

Scientific Synthesis in Support of the Columbia Near-Shore Beneficial Use of Dredged Material Project

A Proposal from the Institute for Natural Resources at Oregon State University to the
Department of Land Conservation and Development

Problem

There has been a significant reduction in the historic flow of sediment from the mouth of the Columbia River (4.3 million cubic meters per year prior to construction of the Columbia River dams, 1.4 million cubic meters per year since the 1960's). This trend, combined with ongoing erosion of the mid-continental shelf region offshore from the Clatsop Plains, has caused a depletion of the sands of the Columbia River littoral area (extending from Tillamook Head, Oregon to Point Grenville, Washington). Furthermore, a deepening of the bathymetry offshore from the Clatsop coastline and loss of sands off the south jetty has made the area, including the jetty, much more susceptible to damage from wave action. This large-scale, chronic erosion is resulting in: (1) loss of commercially, recreationally, and ecologically important areas; and (2) increased potential for breaching of the Columbia River jetties. In addition, the U.S. Army Corps of Engineers (USACE) is considering new modifications in the Columbia River system, including channel deepening and removal of sand from the estuary. The economic and environmental problems associated with disposing of the large volume of sediment to be dredged for channel improvements and on-going maintenance, coupled with the problems associated with reduced sand supply within the littoral system require a regional plan for dredge-sediment management.

Background and Progress to Date

The ongoing erosion offshore from Clatsop Spit and adjacent areas has prompted the USACE to be concerned that the south jetty may eventually be undermined through toe erosion. The jetty is constructed on a sand bar, making it susceptible to erosion. There is long-standing concern that the more narrow northern end of the spit could be breached, resulting in the formation of a second river mouth. The placement of Columbia River dredge material in the near shore area adjacent to the jetty and along the north end of the Clatsop spit (as opposed to the current deep-water ocean disposal sites) may help to slow this process and prevent further damage to the jetty or erosion of the ocean shore beach.

The Columbia Near-Shore Beneficial Use of Dredged Material Project (Project) was created to “explore the use of lower Columbia River maintenance dredge material to address depletion of the natural sand volumes in the nearshore environment off of the South Jetty of the Columbia River.” The Project aims to achieve this goal while minimizing any negative biological impact or environmental impact and ensuring that no safety or navigational problems are created. This approach will help avoid use of the deep-water disposal site for the dredged material, thus keeping sand within the Columbia littoral zone. Specifically, “the objective of this disposal action would be for these

sediments to re-nourish beaches along northern Clatsop Spit and to rebuild the offshore berm to protect the jetty.”

The Project has outlined four primary tasks:

1. Identify and describe a “regulatory roadmap” that must be followed to establish near-shore disposal;
2. Collect and analyze existing technical information regarding the status of habitat and biological resources and begin assessing potential information needs;
3. Develop a plan for the experimental testing (i.e., a demonstration project) of various dispersal methods for dredged material to assess technical feasibility, effectiveness, and environmental impacts as a first step in guiding future, long-term actions to address depletion of sands in the nearshore environment off the Columbia River; and
4. Coordinate with other regional dredge-material disposal/beneficial-use planning projects.

The Project has been working with an Oregon Solutions Team, based at Portland State University’s National Policy Consensus Center, to carry out these tasks. Task 1 is complete, and a regulatory roadmap is available from the Team. For Task 2, a PSU student completed a literature review about habitat and biological resources in the area of concern, and information gaps that must be filled to satisfy the analysis of resource or use impacts and project alternatives. The Project has drafted a plan for the demonstration project called for by Task 3 that would be implemented in 2005 or 2006 (likely the latter); the draft plan addresses both methods of disposal and locations of disposal for experimental testing. Task 4 is ongoing, with regular communications between the Project, the Lower Columbia Solutions Group, and the USACE.

Historic Context: The Columbia River Littoral Cell

A recent white paper titled “Columbia River Littoral Cell – Technical Implications of Channel Deepening and Dredge Disposal”, by the Oregon Department of Geology and Mineral Industries (DOGAMI), describes the changes to the system over the past century. The DOGAMI study summarizes a body of research regarding the erosion that has resulted due to the reduction in sediment to the system from the Columbia River. Studies indicate that there is a loss of offshore sediment to the mid-continental shelf and near shore region offshore from the Clatsop Plains and that the sediment is being transported northwards along the coast and into the lower Columbia River estuary. The deepening of the bathymetry offshore from the Clatsop coastline has subsequently resulted in greater wave energy being focused on the jetty and the ocean shore.

The DOGAMI paper outlines a number of gaps in scientific information:

- Quantification of the patterns of net sediment movement along the coasts of Oregon and Washington.
- Predominant directions of net sand movement
- Seasonal, interannual (e.g., El Niño vs. La Niña), and interdecadal (i.e., Pacific Decadal Oscillation) variation in the volume of sand movement

- Suitability of nearshore and offshore disposal sites for supplying sediments to the beaches of Oregon
- Contribution of sand eroded from the Clatsop Plains, nearshore, and mid-shelf regions as a significant source of beach sediment to the Columbia River littoral system
- Quantitative information on patterns of sedimentation and erosional processes around the mouth of the Columbia River and in the estuary
- Volume of sand that passes through the estuary mouth to the coast (although the consensus to date is that probably very little sand passes out of the estuary to supply the beaches of Oregon and Washington)
- Depth of disposal sites that would be sufficiently shallow to ensure that sediments are likely to end up on the beaches