Improving Understanding of Sediment Dynamics and Direct Management Applications for the South Slough National Estuarine Research Reserve and the Greater Coos Bay Estuary

Overview

The Coos Bay estuary has a diverse set of end users who share a common need: to better understand circulation and sediment transport under current and future conditions. The estuary is one of three Oregon estuaries designated as "deep draft development," which means that planners must balance industry, restoration, and natural resource goals. The project team's primary research objectives are to fill data gaps that are critical to addressing their myriad management needs. These needs include characterizing the present-day sediment distribution, monitoring sediment fluxes to the estuary, and modeling how circulation and sediment in the estuary will respond to perturbations due to both natural and human-induced causes—such as dredging or inundation caused by sea level rise.

The project has direct application to management objectives identified by the South Slough National Estuarine Research Reserve and the broader needs of identified end users, including Coos County, Oregon Department of Fish and Wildlife, Oregon Department of Environmental Quality, and the Oregon Institute of Marine Biology. These end users will remain actively engaged during the project to reach agreed-upon outcomes, such as updating the estuarine management plan, improving the success of oyster restoration projects, informing fisheries habitat maps, and increasing data efficiency among community stakeholders.

Project Location

Coos Bay Estuary

Project Duration

November 2016 to October 2019

Project Lead

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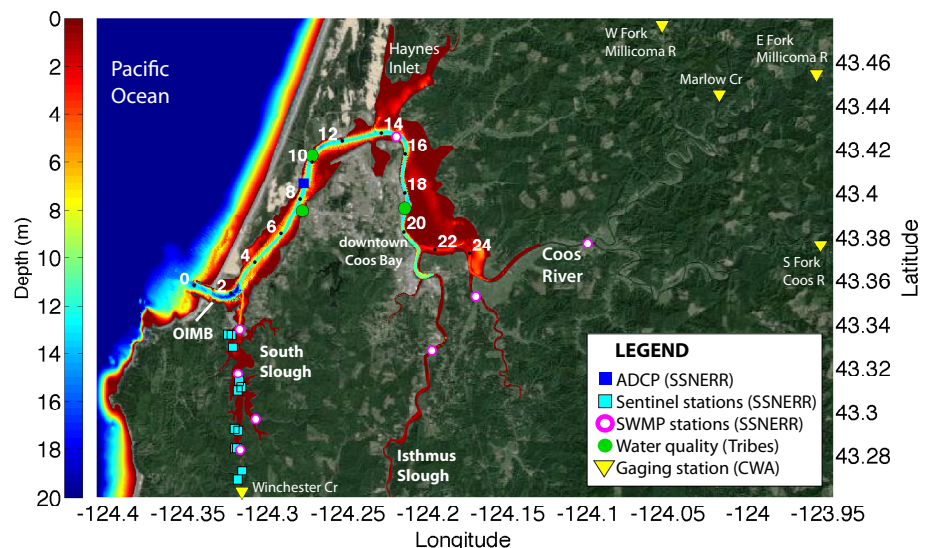(541) 346-8753
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Project Type

Collaborative Research – generating science that informs decisions

Project Partners

- Oregon State University
- Woods Hole Oceanographic Institution
- South Slough National Estuarine Research Reserve
- Coos Watershed Association
- Partnership for Coastal Watersheds

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Anticipated Benefits

- Improved ability of natural resource managers to predict estuary response when considering dredging projects, land use modifications, and climate change, with the goal of enhancing the overall health of the Coos Bay estuary.
- Availability of basic data on sediment distribution to inform habitat suitability maps.
- Better informed Total Maximum Daily Load requirements for the state of Oregon.
- Development of spill and pollution response due to the creation of a validated hydrodynamic model.
- Public repository with data collected and used.

Project Approach

The project will combine new observations and model development. Observations, which include bathymetry, water properties (temperature and salinity), velocity, sediment type, and sediment concentration, will be combined with existing time series and maps. The project team will also develop a hydrodynamic model that can skillfully reproduce the observed velocities and water properties in the estuary over a range of forcing conditions (e.g., river discharge, winds, tides). The hydrodynamic model will incorporate a sediment dynamics component, which will be tested against observations. Throughout the project, the team will work iteratively with end users to ensure that targeted results match end users' identified needs and deliver outputs in a timely fashion.

Targeted End Users and Anticipated Products

All products will be designed to meet the needs of members of the stakeholder group, Partnership for the Coastal Watersheds, which includes natural resource managers, business interests, land use planners, coastal managers, researchers, and educators. Products include the following:

- Data products and analyses, including a new bathymetric data set for the entire Coos Bay estuary, an estuary-wide hydrodynamic model, a new sediment distribution data set for the greater Coos Bay estuary, and an estuary-wide sediment model;
- Synthesis products, including model experiments to characterize estuarine response to perturbations, and analysis of observations and the model fields to develop a characterization of forcing mechanisms controlling circulation and sediment transport;
- Presentations and reports illustrating the response of the estuary to perturbations; and
- Open access to model fields and user-friendly summary metrics.

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