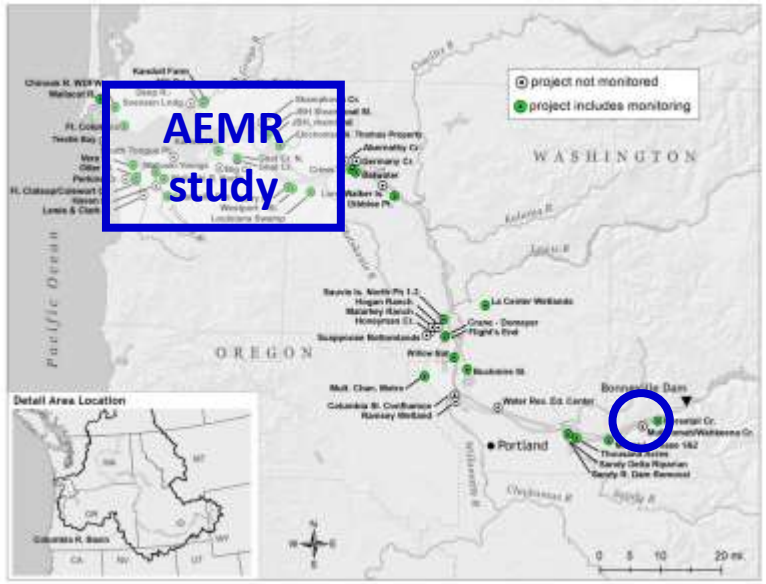
Columbia Estuary Ecosystem Restoration Program (CEERP)

Stated goal

"To undertake the activities necessary to evaluate, protect, monitor, and restore fish and wildlife habitat in the Columbia River estuary" (rkm 0–234)

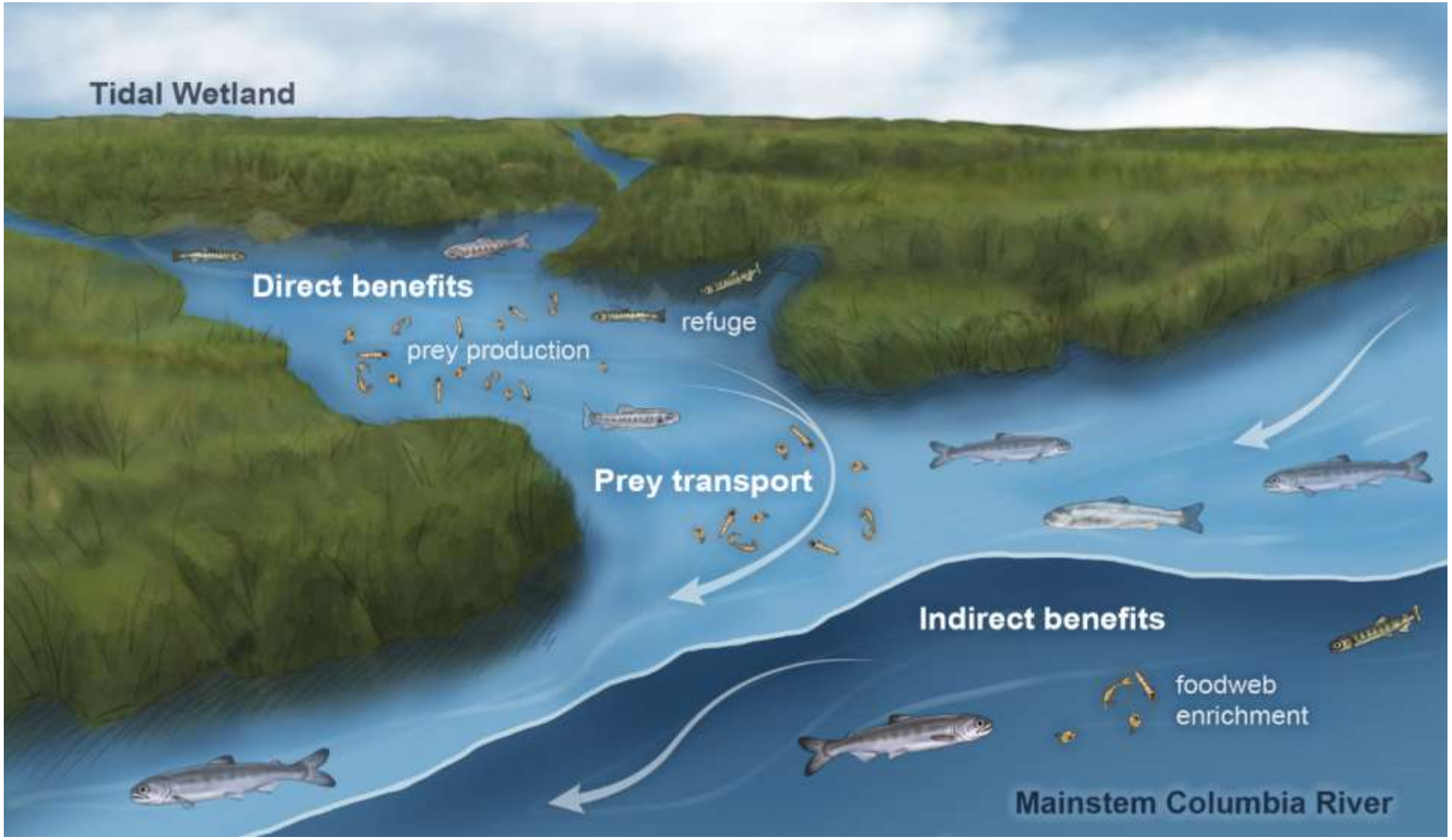
Under CEERP, BPA and USACE have restored 1,000s of acres of tidal marsh habitat

Estuary restoration projects

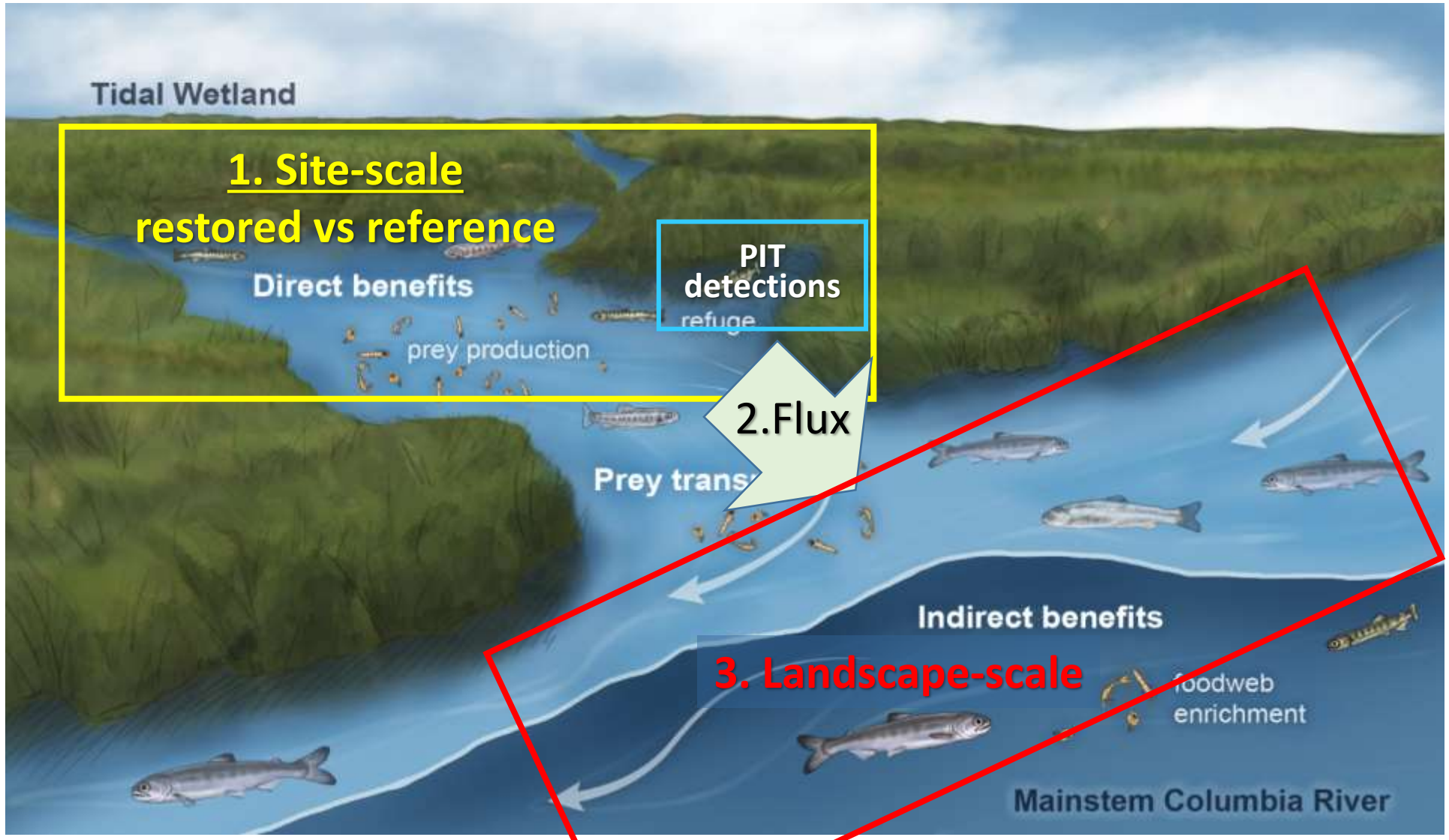


Action Effectiveness Monitoring & Research (AEMR) Key Question: Are the estuary habitat restoration actions achieving expected **direct** and **indirect benefits**, especially to interior ESA-listed **juvenile salmon**?

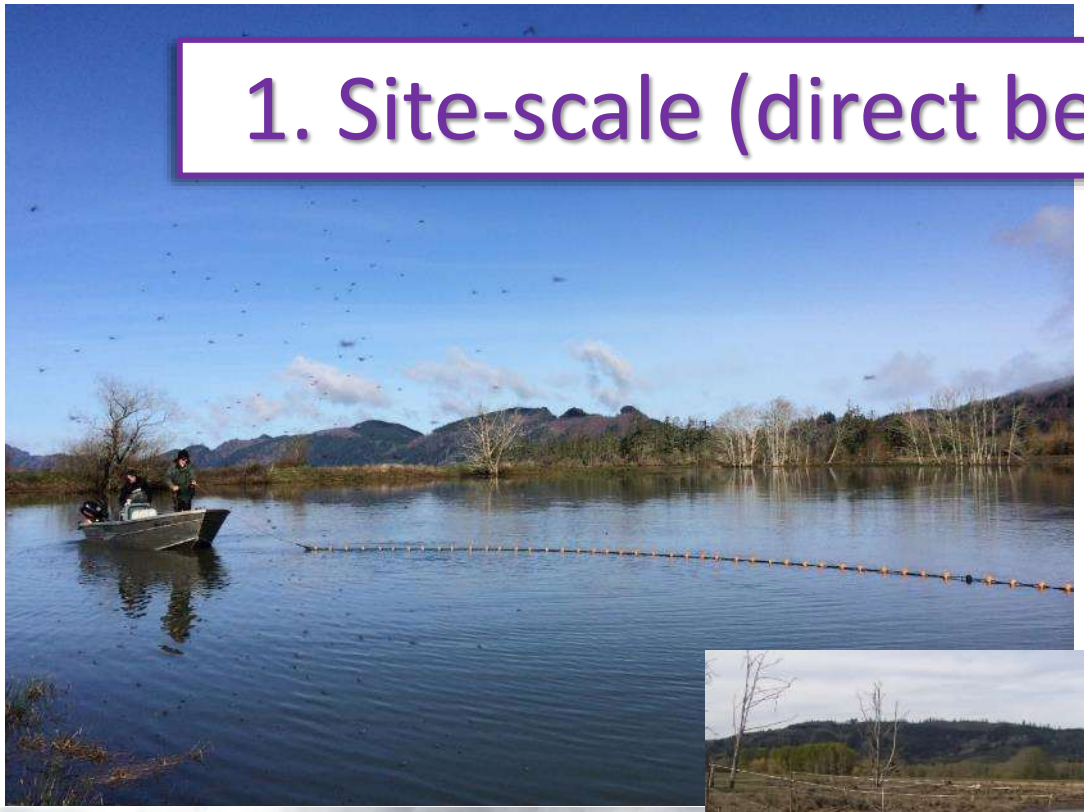
AEMR conceptual model



AEMR study components



1. Site-scale (direct benefits) Lead: N. Sather



1. Site-scale (direct benefits) Lead: N. Sather

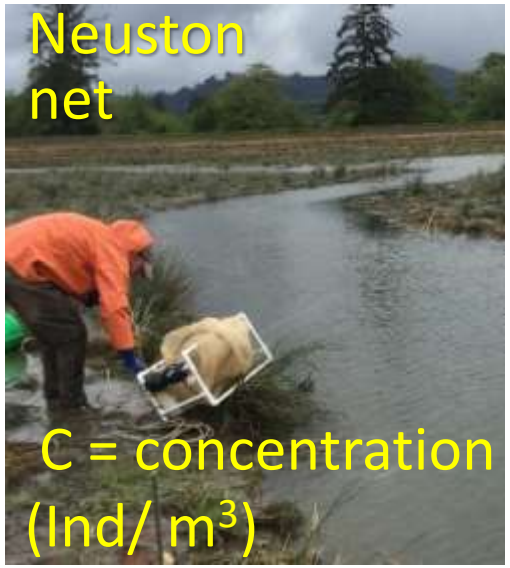
Direct benefits were being realized!

In both reference and restoration sites:

- Prey production was similar
- Subyearling salmon had high diet overlap and high gut fullness.
- Important prey included Chironomids, archanids ceratopoganidae, and zooplankton
- PIT-tagged yearling smolts were detected

2. Flux study (prey export from tidal wetlands) Lead: C. Roegner

X



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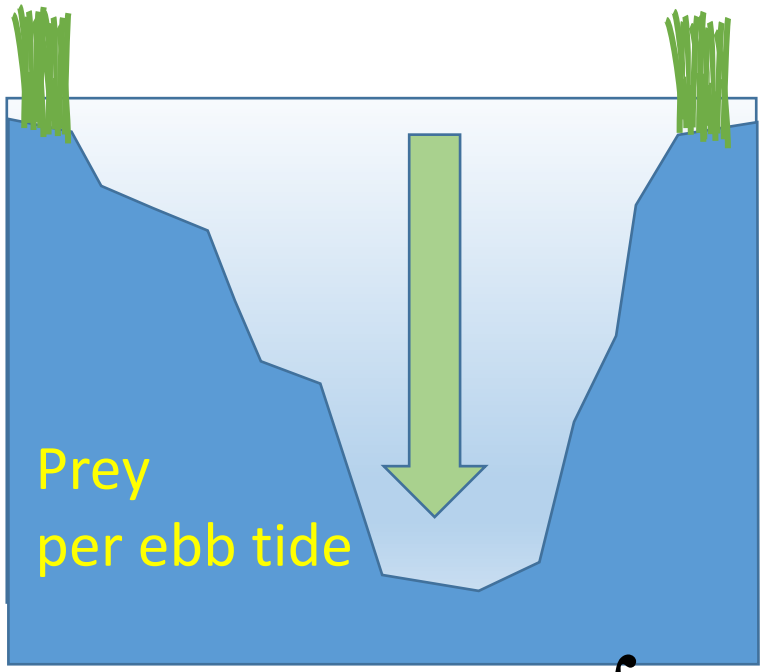


Instantaneous Transport Q x C

= T (ind/s)

Tidal Transport $T_T = \int_{ebb} T$

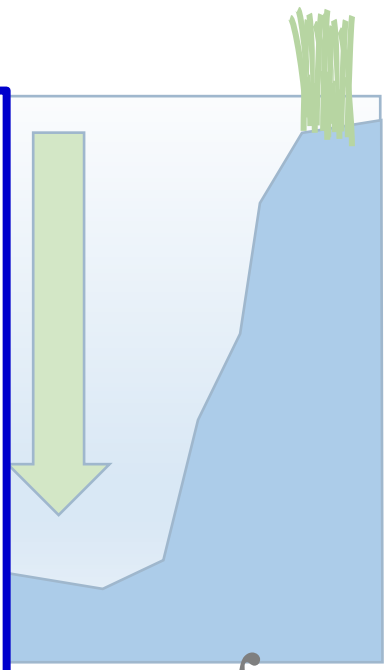
= Total individuals per tide

2. Flux study (prey export from tidal wetlands) Lead: C. Roegner

Indirect benefits (export) were being realized!

In both restoration and reference sites:

- Surprisingly large numbers of insects exported on outgoing tides
- Almost half were Chironomids
- Export equivalent to energy requirements of 10 – 400 salmon per tide!



Instantaneous Transport Q x C

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3. Landscape-scale (indirect benefits to mainstem salmon)
Lead: L. Weitkamp

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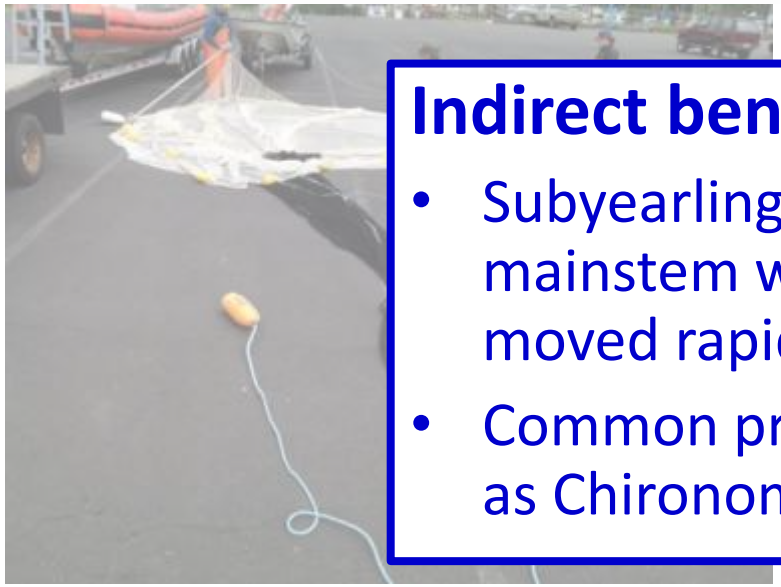
Lead: L. Weitkamp



Indirect benefits to salmon were being realized!

- Subyearling and yearling Chinook and steelhead in mainstem were actively feeding and growing as they moved rapidly downstream
- Common prey included wetland-produced insects such as Chironomids and amphipods

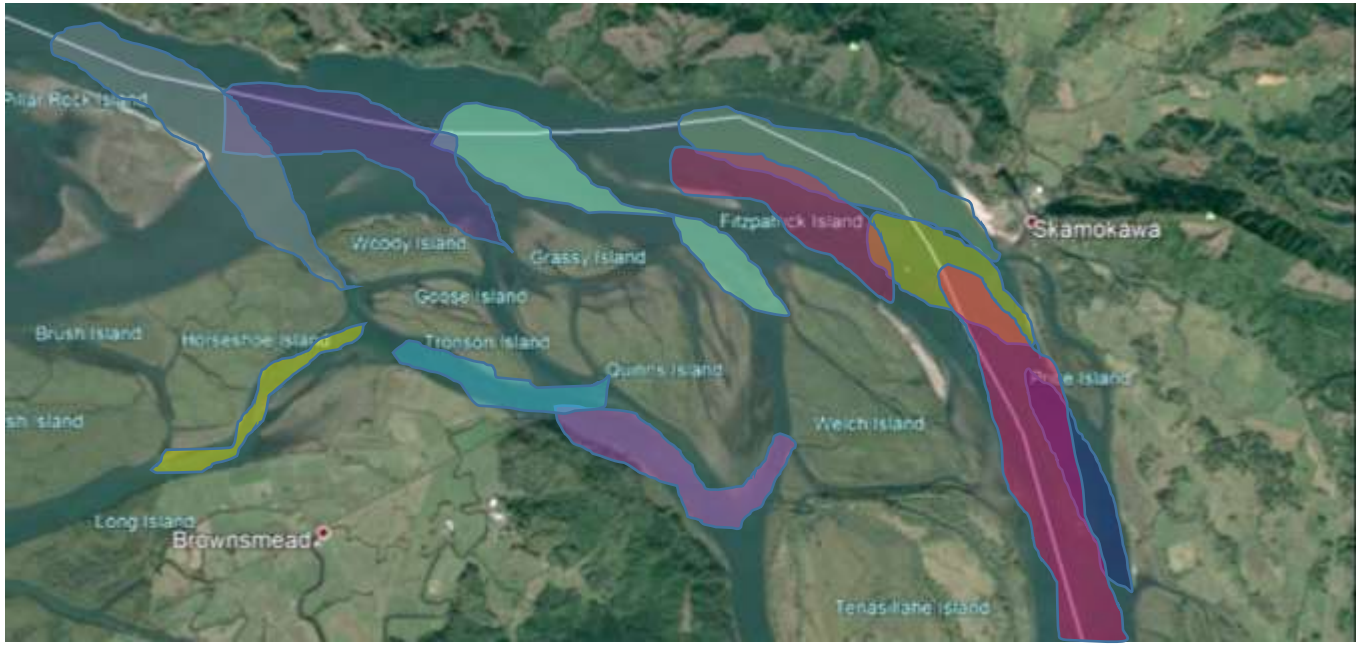
Summary & implications

Tidal wetland restoration does have expected benefits to salmon!

- Prey production directly benefits salmon inhabiting tidal wetlands
- Prey production exported to mainstem indirectly benefits rapidly migrating salmon

Need to look beyond the restoration site to observe all benefits!

- Restored and reference wetlands produce and export significant prey resources to the mainstem river.
- Salmon don't need to enter wetlands to access these prey!



Questions?