

# Ecosystem Monitoring Program: Juvenile Salmon Ecology in Tidal Wetlands of the Lower Columbia River



Lower Columbia  
Estuary  
Partnership

Science Work Group  
October 2020

# Ecosystem Monitoring Program (EMP)

- Status and trends monitoring of conditions in lower river
  - Started in 2005 to provide basic information, fill knowledge gaps on tidal freshwater section of lower river
  - Data used extensively in restoration design and comparison to action effectiveness data
    - Assesses spatial and temporal variability of habitat, fish, food web, and abiotic conditions
    - Tidally influenced emergent habitats used by juvenile salmonids for rearing and refugia
    - Sites are relatively undisturbed shallow water vegetated habitats – used as end points for restoration design
    - Created an inventory of habitats across estuary-tidal freshwater continuum
- Funded by BPA/NPCC

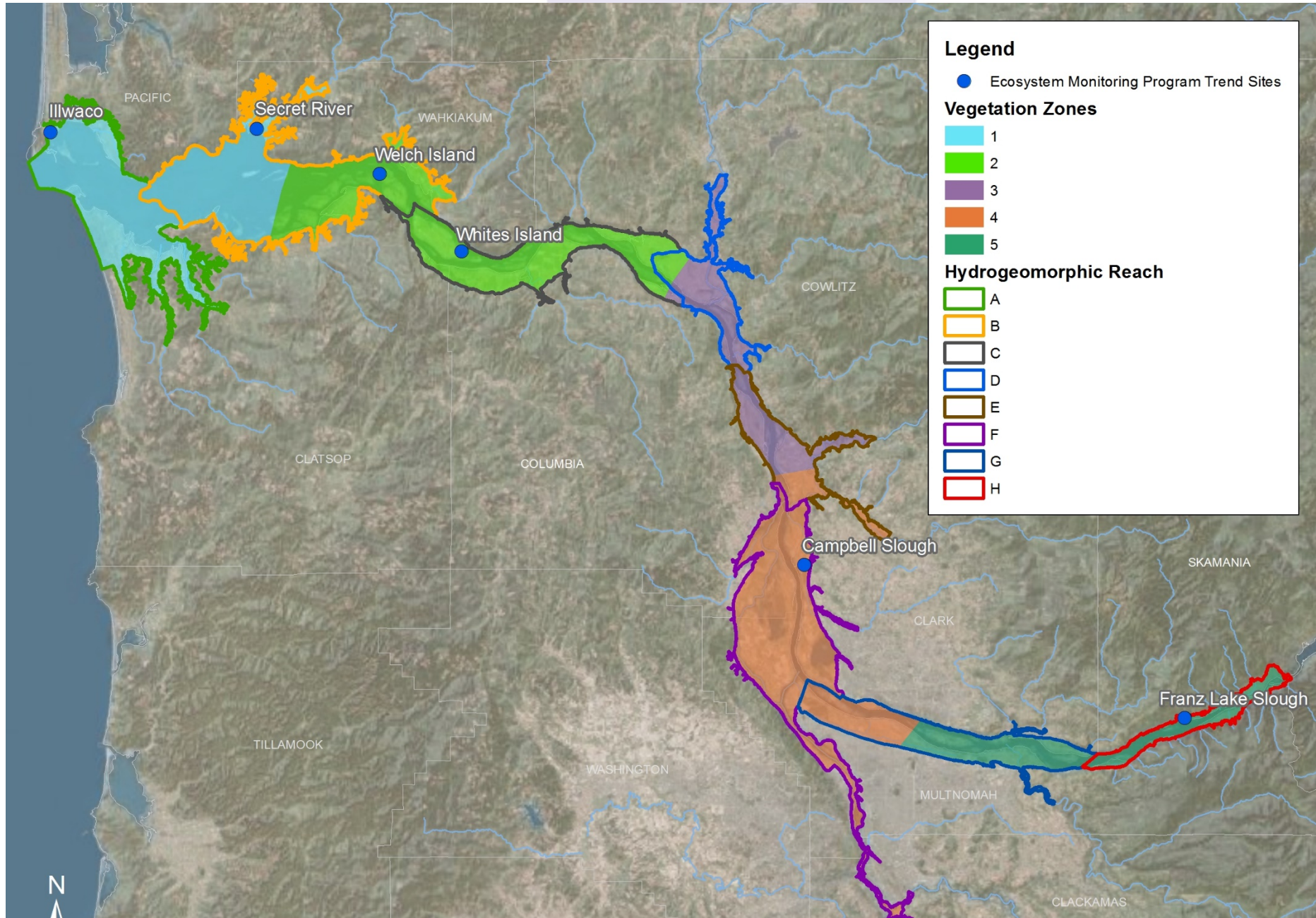


# EMP Sampling Timeline (2005-Now)

Stratified sampling based on 8 hydrogeomorphic reaches (A-H)

- 2007-2012: focus on identifying spatial heterogeneity
  - rotated sites annually to new, un-sampled reach
  - 1 fixed site at Campbell Slough in Reach F
  - Focused on habitat, fish, prey and water temp, pH, DO
- 2011: Added food web (primary, secondary production, isotopes, biogeochemistry)
- 2011-2013: Shift focus to temporal variability - added more fixed sites, dropped rotating
  - 5 sentinel sites represent estuarine-tidal freshwater continuum:
    - Ilwaco Slough (Reach A)
    - Welch Island (Reach B)
    - Whites Island (Reach C)
    - Campbell Slough (Reach F)
    - Franz Lake (Reach H)

# EMP Trends Sampling Sites



# EMP Components

- **Habitat and Hydrology** - Habitat accessibility/quality for fish, macrodetritus production and flux offsite
- **Mainstem and Abiotic Site Conditions** - water quality, organic matter and nutrient flux; factors affecting primary productivity and food-web resources during spring, early summer
- **Food Web** - Role of different food web components in supporting juvenile salmon (primary/secondary production)
- **Fish and Fish Prey** - Assessment of salmonid habitat use, prey availability, and diet preference



# EMP Team

Joe Needoba (OHSU) – Mainstem and Abiotic Site Conditions

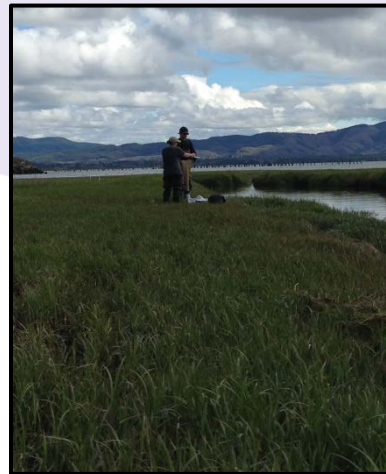
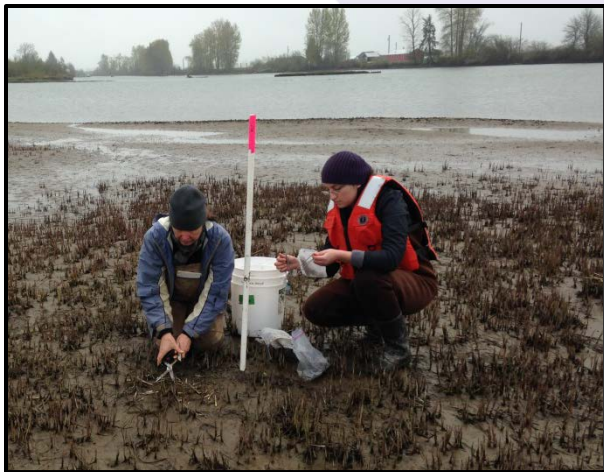
Sarah Kidd, Sneha Rao (EP) (*formerly* Roger Fuller, Katrina Poppe (ETG), Amy Borde (PNNL) – Habitat Structure, Hydrology, Soils, Sediment Accretion, Detritus

Tawnya Peterson (OHSU) – Food Web, e.g., Planktonic and Macrophyte contributions to Juvenile Salmon Food Web

Jeff Cordell, Mary Ramirez, Jason Toft (UW) - Fish Prey and Macroinvertebrate Community

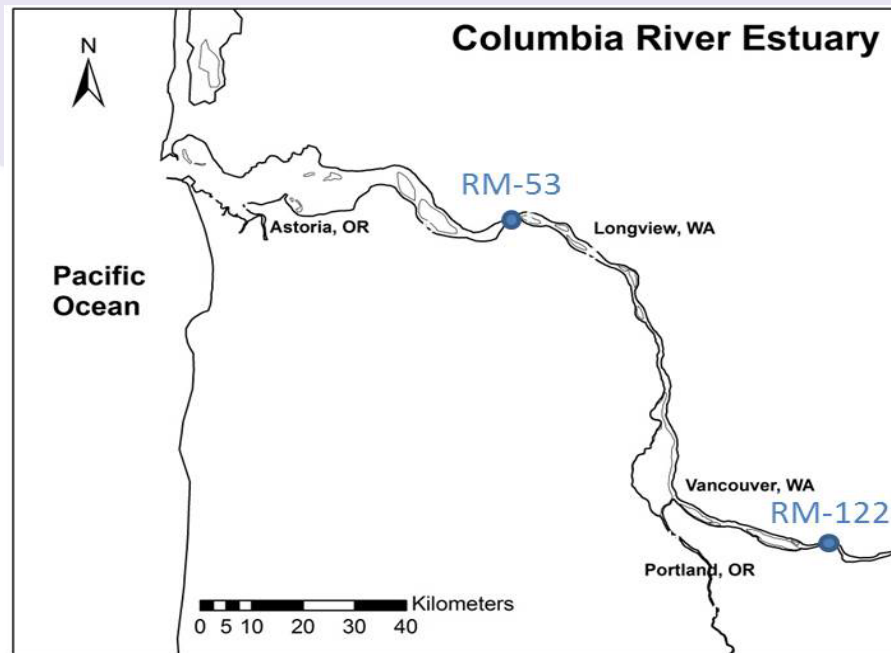
Regan McNatt, Susan Hinton (NOAA) – Fish Community and Occurrence

April Silva, Narayan Elasmarr (CREST) – Really Awesome!! Field Support!



# Mainstem Conditions (OHSU)

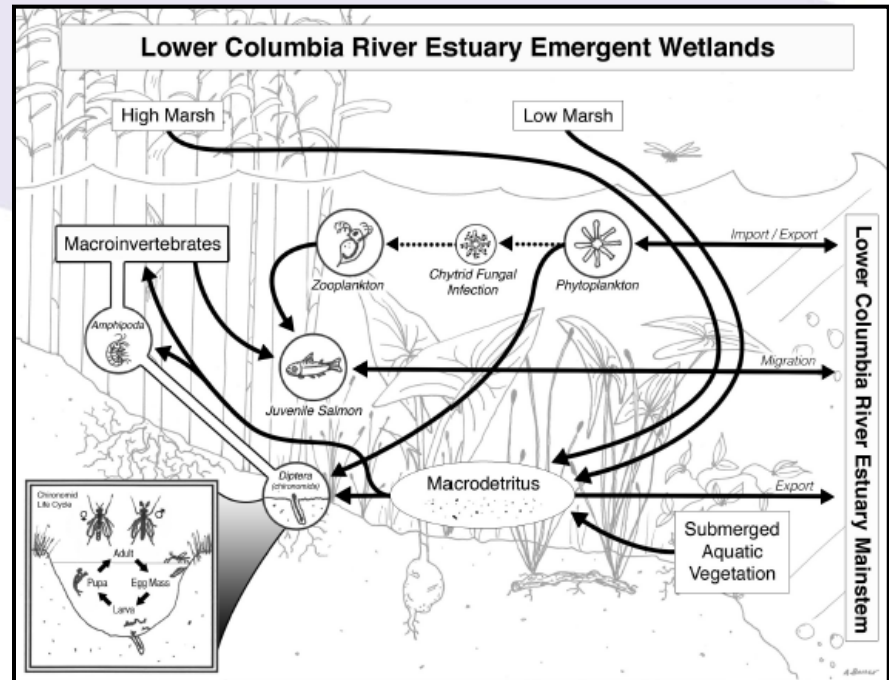
- Center for Coastal Margin Observation and Prediction (CMOP) platforms
  - RM122 (Port of Camas-Washougal; Reach G), 2012-2020
  - RM53 (Beaver Army Terminal; Reach C)
- Temperature, conductivity, chlorophyll *a* fluorescence, dissolved oxygen, colored dissolved organic matter, nitrate, nitrite, and dissolved ortho-phosphate
- Cycling and flux of OM and nutrients
- Understanding of riverine influences on floodplain habitat conditions
- Understanding of riverine vs marine influences on estuary
- Understanding of how lower Columbia tributaries effect conditions in mainstem
- Developing an Estuarine Index (to support NOAA's ocean index)



# Food Web (OHSU, UW)

2011-2020, Reaches A-H

- Food web monitoring at trend sites – April to July
- Primary Production: biomass and productivity of phytoplankton and periphyton (attached algae), stable-isotope analysis (plant, insect, and fish tissue), nutrient concentrations, macrodetritus
- Secondary Production: zooplankton abundance, species composition

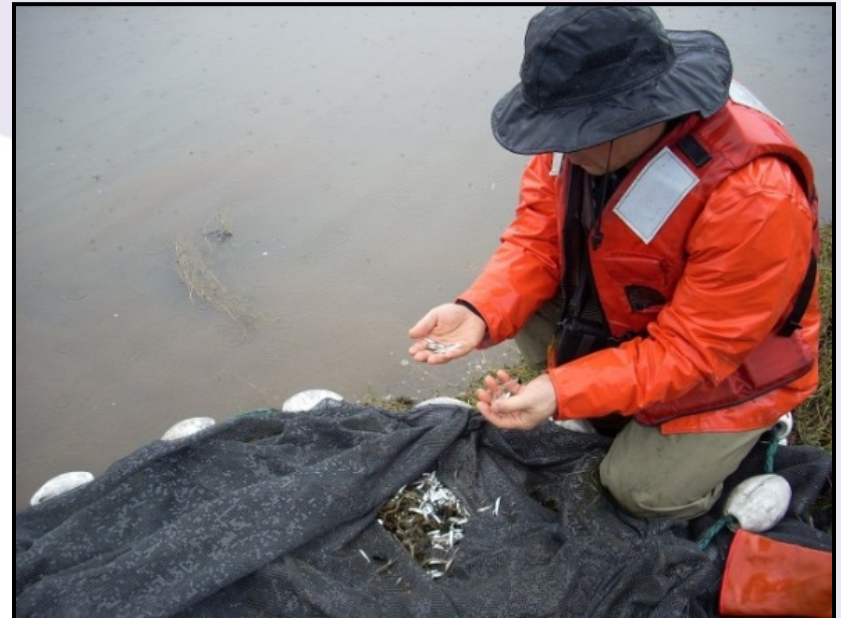




# Fish (NOAA)

2007-2019, Reaches A-H

- Monthly seine sampling (Feb – Jun, then quarterly)
- Fish: Species richness, abundance, CPUE, stock ID, length, weight, otoliths (growth), marked/unmarked, condition, residency, contaminants (historically)



**The End!**

