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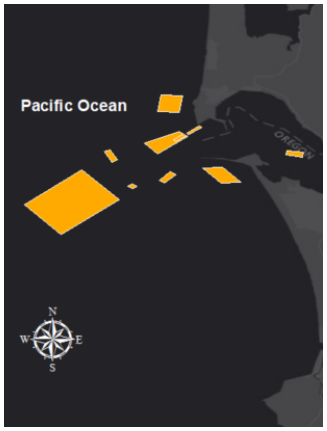
National Regional Sediment Management Program Portland District (NWP): Sediment Mobility on the Oregon and Washington Coast

Description (



NWP/NWS places millions of cubic yards of dredged sediment along the coast of Oregon/Washington each year. Sustainable management of such large quantities of material relies on accurate assessment of the capacity of the network of near shore placement sites managed by the districts. In order to designate new sites and plan for future placement needs, a district must rely on effective partnering and communication between local stakeholders that is driven by reliable data/science. Traditionally scoping level analyses for designating new/evaluating existing placement sites involves defining a closure depth using Hallermeier criterion or similar. However the limit state for sediment mobility under this framework is conservative for the Oregon/Washington coast and as a result can misrepresent the dispersive nature of sediment transport at a given site. This project aims to close the gap between theory and observations in order to support future planning efforts for dredged material management.

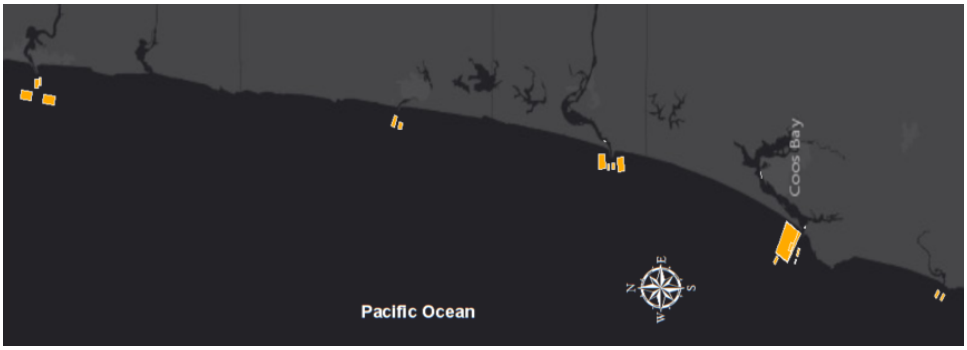


Figure 1 & 2. Maps of various placement sites along Oregon coast.

Issue/Challenge To Address

Evaluating sediment mobility in the near shore is critical for managing dredged material along the Oregon and Washington coasts. An understanding of how/when sediment will move is the first step in designating new placement sites and is the fundamental tool for estimating a site's capacity and design life. Unfortunately sediment transport is not easily predicted and getting a handle of transport potential and pathways is anything but straightforward. Feasibility analyses for placement sites utilize the concept of "outer" and "inner" closure depth limits to delineate active regions in the nearshore. However this approach is based on average wave conditions and does not include the effect of currents on sediment transport, and as a result the limits have been observed to be overly conservative (too shallow) along the Oregon/Washington coast. To increase its practical value, the traditional approach needs to be supplemented to account for the continuum of sediment transport processes that occur across the entire nearshore profile. In reality, dredged material placed between "outer" and "inner" closure depths will provide a tangible benefit; although this benefit diminishes as one moves further offshore toward the "outer" closure depth limit.

This effort builds on previous work and recommendations provided by west coast districts that studied and documented discrepancies between closure depth limits and observations. Specifically we aim to supplement existing consensus by cataloging historical dredged material placement, bathymetric changes, and environmental forcing at select placement sites along the Oregon and Washington Coasts. Correlations among the data will be compared to depth of closure using the Hallermeier/Birkemeier criteria in order to

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illuminate potential discrepancies with observations and existing tools used for screening level analyses. The end goal will be to preliminarily redefine spatial and temporal thresholds for sediment mobility and dispersal rates at select sites along the Oregon and Washington coasts.

In order to support evaluation of potential nearshore placement benefits, results will be presented in terms of "placement effectiveness". As discussed amongst the RSM community, the "effectiveness" of a given nearhsore placement alternative should address how much placed material will directly or indirectly benefit the foreshore-backshore. In other words, if we place 100kCY at a given location, the effectiveness quantifies how much is expected to augment the littoral budget in the short (1-3 years) and long (3-10 years)-term. By analyzing timescales of bathymetric changes and environmental forcing at different project sites, we aim to produce maps of placement effectiveness that will guide sediment management activities in our region. This effort will leverage existing products and therefore will be relatively coarse in nature. Results will be summarized so as to provide recommendations for further refinement.

Successes Lessons Learned

Successfully added two nearshore disposal sites at NWP in the last 6 years. A plethora of data gathered including hydrosurvey, nearshore placement plume velocity/direction, orientation of placement for nearshore sites, etc.

Projected Benefits Cost Savings Value Added

This will help the RSM community define subsequent analyses of dredged material placement in the region; promote effective communication with stakeholders; and inform resource allocation for existing placement site management. Findings will be immediately applicable to on-going/up-coming projects across several districts (e.g. Humbolt placement, North Head site). This may allow for increased placement at existing nearshore disposal sites or expanding existing nearshore disposal sites into greater depths. Stakeholders/resource agencies may be more willing to do this based on the findings of this initiative.

Expected Products

- Correlation of bathymetric/sediment data with environmental forcing
- Comparison between data correlations and theory
- Delineate placement effectiveness
- Technical Note/White Paper, IPR Presentation, Conference Presentation

Stakeholders/Users

NWP, NWS, SPD, ERDC, USGS, ODFW, WDFW, EPA, NOAA, DLCD, DOE, ODEQ, others

Leveraging Opportunities

NWP has 3 existing nearshore sites at the MCR and a number of other nearshore sites along the Oregon Coast. These sites receive between up to 500kcy and as little as 50kcy depending on the site, giving the team a variety of sites to study. NWP hydraulic engineering expertise in-house with experience examining depth of closure.

Points of Contact

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Participating Partners (NOAA, USGS, WA Dept. of Ecology, OR Dept. of Environmental Quality, ODFW, WDFW, CRCFA