ADVANCED MONITORING OF DREDGED MATERIAL PLACEMENT SITES AT THE MOUTH OF THE COLUMBIA RIVER

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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
  - 49 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

- Wicked problems. Large group of stakeholders, with varying concerns (deposition depth/benthic impacts)
- Focus on the beneficial use of dredged material and Engineering with Nature 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
Mouth of the Columbia River Stakeholders

1) National Oceanic and Atmospheric Administration (NOAA)
2) Environmental Protection Agency (EPA)
3) Oregon Governor’s Office
4) Washington Governor’s Office
5) WA Department of Ecology (WDOE)
6) Columbia River Crab Fishers Association (CRCFA)
7) Washington Department of Natural Resources (WDNR)
8) Oregon Dept. of Land Conservation and Development (ODLCD)
9) Oregon Sea Grant
10) Portland State University
11) Oregon State University
12) Oregon Health Sciences University
13) National Policy Consensus Center
14) Oregon Department of Environmental Quality (ODEQ)
15) Port of Astoria
16) Port of Ilwaco
17) Port of Chinook
18) Pacific County, WA
19) Clatsop County, OR
20) Oregon Department of State Lands (ODSL)
21) US Fish and Wildlife Service (USFWS)
22) Oregon Department of Fish and Wildlife (ODFW)
23) Washington Department of Fish & Wildlife (WDFW)
24) Lower Columbia Solutions Group (LCSG)
25) Institute for Natural Resources
26) Center for Public Service
STAKEHOLDER CONCERNS

- Impacts to Commercially Sensitive Species
  - Dungeness Crab
- Permitting
- Wave Amplification
  - Mounding
  - Safety concerns for fishing fleet
- Historic USACE Relationships
  - Distrust
  - Previous Projects
  - Views of the Federal Government
  - Litigation
- Sediment Quality
  - Place like on like material
- Public Perception
  - Proximity of placement area to the beach
  - Ft. Stevens State Park
ADDRESSING STAKEHOLDER CONCERNS – SHOW ME!

Methods used to meet concerns

- Thin-layer placement with the Dredge ESSAYONS
- Benthic Video Sled
  - Presence/Absence of species
- Deposition Monitoring Instruments (CamPods)
  - Deposition
  - Acute crab response
- Acoustic Doppler Current Profiler (ADCP)
  - Dredge plume velocity, turbidity, etc
  - Deposition
- Multi-beam surveys
  - Deposition
- Acoustic crab tags
  - Crab mortality
  - Crab motility
  - Cumulative impacts
- Environmental Buoy
  - Real-time conditions to inform monitoring team
  - Provide the public with a tool to monitor the conditions in the site
- Video Annotation and Reference System (VARS)
  - Software to track species ID and abundance
  - Classification and Counting species
NEARSHORE 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, 2010, and 2018

2006 – Pilot Placement Project at SJS by the ESSAYONS

2008 – Sediment Tracer Study

2010 – Initiate Environmental Clearances

2011 – RSMP Completed

2012 – Initial Placement at the SJS

2014 – Operational Placement in the SJS

2017 – Benthic Sampling

2018 – Pilot Placement at North Head Site (planned)
Benthic Video Sled/VARS Software

- Replaces trawls
  - Less invasive than traditional methods, no take
- MBARI/ERDC developing Video Annotation and Reference System (VARS) Software

(Photo courtesy of NOAA)
DEPOSITION MONITORING INSTRUMENTS (CAMPODS)

(Courtesy of Curtis Roegner-NOAA)
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.

COURTESY OF CURTIS ROEGNER-NOAA
ADCP Data Collection

- Measured currents through the water column
- Directional waves
- Suspended sediments
- Bottom current regime
CONCLUSIONS/LIMITATIONS

- Critical need for on-going stakeholder engagement
- Confidence in benthic response to dredged material placement
- Passive acoustic detections
  - Green Sturgeon (20+ detections)
  - Great White Sharks (4 detections, 3 individuals)
- On-going operational placement of 500kcy annually
- Continue developing innovative monitoring techniques
- Quantifying the migration of material from the nearshore site to the beach
  - Re-evaluating the depth of closure, partial benefits
- Use information from monitoring to expand network of nearshore sites, reduce costs of future monitoring