Enhanced Nearshore Placement at the South Jetty Beneficial Use Site, Mouth of the Columbia River

RSM Bi-Monthly Call

Jarod Norton, Project Manager
USACE Portland District
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Portland, OR

US Army Corps of Engineers
BUILDING STRONG®
Mouth of the Columbia River—Gateway to the Columbia-Snake River System

Columbia River at the Mouth, WA & OR

- Entrance channel 55/48 feet deep, 2640 feet wide, and 6 miles long
- Average annual dredging 3.5 MCY, June-Sept work window
- Support Columbia-Snake River Navigation System
  - 46 million tons of cargo annually, worth $24B
  - Largest wheat and barley export gateway in the Nation
  - Second largest soy export gateway in the World
  - Over $930M in commercial investments-to-date because of the deepening
  - Supports 40,000 local jobs
- Large group of stakeholders, with varying concerns (deposition depth/benthic impacts)
- Focus on the beneficial use of dredged material to prevent ‘wasting’ clean sediment resources.
- Innovative monitoring program to build stakeholder trust, leverage opportunities, and collect baseline data for the addition of nearshore sites.
- Disposal Mission, responsible use of the placement sites to maximize capacity
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<th>Stakeholder</th>
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<td>1) National Oceanic and Atmospheric Administration (NOAA)</td>
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<td>2) Environmental Protection Agency (EPA)</td>
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<td>3) Oregon Governor’s Office</td>
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<td>4) Washington Governor’s Office</td>
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<td>5) WA Department of Ecology (WDOE)</td>
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<td>6) Columbia River Crab Fishers Association (CRCFA)</td>
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<td>7) Washington Department of Natural Resources (WDNR)</td>
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<td>8) Oregon Dept. of Land Conservation and Development (ODLCD)</td>
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<td>9) Oregon Sea Grant</td>
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<td>10) Portland State University</td>
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<td>11) Oregon State University</td>
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<td>12) Oregon Health Sciences University</td>
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<td>13) National Policy Consensus Center</td>
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<td>14) Oregon Department of Environmental Quality (ODEQ)</td>
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<td>15) Port of Astoria</td>
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<td>16) Port of Ilwaco</td>
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<td>17) Port of Chinook</td>
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<td>18) Pacific County, WA</td>
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<td>19) Clatsop County, OR</td>
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<td>20) Oregon Department of State Lands (ODSL)</td>
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<td>21) US Fish and Wildlife Service (USFWS)</td>
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<td>22) Oregon Department of Fish and Wildlife (ODFW)</td>
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<td>23) Washington Department of Fish &amp; Wildlife (WDFW)</td>
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<td>24) Lower Columbia Solutions Group (LCSG)</td>
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<td>25) Institute for Natural Resources</td>
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<td>26) Center for Public Service</td>
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South Jetty Site Operational Placement Process

- 2004 – Oregon Nearshore Beneficial Use Project initiated to collaboratively address the depletion of sand in the nearshore environment south of the MCR South Jetty
- 2005 – First Science-Policy Workshop was held. Additional workshops held in 2007, 2009, and 2010
- 2006 – Pilot Placement Project at SJS by the ESSAYONS
- 2008 – Sediment Tracer Study
- 2010 – Initiate Environmental Clearances
- 2011 – RSMP Completed
- 2012 – Operational Placement at the SJS (initiated in 2014)
Monitoring Program

Benthic Surveys
• Use of the NOAA benthic video sled to enable quantification of macrofaunal abundances and distributions.
• Conduct benthic surveys at control and dredge material deposition sites spanning the operations period.
• Analysis includes extracting organism abundance data from digital video logs and testing for significance in a BACI statistical design.

Crab Mortality and Motility
• Deploy acoustic receiver moorings at control and impact sites.
• Catch, tag, release and monitor crab movements during and after dredge material deposition events.
• Analysis of crab positions.
• Campod Deployment

Models, Tools, Databases, etc
• Sediment Profile Imaging Photography (SPI)
• Multi-beam survey data
• Acoustic telemetry to evaluate survival of Dungeness crabs
• Benthic video sled to assess the presence of benthic species
• Benthic Algorithm Development

Benefits
• Keep sediment in the littoral cell
• Slowing the erosion of Clatsop Spit
• Maintain Jetty Foundation/Root
• Reduced costs to the dredging program
• Increased habitat opportunities
• Distribute material between a network of sites
• Reducing the likelihood of mounding in the nearshore sites
Environmental Buoy

- Prevalent phytoplankton blooms in previous years wasted resources
- Deployed by the Center for Coastal Margin Observation and Prediction (CMOP) Science and Technology University Research Network (SATURN)
- Provides real-time conditions in the SJS to allow monitoring during optimal conditions

Reporting Properties:
- Salinity
- Temperature
- Dissolved oxygen
- Conductivity
- Turbidity
- Chlorophyll Fluorescence
- Wind information
- National Buoy Data Center (NBDC)
Environmental Buoy

- Mooring schematic for real-time bottom node
- Location: 1 nm to 6 nm South of South Jetty
- Water Depth: 40' - 60'
- Exact location decided by science requirements
- If lighted will need PATON license
- Telemetry: 900MHz spread spectrum
- Radio and antenna housed in lightweight wash-over buoy
- Mooring designed for short summer, fair weather
- Design requirement: observe turbidity without creating it
- Full data set recorded on instruments for later download
Environmental Buoy
Benthic Video Sled Surveys

• Use of the NOAA benthic video sled to enable qualitative view of macrofaunal abundances and distributions.
• Conduct benthic surveys at control and dredge material deposition sites spanning the operations period.
• Analysis includes extracting organism abundance data from digital video logs and testing for significance in a BACI statistical design.
• MBARI to develop Automated Event Detection and Classification (AVEDac) Software
• Replaces trawls
• Exploratory surveys to the north for possible expansion of nearshore placement network
Benthic Video Sled
Automated Event Detection and Classification (AVEDac) Software

- Developed by MBARI, Caltech, and USC for analysis of ROV video
- Software is capable of tracking objects of interest through video frames
- Continued development of the software to review video and classify species
- Quality Control by OSU graduate student
- Once developed it should reduce labor requirement
Area reserved for detailed baseline monitoring. This area NOT be affected by dredged material placement until completion of baseline monitoring activities. 5700 ft (E-W) x 3,025 ft (NW-SE).

Area reserved for OPERATIONAL Use of SJS by the Hopper dredge Essayons. 250,000 cy to 290,000 cy of sand dredged from the MCR channel will be placed within this area during 15 AUG to OCT 2013. The Essayons will use the "thin-layer" method for placing dredged material, to minimize bottom deposition. 5700 ft (E-W) x 4,235 ft (NW-SE).

Refer to Operational Site Use Plan 1.
Acoustic Crab Tags

(Preliminary data courtesy of NOAA)
Deposition Monitoring Instruments (Campods)

- Measure material deposition following placement by dredge ESSAYONS (target 5cm)
- Monitoring crab response to placement (mortality at 10cm burial)
- Capture baseline conditions in the SJS
Prototype deployable deposition meter, via Curtis Roegner-NOAA. These are designed to go “over the side” and be retrieved like crab traps.

A Gopro camera, attached to the deposition meter mount, can record the deposition event.
MCR South Jetty Site - SJS (CWA 404)

Layout For Phased Implementation of Initial Site Utilization & Monitoring Plan

Coordinates are SPCS Oregon, north, ft NAD83
Elevations are in ft, below MLLW, data = Aug 2012, contour interval = 5 ft

US Army Corps of Engineers
Portland District
OFFSHORE transect monitoring stations – NOAA (3 stations for each transect: one ON dump transect CL and one each 100 ft offset from dump transect CL)

INSHORE transect monitoring stations – NOAA (3 stations for each transect: one ON dump transect CL and one each 100 ft offset from dump transect C)

Anchor point for monitoring instrument daisy-chain. Outermost points on transect are anchor points with surface buoy flags
ADCP Data Collection

Data collection includes:

- Measured currents through the water column
- Directional waves
- Suspended sediments
- Bottom current regime
- The intent of the data collection is to measure dredge material plume velocities and suspended sediments
- Infer impacts to benthic communities based on lab results
NOAA TELEMETRY ARRAY NODES
+ BOTTOM-MOUNT TRIPOD
- OCEAN TRIPOD CONTROL TRANSECTS
• •
SJS DAY PLACEMENT BOUNDARY
/
ESSAYONS 2015 DISPOSAL TRACKS

MCR South Jetty Site

0 750 1,500 2,250 3,000
Feet

BUILDING STRONG®
Big Waves

Placement

Event
SJS Difference Plot 2014
Conclusions/Limitations

- Critical need for on-going stakeholder engagement
- Measurements of benthic response to dredged material placement
- Passive acoustic detections
- On-going operational placement of 300 kcy annually
- AVEDac software needs work to be fully operational
- Continue developing innovative monitoring techniques
- Monitoring the migration of material from the nearshore site to the beach
- Use information from monitoring to expand network of nearshore sites, reduce costs of future monitoring