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

Estuary Partnership

Science Work Group October 22, 2019

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

Tawnya Peterson (OHSU) - Food Web

Jeff Cordell, Mary Ramirez (UW) - Fish Prey

Regan McNatt, Susan Hinton (NOAA) - Fish Community







Mainstem Conditions (OHSU)

- Center for Coastal Margin Observation and Prediction (CMOP) platforms
 - RM122 (Port of Camas-Washougal; Reach G), 2012-2019
 - RM53 (Beaver Army Terminal; Reach C)
- Temperature, conductivity, chlorophyll *a* fluorescence, dissolved oxygen, colored dissolved organic matter, nitrate, nitrite, and dissolved orthophosphate
- 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 Index (similar to NOAA's ocean index)



Food Web (OHSU, UW)

2011-2019, 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)



Awesome New Staff:

Please Welcome Sneha Rao



The End!

on hard and a second to be second as a second to the second second