



Columbia River Estuary and Nearshore Data Products and Tools

Kate Sherman¹, Joe Bizzarro², Jamey Selleck³, Joan Drinkwin³, Van Hare¹, Dave Fox⁴, Tanya Haddad⁵, Andy Lanier⁵, Allison Bailey⁶

¹Pacific States Marine Fisheries Commission, Portland, Oregon

²Cooperative Institute for Marine Ecosystems and Climate, University of California, Santa Cruz, CA

³Natural Resource Consultants, Seattle, WA

⁴Oregon Department of Fish and Wildlife, Newport, OR

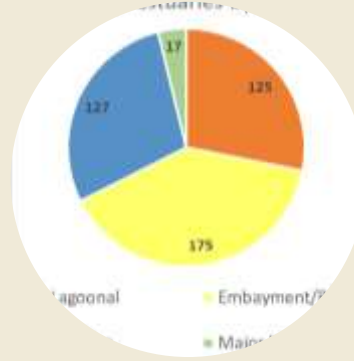
⁵Oregon Coastal Management Program, Department of Land Conservation and Development, Salem, OR

⁶Sound GIS, Seattle, WA

Pacific Marine and Estuarine Fish Habitat Partnership

www.pacificfishhabitat.org

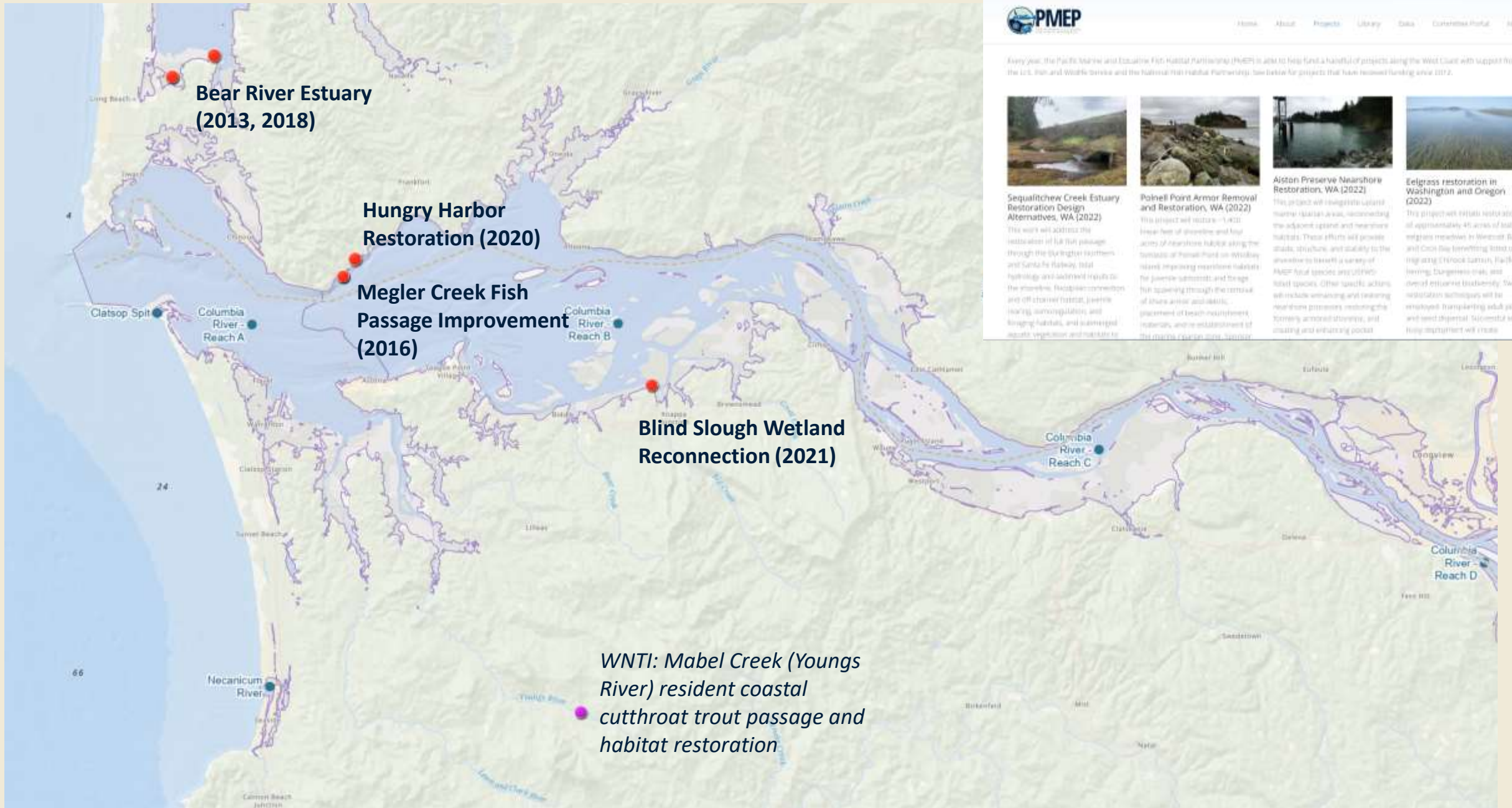
- Gathers expertise to synthesize best available information estuaries, nearshore, and connectivity
- Develops and compiles new datasets to fill high-priority data gaps in our understanding of fish habitats of fish habitats including estuary extent, estuary loss by type, and extent of eelgrass.
- Provides targeted funding for high-priority restoration and conservation projects



Regional Fish Habitat Partnerships



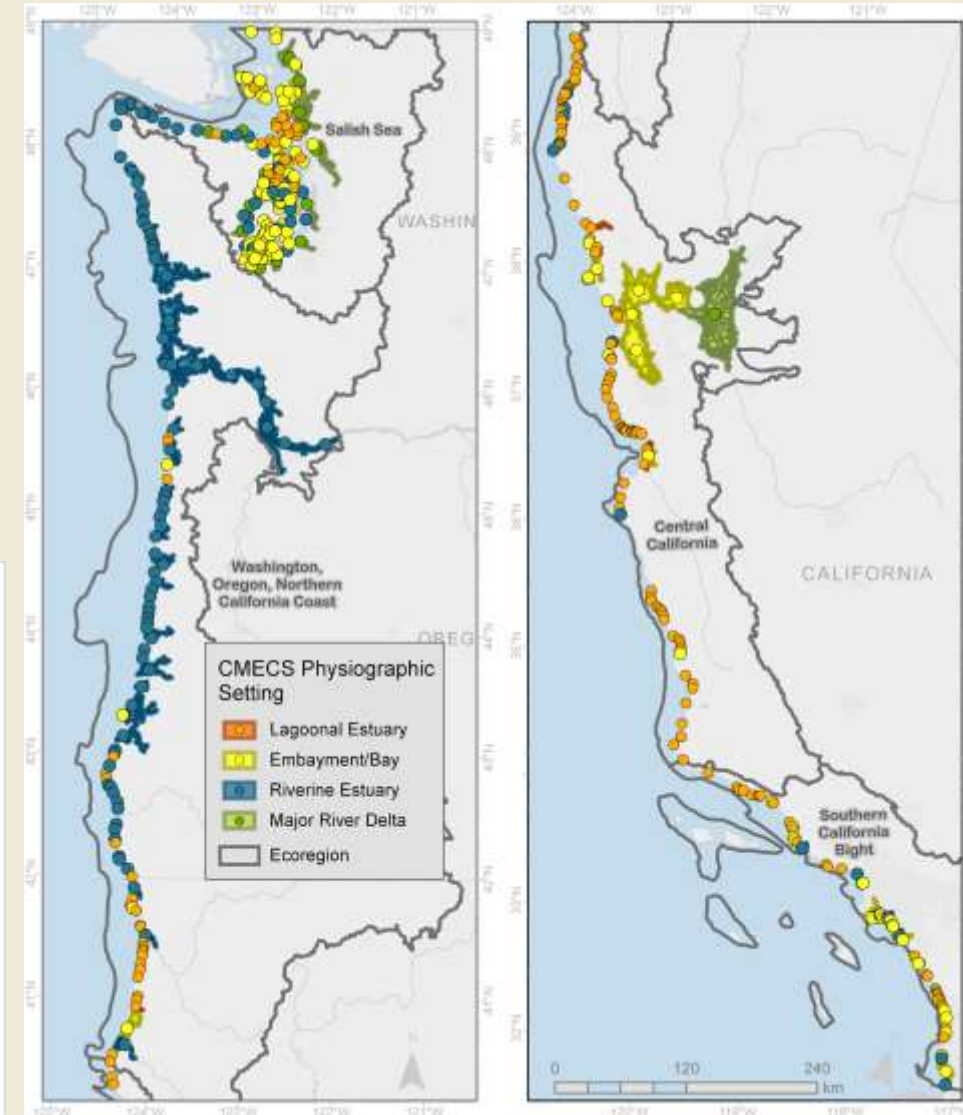
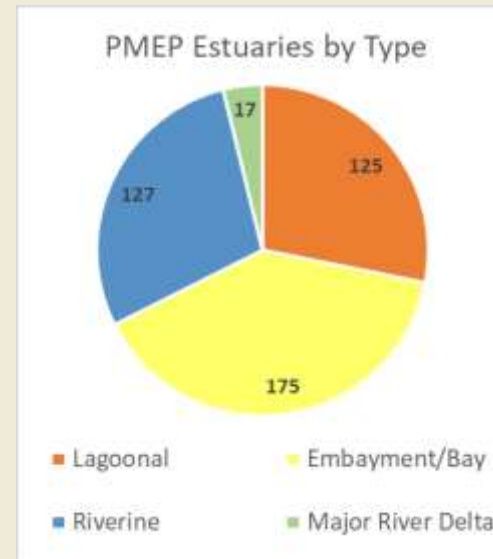
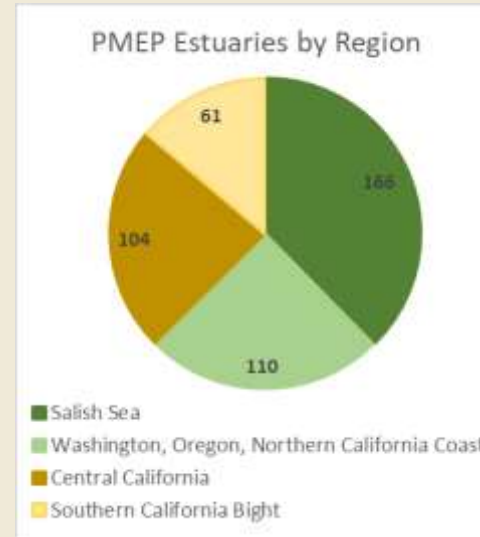
Note: Alaska and islands not to scale
Includes current fish habitat partnerships, approved by the NFHP Board, June 2016.





Spatial Data System: *Estuaries*

- Ecoregion (CMECS / MEOW)
- Estuary Extent (50% exceedance methodology)
- Classification (CMECS)
- Focal species presence (JP, P)
- Biotic Habitat Types (CMECS)
 - Eelgrass
- Tidal wetland loss rapid assessment (55 estuaries)
 - Tidally Restored Areas Mapping
 - *Columbia River: 93% agreement with LCEP assessment of tidally restricted areas*

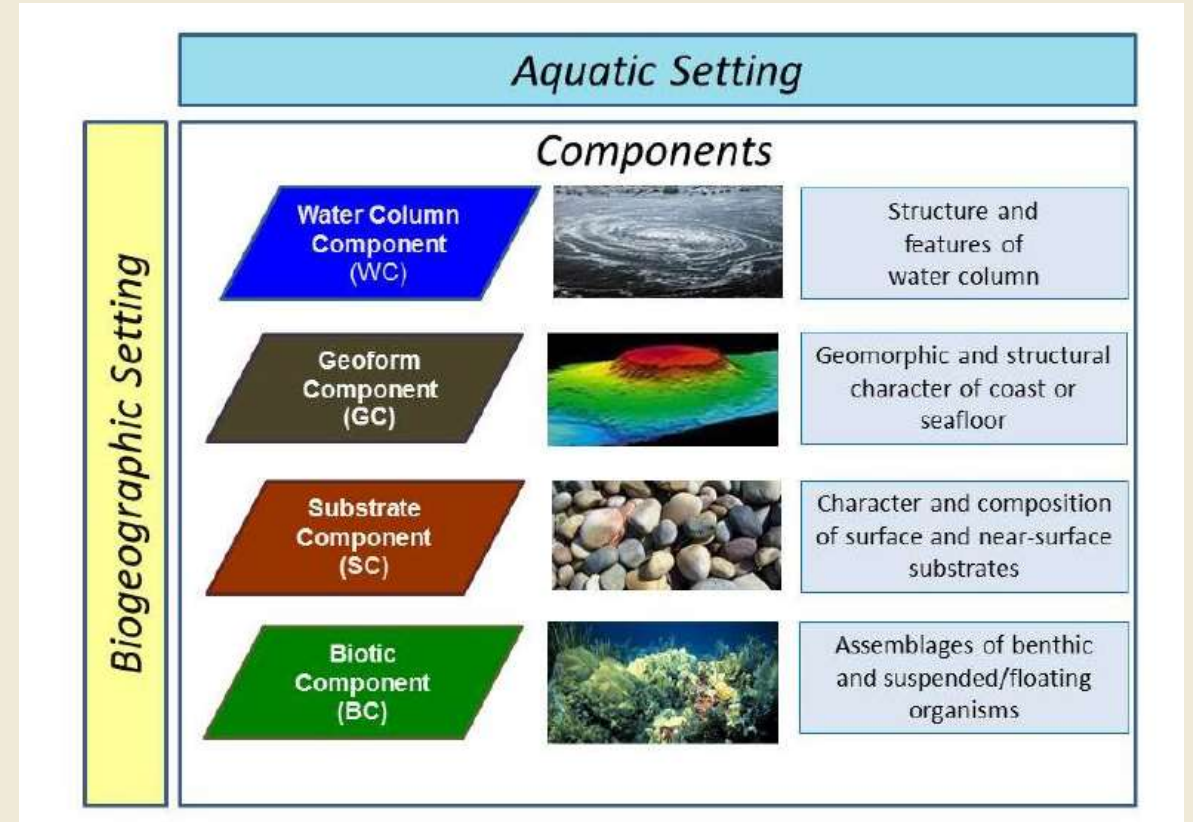


Coastal Marine and Ecological Classification Standard (CMECS)

Recognized by the FGDC as the federal standard for classifying coastal and estuarine habitats

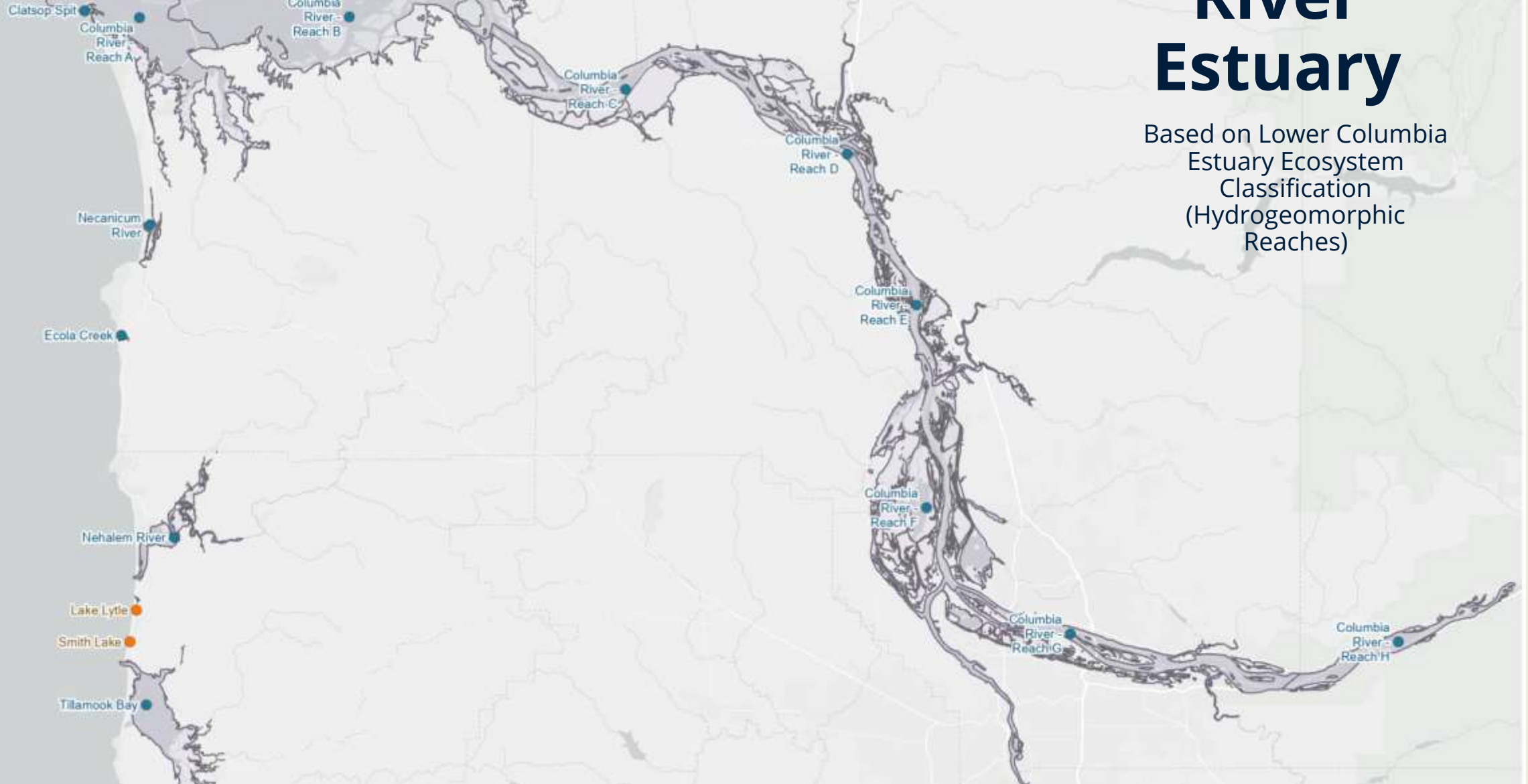
PMEP and OCMP use CMECS to classify habitats along the West Coast

- Biogeographic Setting (Ecoregion)
- Aquatic Setting (System)
 - Estuaries
 - West Coast: biotic component
 - Oregon (and WA portion of Columbia River): 3 components
 - Nearshore
 - West Coast: Biotic and Substrate components



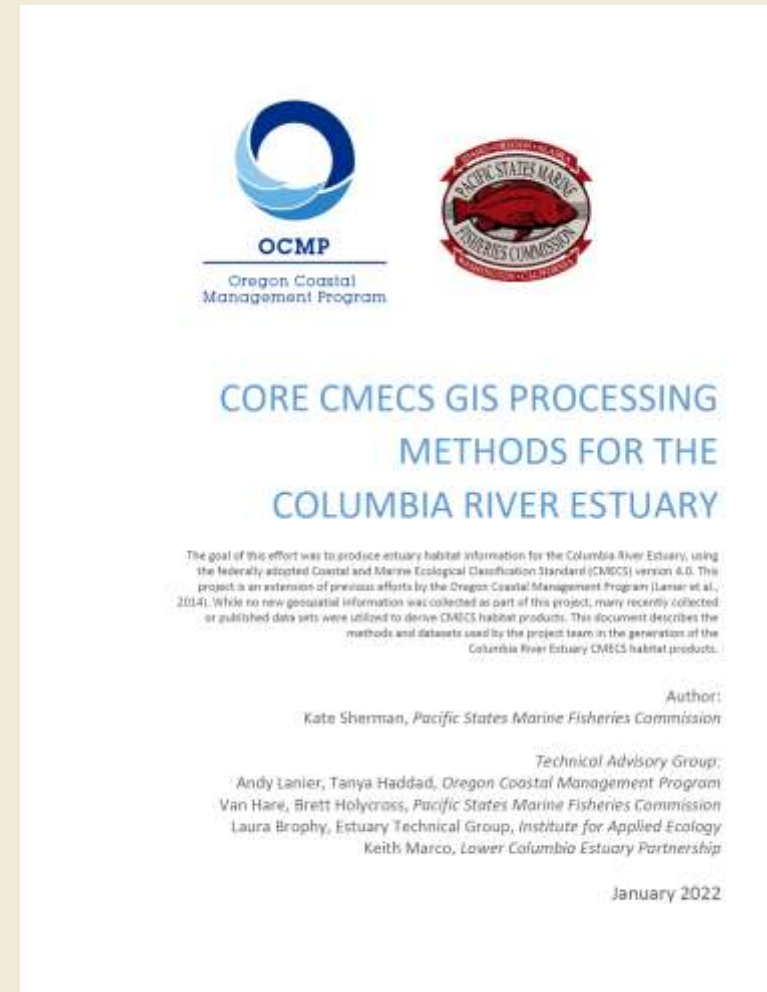
Columbia River Estuary

Based on Lower Columbia Estuary Ecosystem Classification (Hydrogeomorphic Reaches)



Columbia River CMECS Project

- Support the Oregon Coastal Management Program (OCMP)'s efforts to expand their spatial data framework within the Oregon Coastal Zone.
 - The goal of this project was to use current geospatial data to modernize the informational foundation for Oregon's estuary management program.
 - Fill an important data gap and create spatial data in Oregon's estuary data
 - OCMP partnered with PSMFC to complete the whole estuary.
 - Technical Advisory Group



Methods

- Technical Work Group
- Identify existing datasets and source data screening
 1. Existing datasets
 2. Interpolations
 3. Digitized new data
- Anchor layer (50% exceedance estuary extent)
- Retain source geometry
- Cartographic smoothing



Jetty Lagoon, Oregon ShoreZone

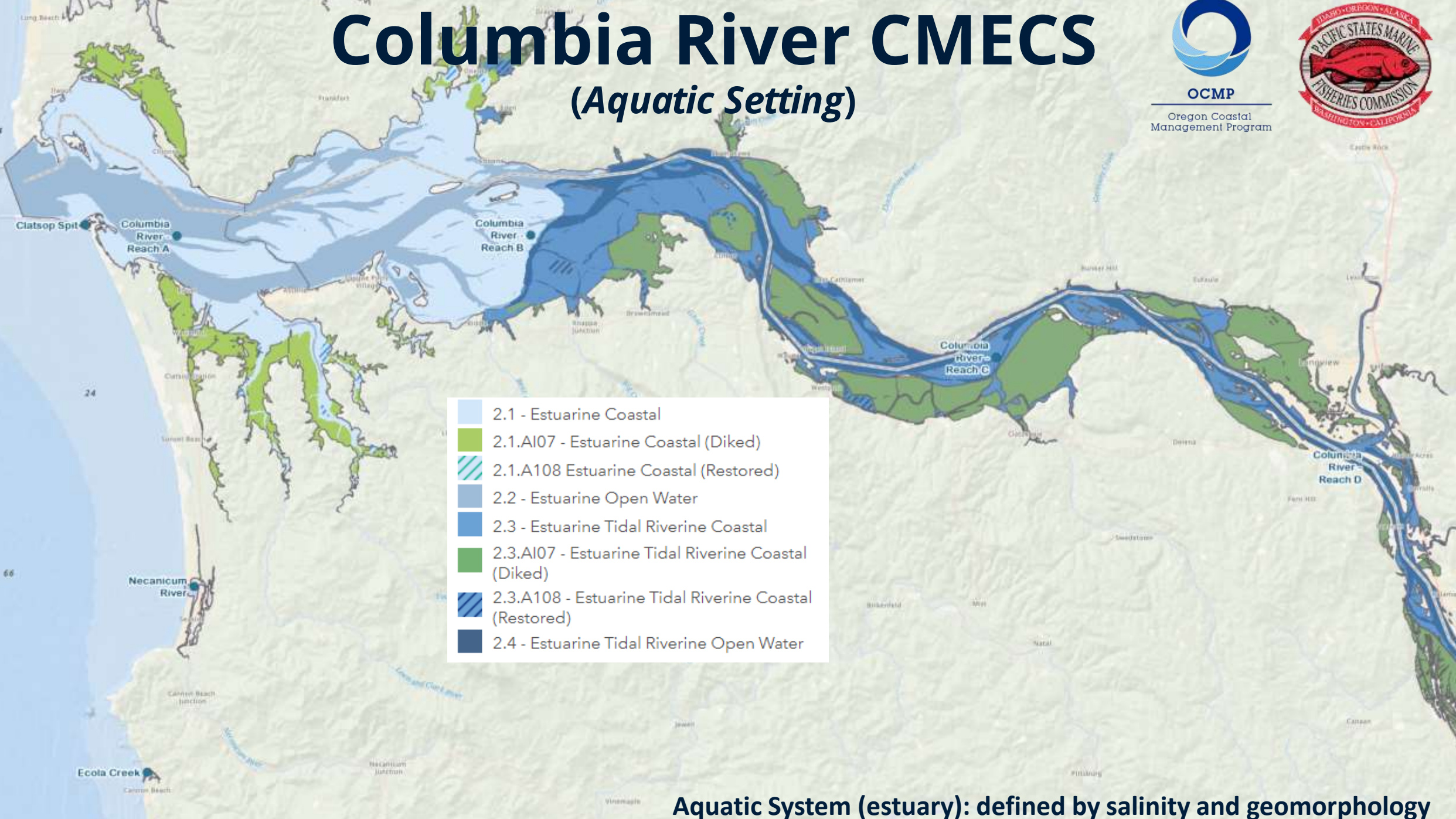
Columbia River CMECS

(Aquatic Setting)



OCMP

Oregon Coastal Management Program

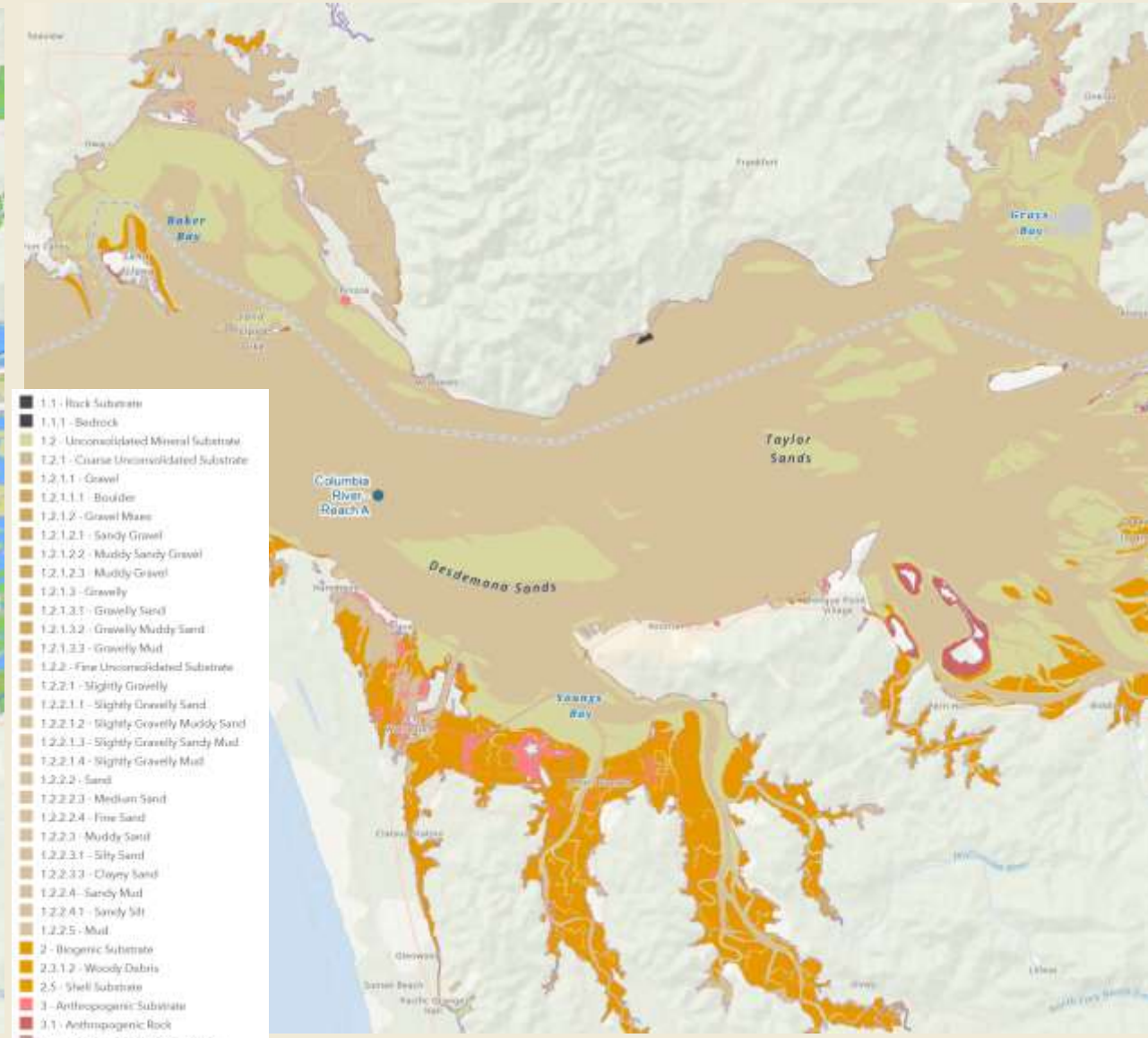


Aquatic System (estuary): defined by salinity and geomorphology

Columbia River CMECS (Geoform and Substrate Components)

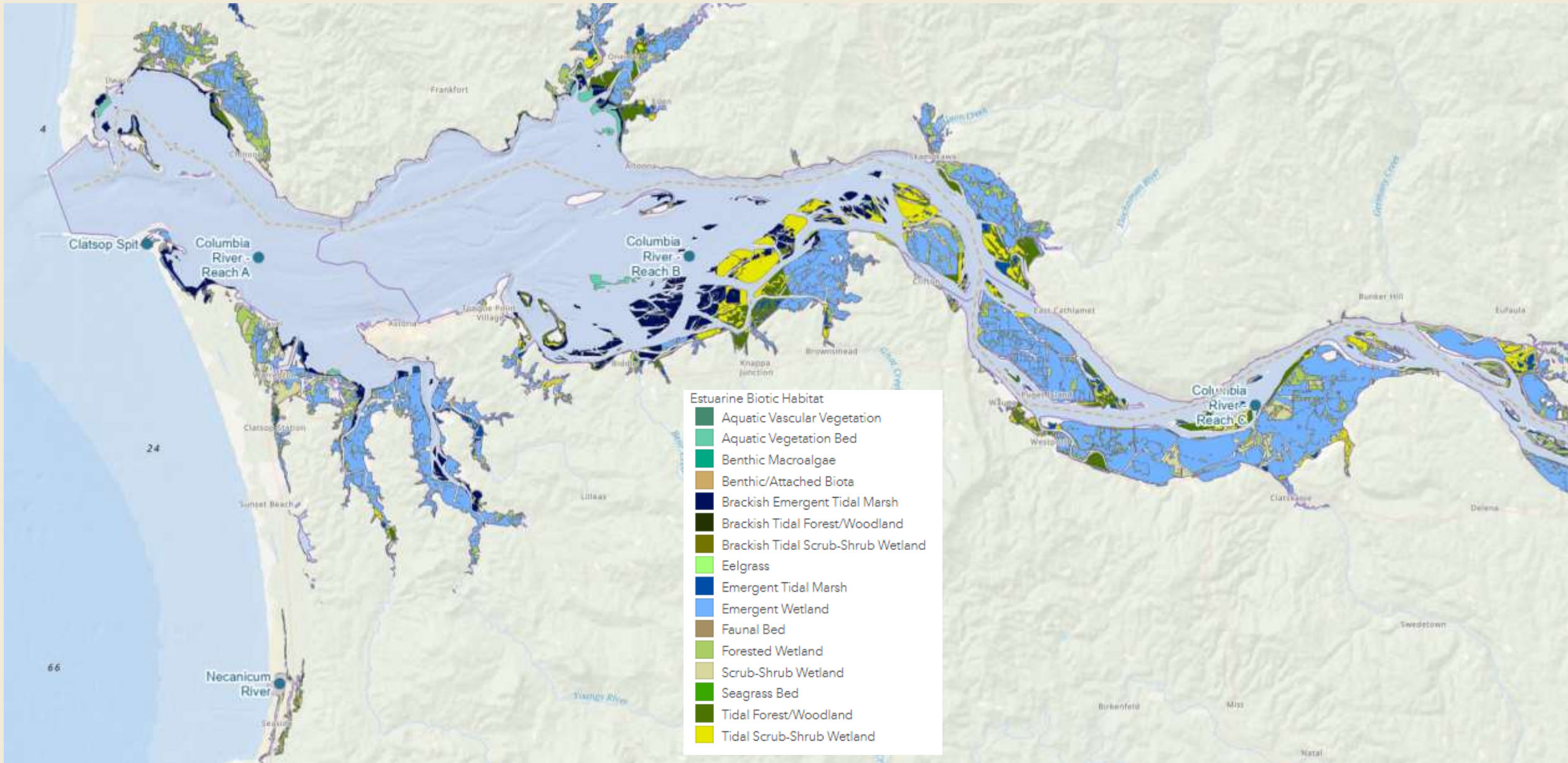


Geoform: geomorphic and structural characteristics



Substrate: non-living materials that form an aquatic bottom or seafloor

Columbia River CMECS (*Biotic Component*)





Spatial Data System: Nearshore

1. *Develop nearshore zones for PMEP's spatial data system*
2. *Compile and standardize nearshore habitat spatial dataset*
3. *Review state of the knowledge (SOK) of nearshore fish habitat*



Pacific Northwest CMECS Substrate Habitat



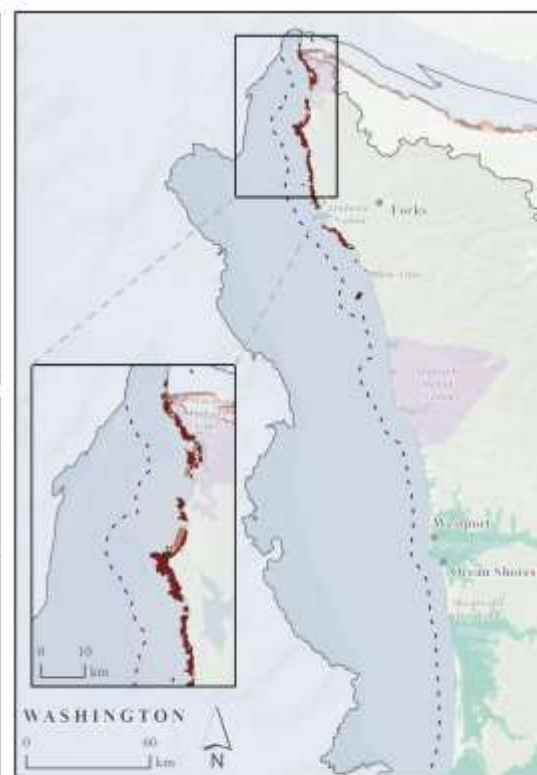
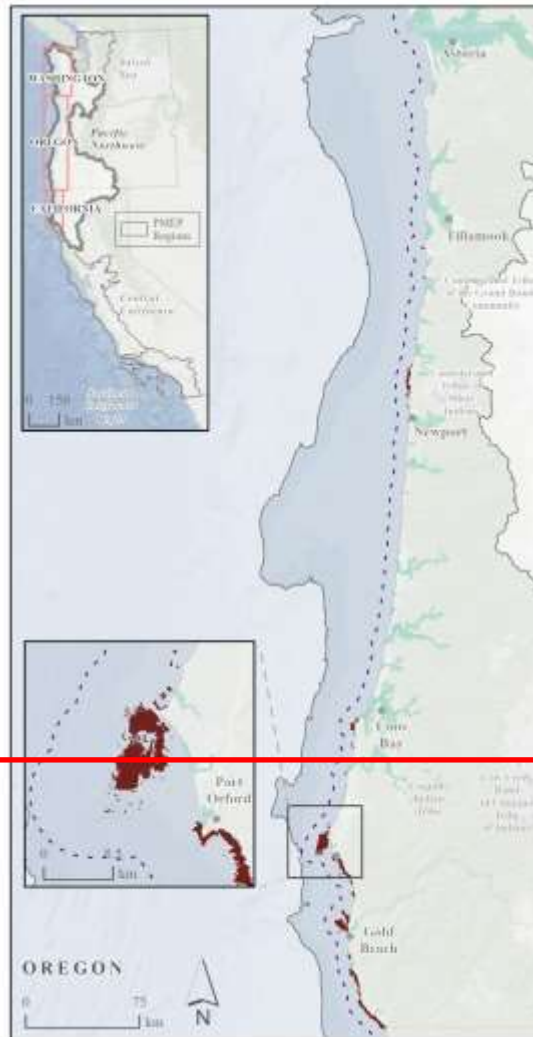
- 1.1 - Rock Substrate
- 1.2 - Unconsolidated Mineral Substrate
- 1.2.1 - Coarse Unconsolidated Substrate
- 1.2.2 - Fine Unconsolidated Substrate
- 2 - Biogenic Substrate
- 3 - Anthropogenic Substrate
- 9.9.9.9 - Unclassified
- State Waters Boundary
- Current and Historical Estuary Extent
- Tribal Land Area Representations



Pacific Northwest CMECS Biotic Habitat



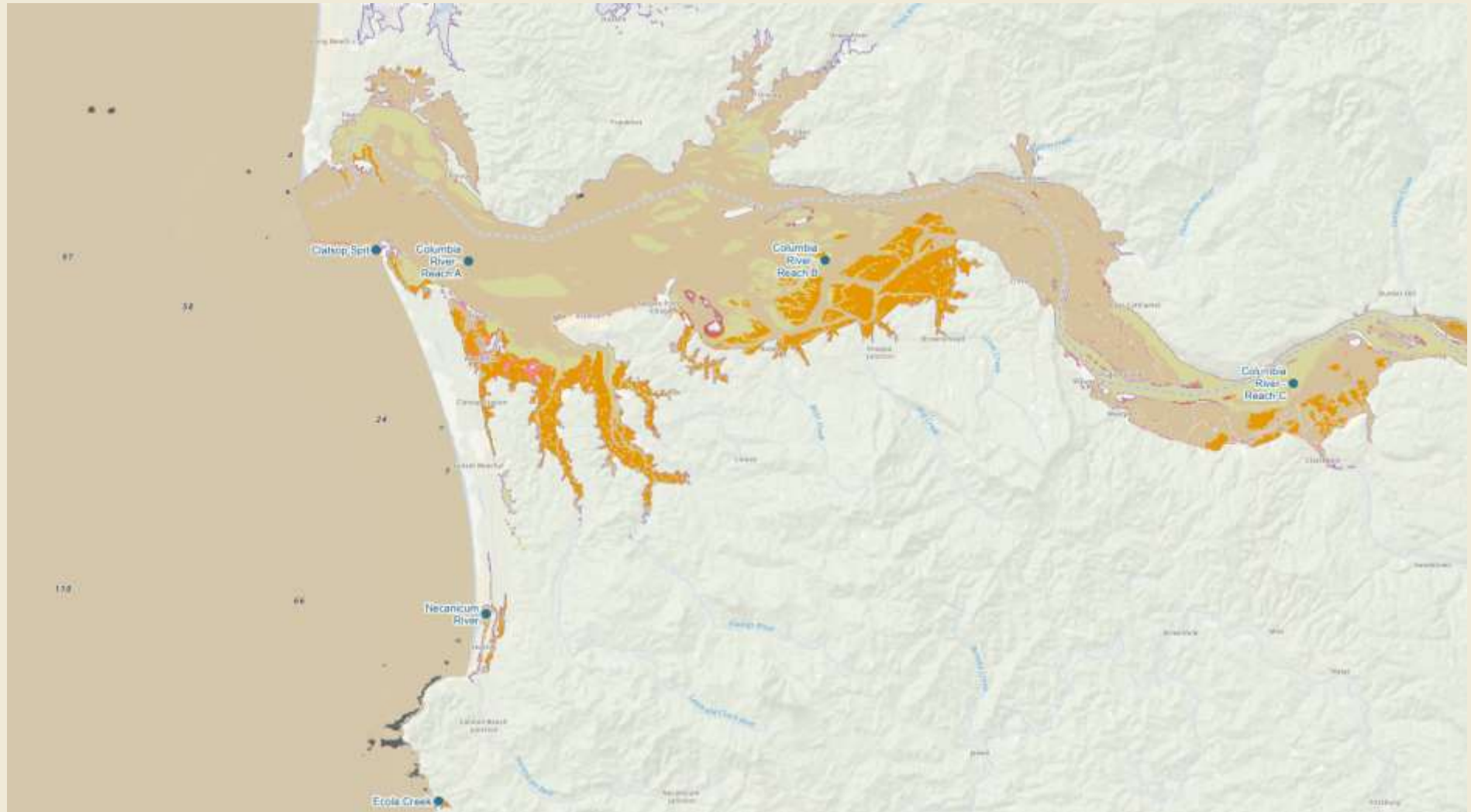
- 1.2 - Floating/Suspended Plants and Macroalgae
- 2 - Benthic/Attached Biota
- 2.2 - Faunal Bed
- 2.5 - Aquatic Vegetation Bed
- 2.5.1 - Benthic Macroalgae
- 2.5.1.1 - Seagrass Bed
- 2.5.1.2 - Canopy-Forming Algal Bed (Kelp)
- State Waters Boundary
- Current and Historical Estuary Extent
- Tribal Land Area Representations





Columbia River Estuary and Nearshore

- 1.1 - Rock Substrate
- 1.1.1 - Bedrock
- 1.2 - Unconsolidated Mineral Substrate
- 1.2.1 - Coarse Unconsolidated Substrate
- 1.2.1.1 - Gravel
- 1.2.1.1.1 - Boulder
- 1.2.1.2 - Gravel Mixes
- 1.2.1.2.1 - Sandy Gravel
- 1.2.1.2.2 - Muddy Sandy Gravel
- 1.2.1.2.3 - Muddy Gravel
- 1.2.1.3 - Gravelly
- 1.2.1.3.1 - Gravelly Sand
- 1.2.1.3.2 - Gravelly Muddy Sand
- 1.2.1.3.3 - Gravelly Mud
- 1.2.2 - Fine Unconsolidated Substrate
- 1.2.2.1 - Slightly Gravelly
- 1.2.2.1.1 - Slightly Gravelly Sand
- 1.2.2.1.2 - Slightly Gravelly Muddy Sand
- 1.2.2.1.3 - Slightly Gravelly Sandy Mud
- 1.2.2.1.4 - Slightly Gravelly Mud
- 1.2.2.2 - Sand
- 1.2.2.2.3 - Medium Sand
- 1.2.2.2.4 - Fine Sand
- 1.2.2.3 - Muddy Sand
- 1.2.2.3.1 - Silty Sand
- 1.2.2.3.3 - Clayey Sand
- 1.2.2.4 - Sandy Mud
- 1.2.2.4.1 - Sandy Silt
- 1.2.2.5 - Mud
- 2 - Biogenic Substrate
- 2.3.1.2 - Woody Debris
- 2.5 - Shell Substrate
- 3 - Anthropogenic Substrate
- 3.1 - Anthropogenic Rock
- 3.1.2 - Anthropogenic Rock Rubble
- 3.1.3 - Anthropogenic Rock Hash
- 3.3 - Construction Materials
- 9.9.9.9.9 - Unclassified



Nearshore State of the Knowledge Report

- Identified need to understand large-scale processes and connectivity between species and habitats for nearshore and offshore along the U.S. West Coast
- To provide the best available science and inform opportunities to conserve, protect, restore, and enhance fish habitat in nearshore areas

Photo by ODFW



STATE OF THE KNOWLEDGE
U.S. WEST COAST NEARSHORE HABITAT USE BY
FISH ASSEMBLAGES & SELECT INVERTEBRATES



Applications



PMEP West Coast Estuary Viewer

This map viewer highlights spatial data products developed by PMEP to characterize habitats and synthesize information in support of habitat conservation and restoration goal setting. Most of the data presented in this viewer are available for download below.



West Coast Estuaries Explorer

Partner Data is useful for quickly comparing estuaries to each other along the coastlines of Washington, Oregon, and California. Using dynamic filters and an interactive map you can find estuaries that meet specific criteria or estuaries that provide habitat for focal species of interest to you.



West Coast USA Current and Historical Estuary Extent

This layer represents the current and historical tidal wetlands, or estuary extent, for the West Coast of the contiguous United States.



PMEP Estuary Points

This layer represents estuaries, as points, in the Pacific Marine and Estuarine Fish Habitat Partnership's (PMEP) spatial data system.



West Coast USA Estuarine Biotic Habitat

These data represent the Biotic Component (BC) of the Coastal and Marine Ecological Classification Standard (CMECS) for estuaries of the West Coast of the contiguous United States.



West Coast USA Eelgrass (Zostera sp.) Habitat

This package of map layers represents the presence and maximum observed extent of eelgrass (Zostera sp.) habitat on the West Coast of the United States (Washington, Oregon, and California), based on the best available existing spatial data showing the current and historic extent of eelgrass in the region.



<https://www.pacificfishhabitat.org/data/>

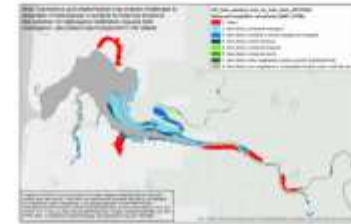
Partner Data

Partner Data Products



Columbia River Estuary Coastal Marine and Ecological Classification Standard (CMECS)

Oregon Coastal Management Program, 2021
The goal of this effort was to produce estuary habitat information for the Columbia River Estuary, using the federally adopted Coastal and Marine Ecological Classification Standard (CMECS) version 4.0. This project is an extension of previous efforts by the Oregon Coastal Management Program (Larver et al., 2014). While no new geospatial information was collected as part of this project, many recently collected or published data sets were utilized to derive CMECS habitat products.



Comparing Historical Losses of Tidal Wetlands on the Oregon Coast, USA

Institute for Applied Ecology, 2019
This study evaluated historical extent (prior to European settlement), current extent, and losses for each of the three major tidal wetland types (emergent, scrub-shrub, and forested) on the Oregon coast. The first study of its kind on the Oregon coast, it produced results vital to conservation and restoration planning, since these wetland types are often targets for restoration and each type supplies unique ecosystem services. The study included the coast's 15 largest estuaries; they contain 96.5% of the coast's historical tidal wetland area, so results are representative of the coast in general.



Modeling Sea Level Rise Impacts to Oregon's Tidal Wetlands

Institute for Applied Ecology, 2017
Tidal wetlands currently exist just at and above sea level, and healthy tidal wetlands are able to adapt to slow sea level changes. But if sea level rises too fast, tidal wetland plant communities may not be able to persist at their current locations. To survive, these plants may have to move to areas of higher elevation. These higher areas are called "landward migration zones" (LMZs); they are potential future tidal wetlands under sea level rise ("SLR"). This project modeled and prioritized these LMZs in Oregon.

<https://www.pacificfishhabitat.org/partner-data/>



Data Tools Trainings

- 2 Day workshop
- Become more familiar with datasets and data tools
- Learn using scenarios applicable to restoration, conservation and management of estuarine and nearshore resources.
- Next data tools training (virtual) – February 6-7, 2024 through WA Coastal Training Program



Pacific Marine and Estuarine Fish Habitat Partnership
South Slough National Estuarine Research Reserve Coastal Training Program
PMEP Data Tools Training, April 5 & 6 2022, 10:00AM – 12:30PM

Day 1
Introductions
PMEP Data Tools
Scenario 1 – Comparing Estuaries
Scenario 2 – Risk of Habitat Degradation
Scenario 3 (part 1) - Restoration Planning
PMEP Estuary Viewer
Scenario 3 (part 2) - Restoration Planning
Wrap up & homework
Day 2
Introductions
Scenario 4 – Tidal Wetlands Loss
Scenario 5 – Tidal Swamp Conservation
Scenario 6 (part 1) - Dataset downloading and uploading
Scenario 6 (part 2) - Individual questions
Reflection
Wrap up



Take-aways

- Habitat data available for Columbia River and Nearshore (with West Coast context)
 - All data available for download on PMEP's website for use in Desktop GIS
 - Web services publicly available for use in web-based mapping applications
 - Estuary Explorer and Estuary Viewer are web-based tools for viewing data (no desktop GIS needed)
- *Coming soon: Nearshore Habitat Viewer*
- **Next data tools training (virtual) – February 6 - 7, 2024 through WA Coastal Training Program**
<https://coastaltraining-wa.org/>



*Photo by Adam Obaza,
Paua Marine Research Group*



Kate Sherman, GIS Data Steward, ksherman@psmfc.org

Joan Drinkwin, Coordinator, jdrinkwin@nrccorp.com

www.pacificfishhabitat.org