

THIN-LAYER PLACEMENT PROJECT SHEET



The Mouth of the Columbia River

October 2023

Location: Mouth of the Columbia River

Type: Sediment Remediation

Area: 2.4 acres NHS

City: Warrenton and Astoria, OR & Chinook and Ilwaco, WA

County: Clatsop, OR & Oregon and Pacific, WA

Main Agencies: USACE, US Environmental Protection Agency, US Fish and Wildlife Service, NOAA Fisheries, Oregon Department of Environmental Quality, Washington Department of Ecology, Oregon Department of Land Conservation and Development

State/Province: Oregon & Washington

Country: United States



Taken from Roc Doc Travel. <https://rb.gy/usri2>

Background

The Mouth of the Columbia River (MCR) is one of the world's most energetic and dangerous coastal inlets, bordering the states of Oregon and Washington. The area is characterized by vigorous waves and currents, with waves exceeding 8 m and currents exceeding 7 knots during ebb tide. The channel entrance is about 55/48 feet deep, 2,640 feet wide, and 6 miles long.

Approximately, 3.5 - 4.5 million cubic yards (mcy) of sand need to be dredged from MCR annually. In the past, most of the dredged material was disposed in offshore sites, where it would become unavailable. In 2005, a pilot project was conducted that investigated the placement of dredged material in a nearshore site south of the South Jetty Site (SJS) with the purpose of nourishing littoral zones, minimize mounding, and maximizing the material. The pilot project presented results that confirmed the efficiency of the thin-layer placement (TLP) method, thus it was implemented in other beneficial use sites. Around 2018, USACE projected to increase the amount of dredged material placed in the MCR littoral zones, proposing the placement of material at the North Head Site (NHS).

Project Description

In 2014, approximately 340,000 cy of dredged material were disposed in the SJS. Dredged material was mostly fine sand mixed with less than 3 percent of silt and clay. It was all placed using an ocean-going hopper dredge due to the vigorous wave-current interactions of the MCR. A year after placement, the site showed no signs of mounding and the accumulation of the material remained under 6 inches. This project posed a concern on how the shallow and deep water epifauna at the disposal site would be affected. Consequently, the project administered a Before-After Control-Impact (BACI) study using video sleds for benthic monitoring.

Findings

The monitoring program collected benthic video data, tested the efficiency of TLP, and tracked the mortality/motility of various species, which included the Dungeness crabs. The BACI study collected data from a control site with no former sediment addition and an impacted site where natural deposition occurred. The collected data from these separate sites was compared for a two-year period. There was no detectable damage done to benthic zone due to TLP of dredged material. Due to the optimal results from this project, the TLP technique of dredged material was applied on other littoral zones of the MCR. In 2018, the 2.4-acre North Head Site (NHS) was proposed as the next nearshore disposal site. Nine placements, 51,000 cy each, of sand were deposited along a 5,000 feet long and 150 feet wide transect at NHS. The placements resulted in a 2 feet high berm. The transect was monitored at 0 days, 7 days, and 60 days after dredged material placement. At day 0, the berm had an initial detectable volume of 49,000 cy and measured 5,000 feet long and 300 - 500 feet wide. By day 7, the berm had reduced to 37,000 cy of detectable volume due to sediment dispersion. Finally, at day 60 the berm had reduced to a detectable volume of 17,000 cy and diminished to a 1-foot-high mound. Measured berm morphology suggests that dispersed sediment transported onshore due to the vigorous wave-current conditions of the MCR. Onshore sediment transport was expected, between 9-17 percent of initial berm volume was predicted to accumulate along the shoreline. The optimal results of this project stipulate TLP as a viable technique for sediment remediation of highly active coastal environments.

Please read Monitoring and modeling dispersal of a submerged nearshore berm at the mouth of the Columbia River, USA, a recent research study that included monitoring and modeling of the dredged material placed at the Mouth of the Columbia River for more information:

<https://www.sciencedirect.com/science/article/pii/S0378383923000091?via%3Dihub>

References

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- Norton, J., Moritz, R., Ott, M., Briner, W., & Roegner, C. (2015). *Balancing Benefits and Impacts When Using A Nearshore Dredged Material Placement Site At The Mouth Of The Columbia River*. https://doi.org/10.1142/9789814689977_0147
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<https://doi.org/10.1016/j.coastaleng.2023.104285>



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Information on thin layer placement (TLP) case studies has been compiled as part of a DOTS/EWN project to provide a source of information, knowledge, and experience on TLP of sediment or dredged material in aquatic environments. The Thin Layer Placement Website and Map-Portal are funded by the US Army Engineer Research and Development Center (ERDC). POCs for the Thin Layer Placement Website and Map-Portal are:

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