

Regional Sediment Management Highlights – Portland District

RSM IPR 2017

Jarod Norton, Project Manager

USACE Portland District

May 16, 2017

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 3.5-4.5 MCY, June-Sept work window.
- Support Columbia-Snake River Navigation System
 - \$24 Billion worth of U.S. products and 46 million tons of cargo annually.
 - Largest wheat and barley export gateway in the Nation.
 - Third largest grain 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 (CRCFA), varying concerns cause Wicked Problems.
- 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 beneficial use sites.
- Disposal Mission, responsible use of the placement sites to maximize efficiency.

Oregon Coastal Projects

- 11 Emerging Ports (under 1 Million tons)
- 1 moderate use Port (1-10 Million tons)
- 7 USCG stations and 2 seasonal USCG stations
- Life and safety dredging of breaking bars is priority

- 2013 MOA with State of Oregon to fund life and safety dredging when no Federal funds available, in process of renewing agreement this year.
- Average annual dredging amounts, coast wide:
 - Dredge YAQUINA 825K CY
 - Dredge ESSAYONS 800k CY (Coos Bay entrance)
 - Contract dredges (Clamshell and pipeline), varies between 40kcy and 500kcy
- Supports major fishing industry, with 5 year average of landings at 73,000 tons, valued at \$150M per year.
- Various stakeholders including commercial and recreational fishermen, environmental interest groups and shipping industry, resulting in need for constant communication and collaboration
- Several nearshore disposal sites that protect stability of sand spits and integrity of jetty systems
- Endangered Western Snowy Plover habitat on Coos Bay North Spit, due to disposal site providing excellent habitat, result is heavily managed Corps administered lands for ESA.





US Army Corps
of Engineers
Portland District

Channels & Harbors Operational Projects



1. Mouth of The
Columbia River (MCR)



19. Baker Bay



18. Chinook



17. Cowlitz River



16b. Lower Columbia River



2. Skipanon Channel



3. Nehalem River



4. Tillamook Bay



5. Depoe Bay



6. Yaquina Bay & Harbor



7. Yaquina River



8. Siuslaw River



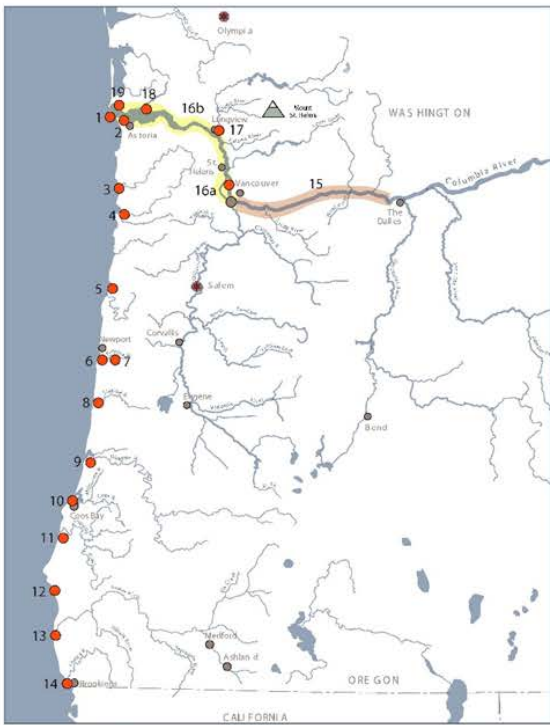
9. Umpqua River



10. Coos Bay



11. Coquille River



16a. Lower
Willamette River



15. Vancouver to The Dalles



14. Chetco River

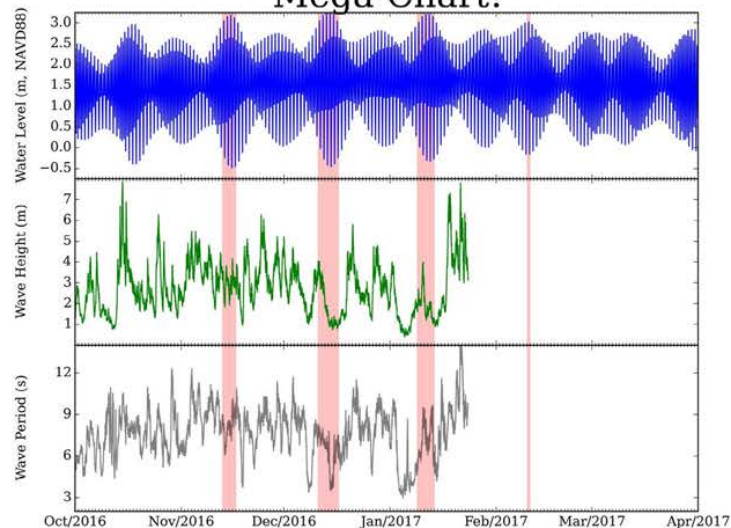


13. Rogue River at
Gold Beach



12. Port Orford

Mega-Chart!



BUILDING STRONG®

NWP RSM Highlights

2012

- AdH Modeling in the Lower Columbia
- MCR Adaptive Management

2013

- Oregon Sediment Model (Port Orford)
- MCR South Jetty Dune Stabilization

2014

- Oregon Shoreface Sediment Stabilization (Yaquina South Jetty)

2015

- Lower Columbia River RSMP

2016

- Lower Columbia River RSMP
- Optimizing Fall Creek Reservoir Flush

2017

- Crab Response to Nearshore Dredged Material Placement (NAO)
- Lower Columbia River RSMP



FY12 CLW AdH Modeling

BLUF: Portland District needed more information to shape the selection of C&LW disposal sites to reduce the amount of material migrating back into the FNC, to increase efficiency of the navigation program.

Issues to Address

- Limit the amount of material that is re-handled during maintenance dredging.
- Increase efficiency of the overall C&LW dredging program.
- Use existing structures and natural features to aid the retention of material placed.

Challenges

- Maintain the Columbia River FNC with a limited budget, dredge plant constraints, and environmental work-windows.
- Reduce draft restrictions in the river.
- Meet stakeholders needs.
- Post Channel Improvement



WESTPORT & EUREKA Bars

CRM 53
Columbia River

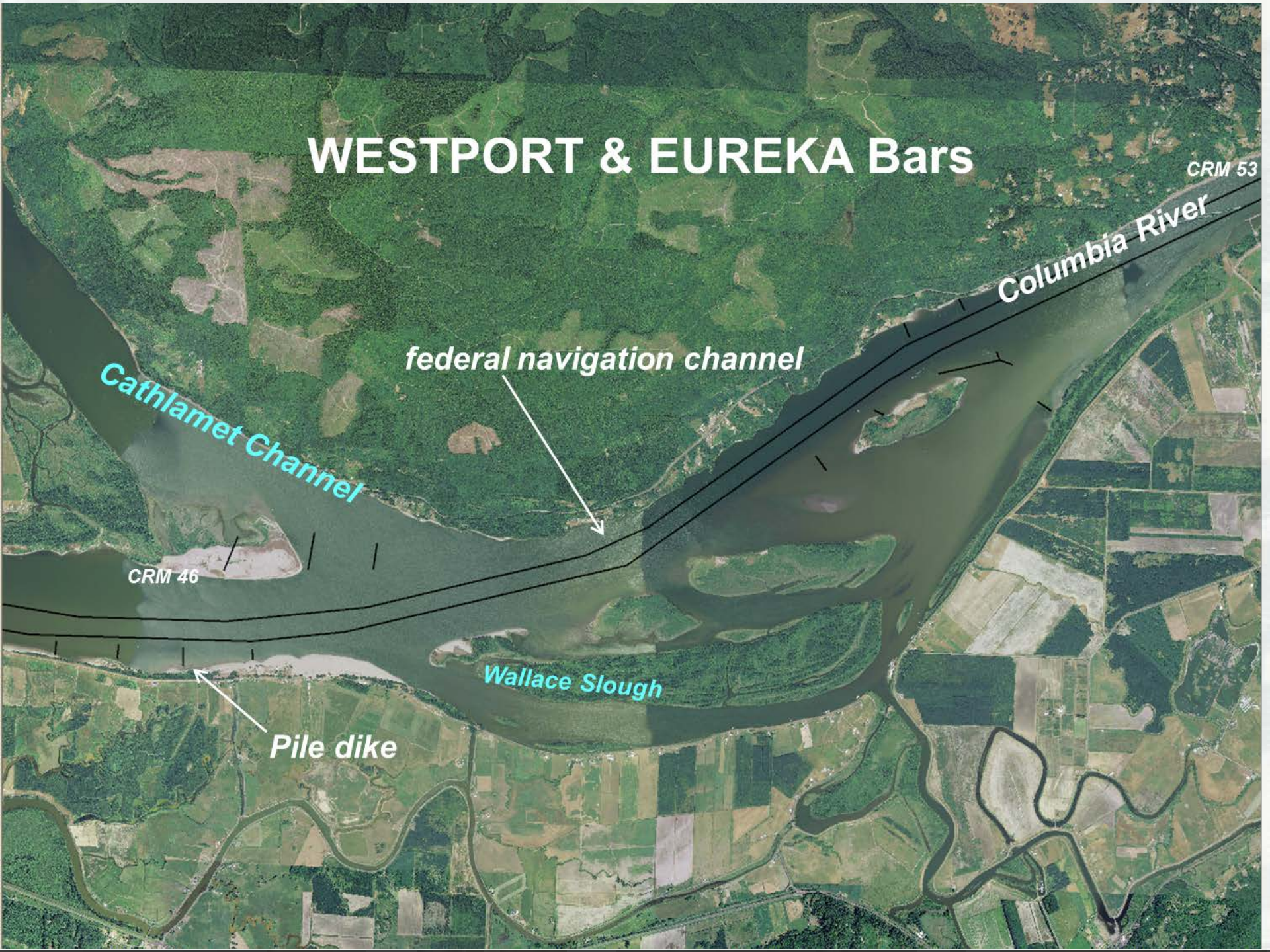
federal navigation channel

Cathlamet Channel

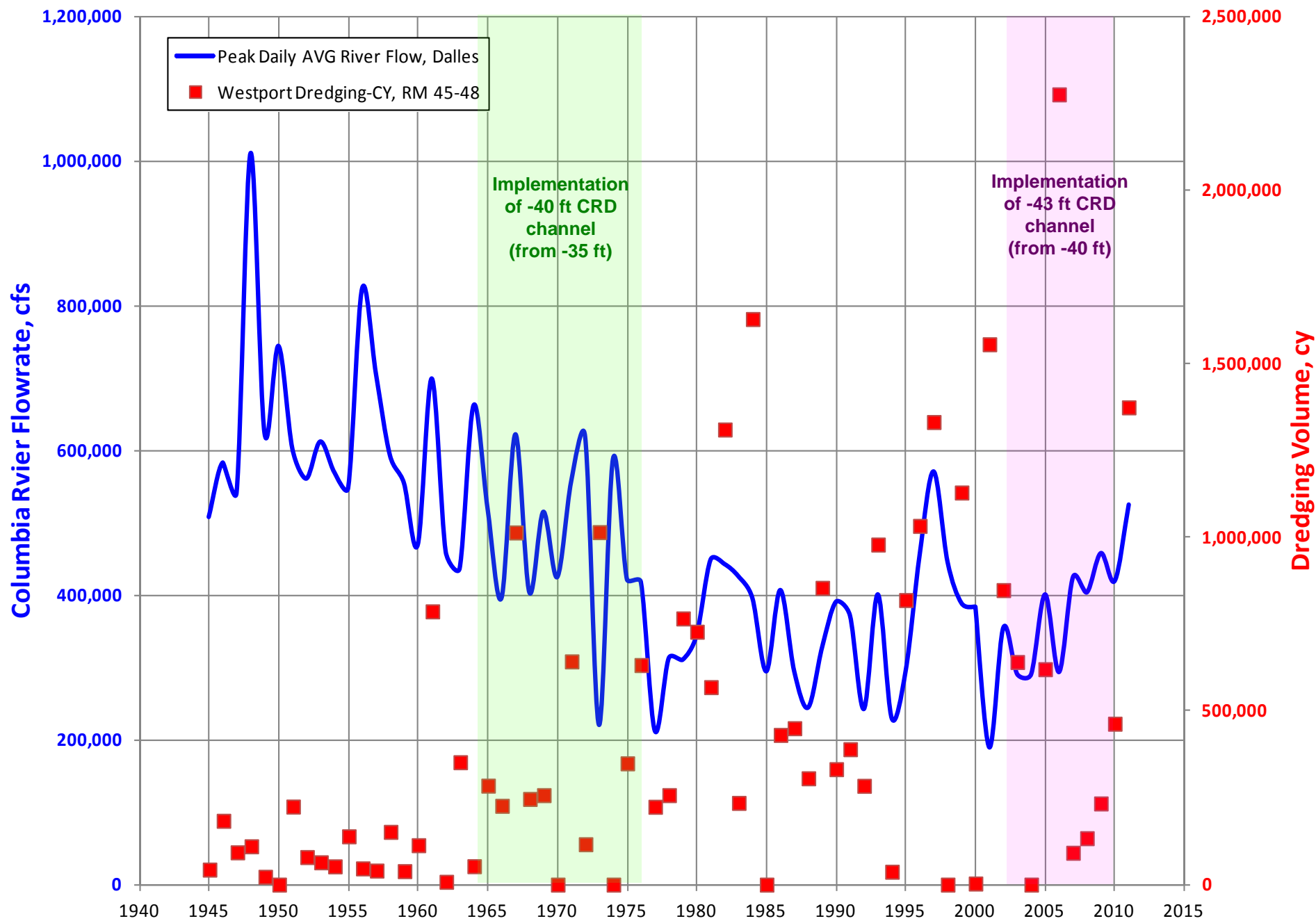
CRM 46

Wallace Slough

Pile dike



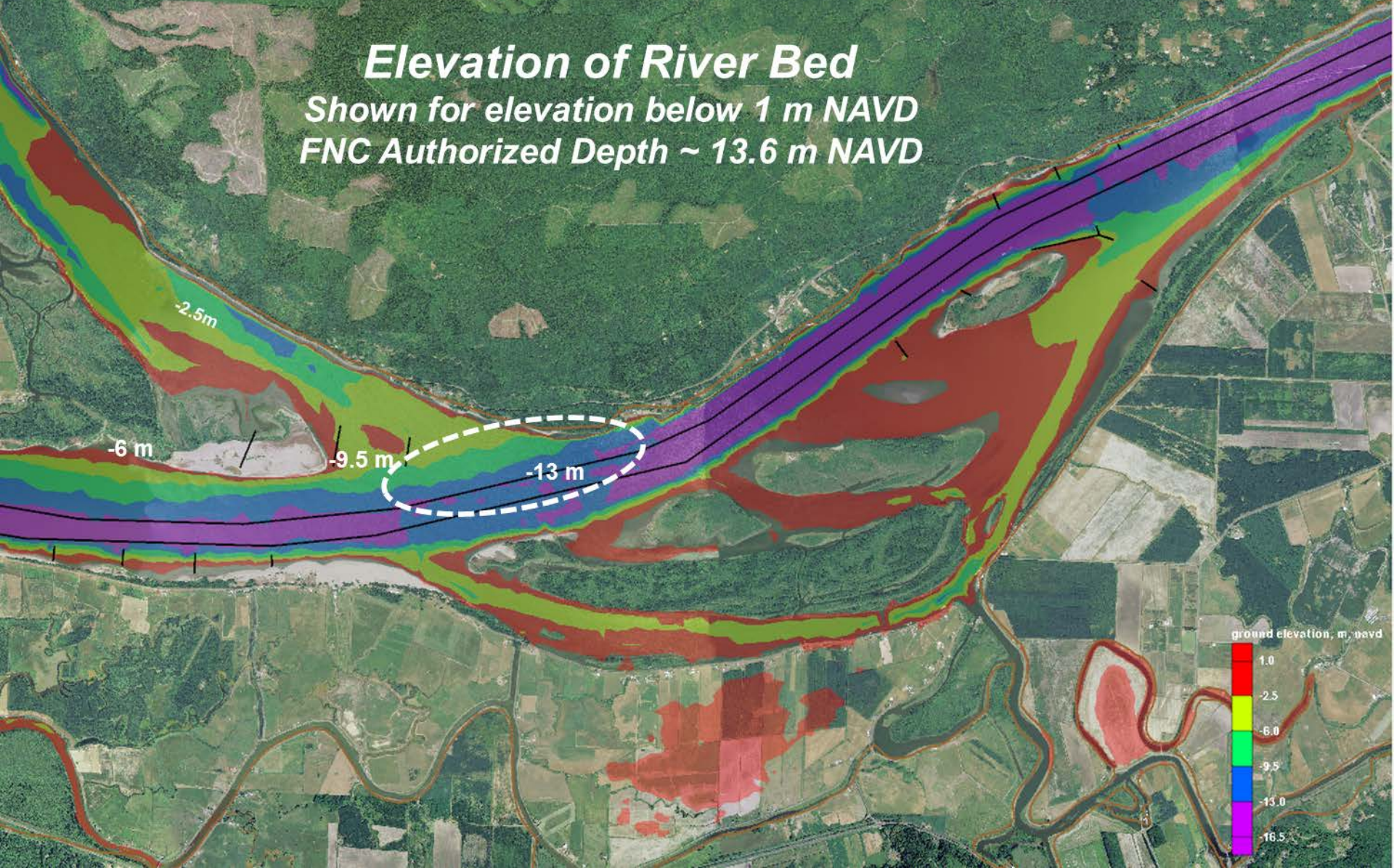
Columbia River Discharge Compared Dredging



WESTPORT

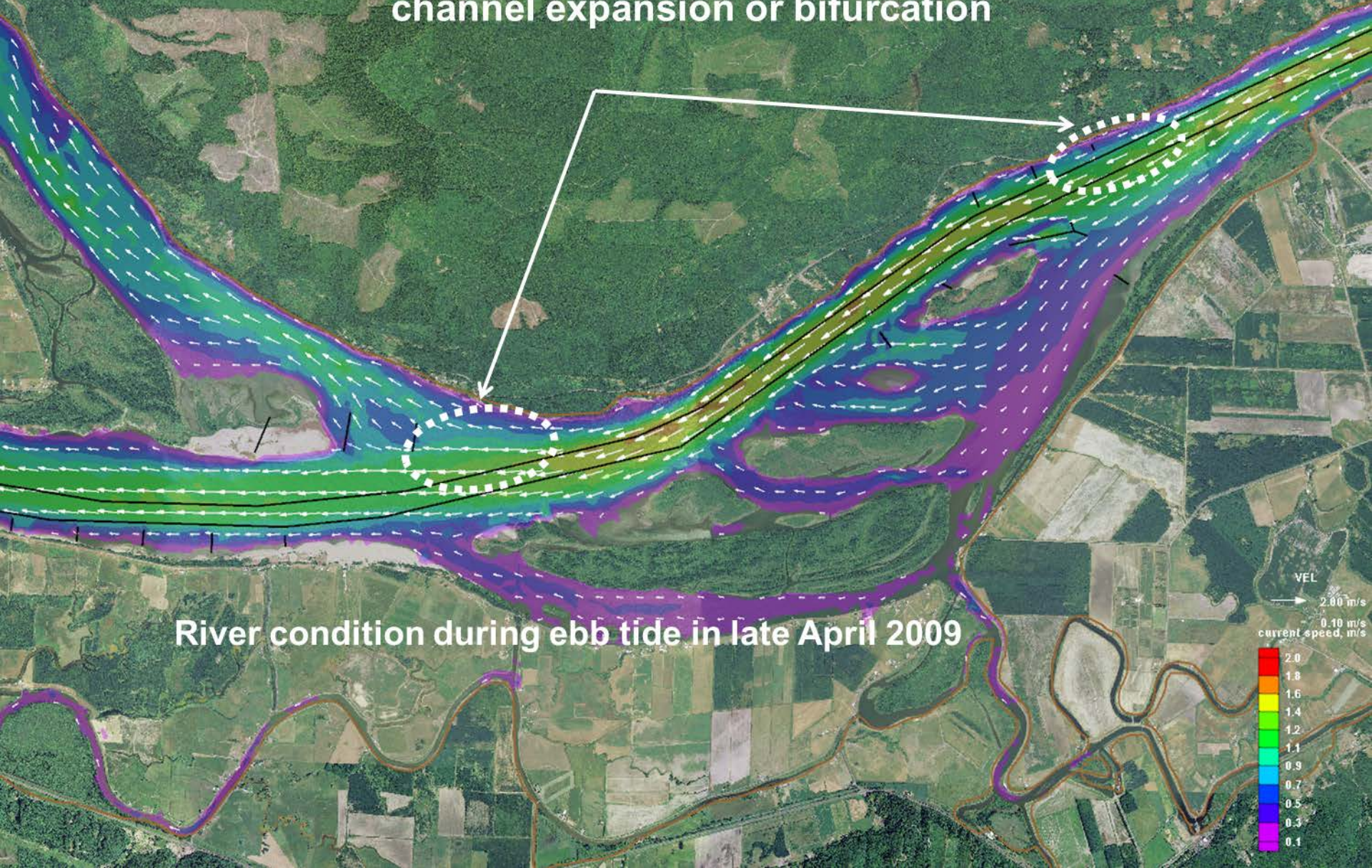
Elevation of River Bed

*Shown for elevation below 1 m NAVD
FNC Authorized Depth ~ 13.6 m NAVD*



Unsteady Flow Dynamics – River Velocity affected by tides and tributary inflow

Shoaling areas can occur where River Velocity slows due to channel expansion or bifurcation



Proposed flowlane placement site OR 71.4-2012
430 ft x 2300 ft === 3 ft lift
80,000 CY limit for 2012 placement

Proposed flowlane placement site OR 72.0-2012
430 ft x 2400 ft === 5 ft lift
120,000 CY limit for 2012 placement

Proposed flowlane placement site OR 78.1-2012
370 ft x 3200 ft === 3 ft lift
100,000 CY limit for 2012 placement

Proposed flowlane placement site OR 81.5-2012
400 ft x 2700 ft === 1 to 2 ft lift
40,000 CY limit for 2012 placement

Proposed flowlane placement site OR 82.4-2012
400 ft x 2700 ft === 2 ft lift
80,000 CY limit for 2012 placement

RM 71

Kalama

Sandy Island

RM 78

Deer Island

Martin Island

Goat Island

RM 82

See attached figures for Inwater Placement Site Details



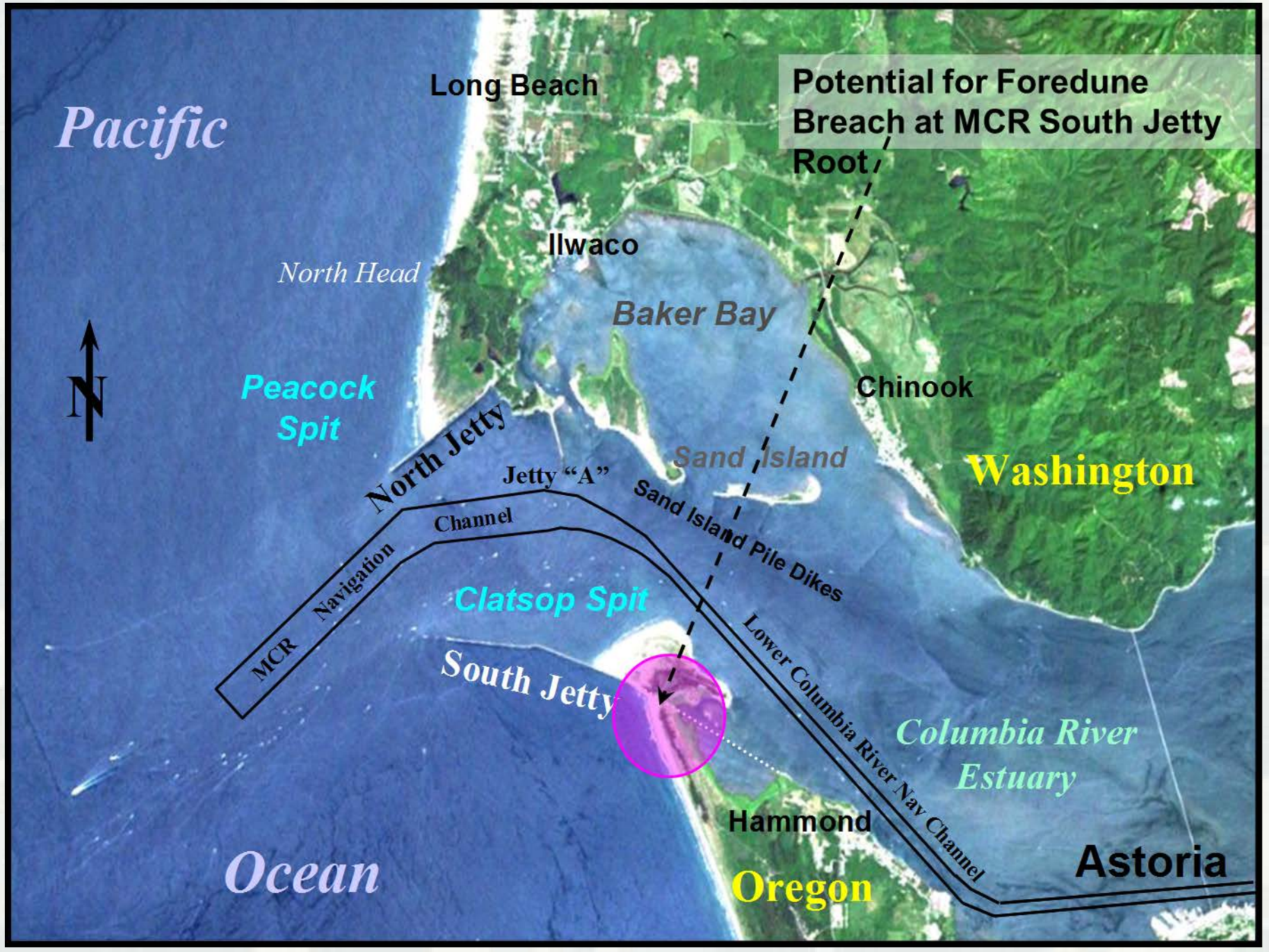
Elevation, NAVD, in



FY13 MCR South Jetty Dune Stabilization

- Repair eroded areas near the MCR South Jetty Root
- Prevent breach into Trestle Bay
 - ▶ Critical habitat for a number of species
- Protect a public investment, the Jetty System
- Beneficial use of material from other USACE projects
 - ▶ Cobble used for dune stabilization was dredged in 2010 during the CLW channel deepening
- Allow system to respond naturally to high energy events
 - ▶ Feature intended to move with wave attack
- Lower cost than traditional methods
- Replicates natural features found along the Oregon Coast





Pacific

Long Beach

Potential for Foredune
Breach at MCR South Jetty
Root

North Head

Ilwaco

Baker Bay

Chinook

Washington

Peacock
Spit

North Jetty

Jetty "A"

Sand Island

Sand Island Pile Dikes

Clatsop Spit

Lower Columbia River Nav Channel

South Jetty

Columbia River
Estuary

Hammond

Oregon

Astoria

Ocean

Clatsop Spit

31 JAN 2006

Previous Concern

Eroding South Jetty Foredune

**Is the last line of defense
between Trestle Bay (estuary)
and Pacific Ocean**

South Jetty

DUNE

DUNE

DUNE

LOW Elevation
Backshore

Trestle Bay

South jetty root

Erosion of Dune

31 JAN 2006

11 SEP 2002

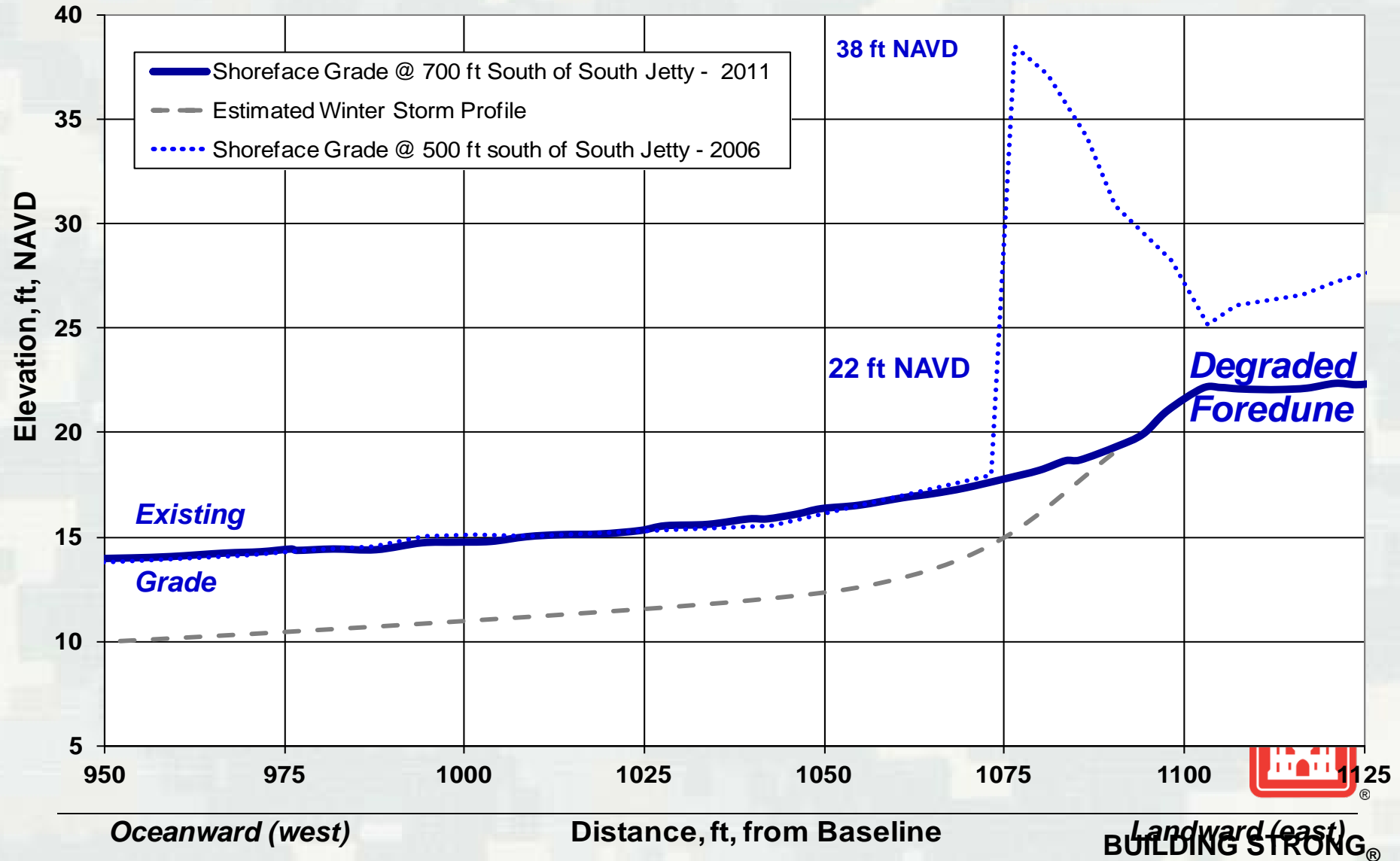
Low
Elevation
Backshore

DUNE DUNE

DUNE

Template for South Jetty Dune Augmentation: Cobble Berm

2006 vs. 2011 Beach Profile Foreduke



**Wave-induced
Erosion of primary
Dune protecting
low elevation
backshore (east,
behind dune)**

7/29/03



2/04/06



**View to
east along
south jetty
root**



BUILDING STRONG®

MCR South Jetty Dune Stabilization



MCR South Jetty Dune Stabilization

Emergency vehicle access zone

**\$1.7 Million construction cost
17,000 CY sand excavation
34,000 CY NEW material Placed**

**Completed Work
3 Oct 2013**

FY14 Oregon Shoreface Stabilization

BLUF: The Portland District speculated that increased shoaling in the Yaquina Entrance channel is a result of Aeolian transport. Sand fencing is proposed to interrupt a circular pattern of accretion on the south jetty, migration into the channel and movement out of the channel back to the jetty.

Challenges

- Limited federal/state resources
- City of Newport - South Beach State Park Master Plan
- Public perception of sand fences
- Stakeholder/Interest in the project area
- Recreational use of the site

Expected Benefits

- Up to 40,000 CY may be captured in the proposed sand fencing implementation plan, savings of roughly \$300k
- Unit price of \$.03/CY for sand fencing compared to \$7.50/CY for hopper dredging
- Allows dredge YAQUINA to focus on other priorities
- Build Yaquina South Jetty Foredune



FY14 Oregon Shoreface Stabilization



FY15 Lower Columbia River RSMP

BLUF: A Regional Sediment Management Plan (RSMP) is needed to ensure that dredging and placement of material is done in the most beneficial manner practicable, while preventing re-shoaling and ensuring a reliable Federal Navigation Channel.



Columbia River and Lower Willamette Channel

- RM 3 to 106.5
- 43' authorized depth, 5' advanced maintenance.
- 6-8 MCY dredged annually.
- Hopper and pipeline dredging typically March – Nov.



BUILDING STRONG®

FY15 –FY17 Lower Columbia River RSMP

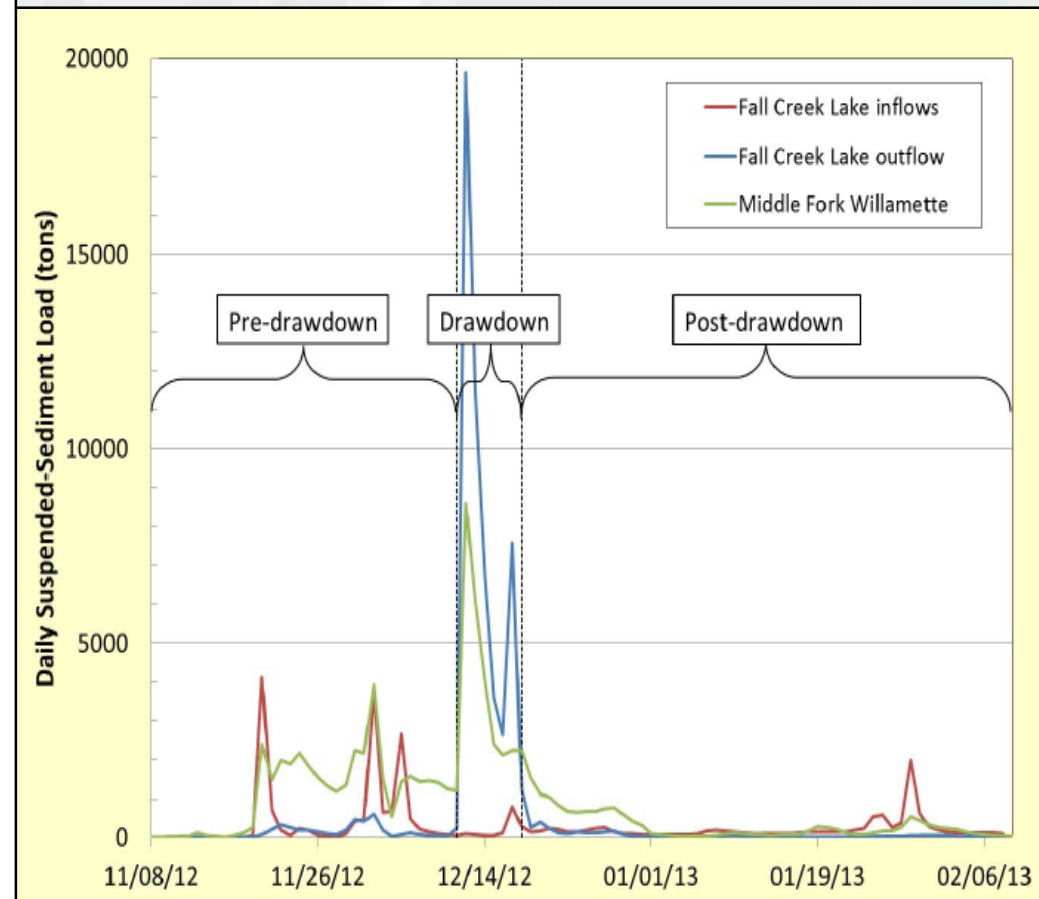
Approach

- Use previous RSMP attempts in the region (MCR, LCREP, etc)
- Completed a literature review of dredging and beneficial use opportunities in the LCR.
- Engage a stakeholder working group.
- Develop a sediment budget using USGS stations monitoring suspended sediments.
- Evaluate a range of a beneficial use opportunities, including: ecosystem restoration and habitat creation; shoreline placement to protect levees, upland disposal sites, and other infrastructure; commercial use; and, extending the useful life of existing pile dike systems.
- Initiate CAP Section 204 Project to evaluate placement sites.
- Coordinate with long-term pile dike repair effort.



FY16 Optimization Fall Creek Sediment Flushing

BLUF: Fall Creek Reservoir is the first regular USACE reservoir flushing initiative. NWP collaborated with USGS to monitor the flushing event and with HEC to model it, applying new features in HEC-RAS to evaluate TMDLs and automate operational alternatives.

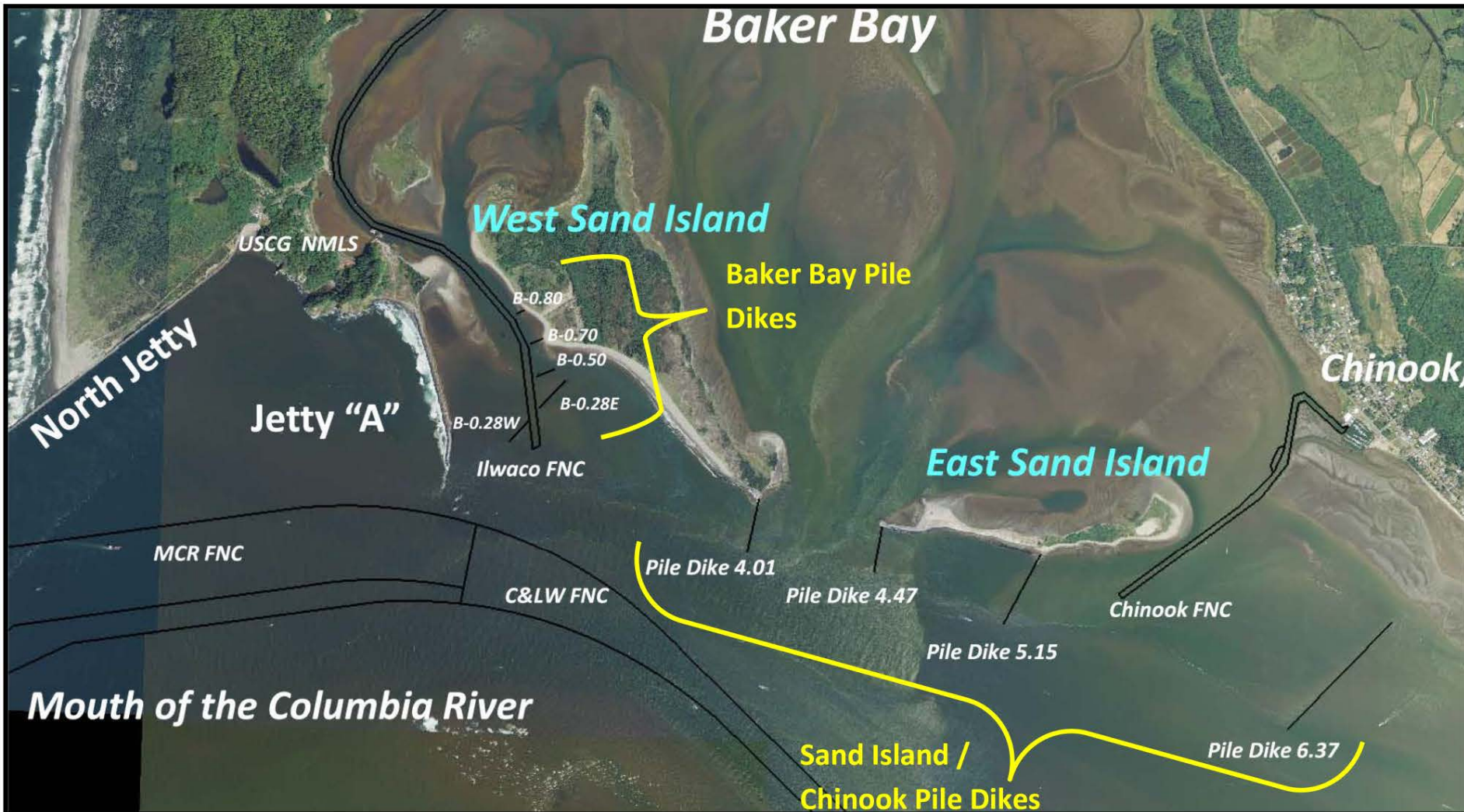


Future NWP RSM Work

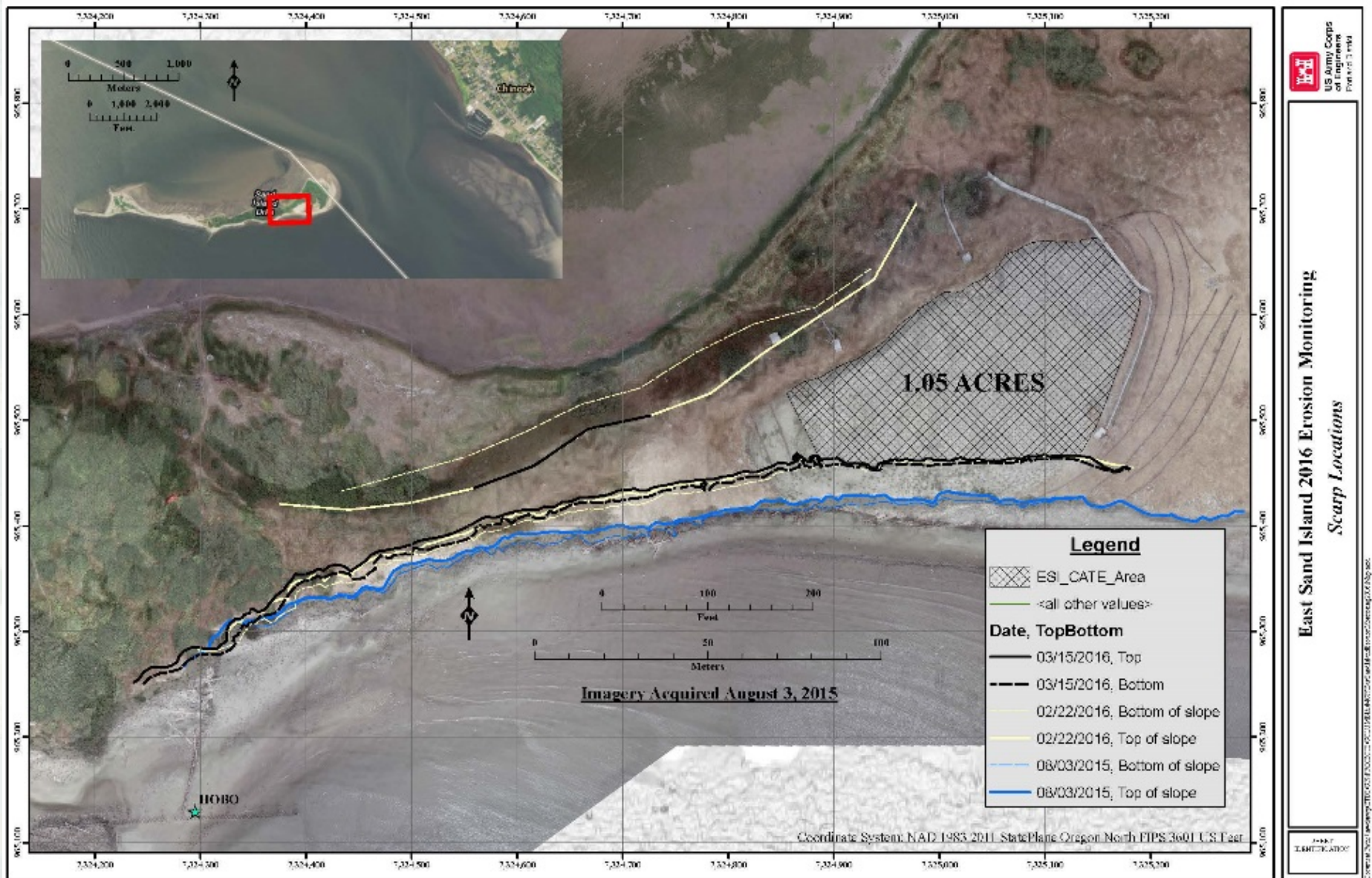
- FY17
 - ▶ Joint proposal with NAO on Crab Response to Dredged Material Placement (Dungeness v Blue)
 - ▶ CLW RSMP
- Future Projects
 - ▶ West Sand Island Erosion Repair
 - ▶ East Sand Island Erosion Repair
 - ▶ Woodland Islands (CAP 204)
 - ▶ Beverly Beach Placement (Oregon Dept of Transportation Partner)
 - ▶ North Head Site



East/West Sand Island Erosion



East Sand Island



West Sand Island Erosion

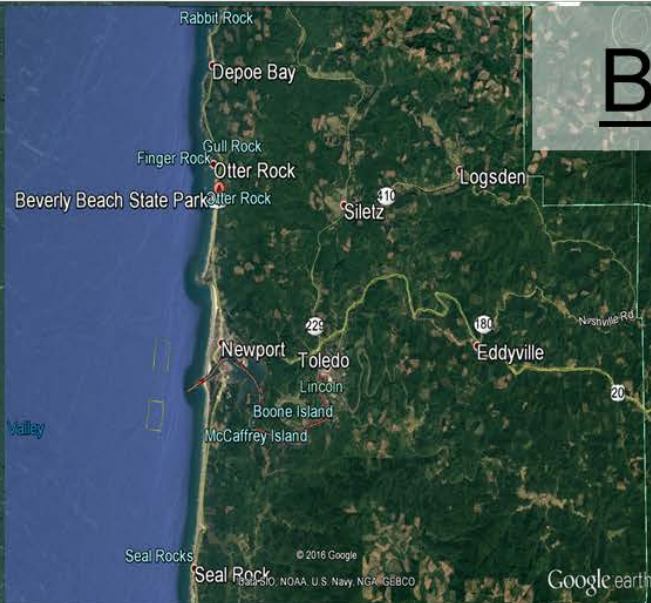


West Sand Island



Lost Shore Connections

Beverly Beach

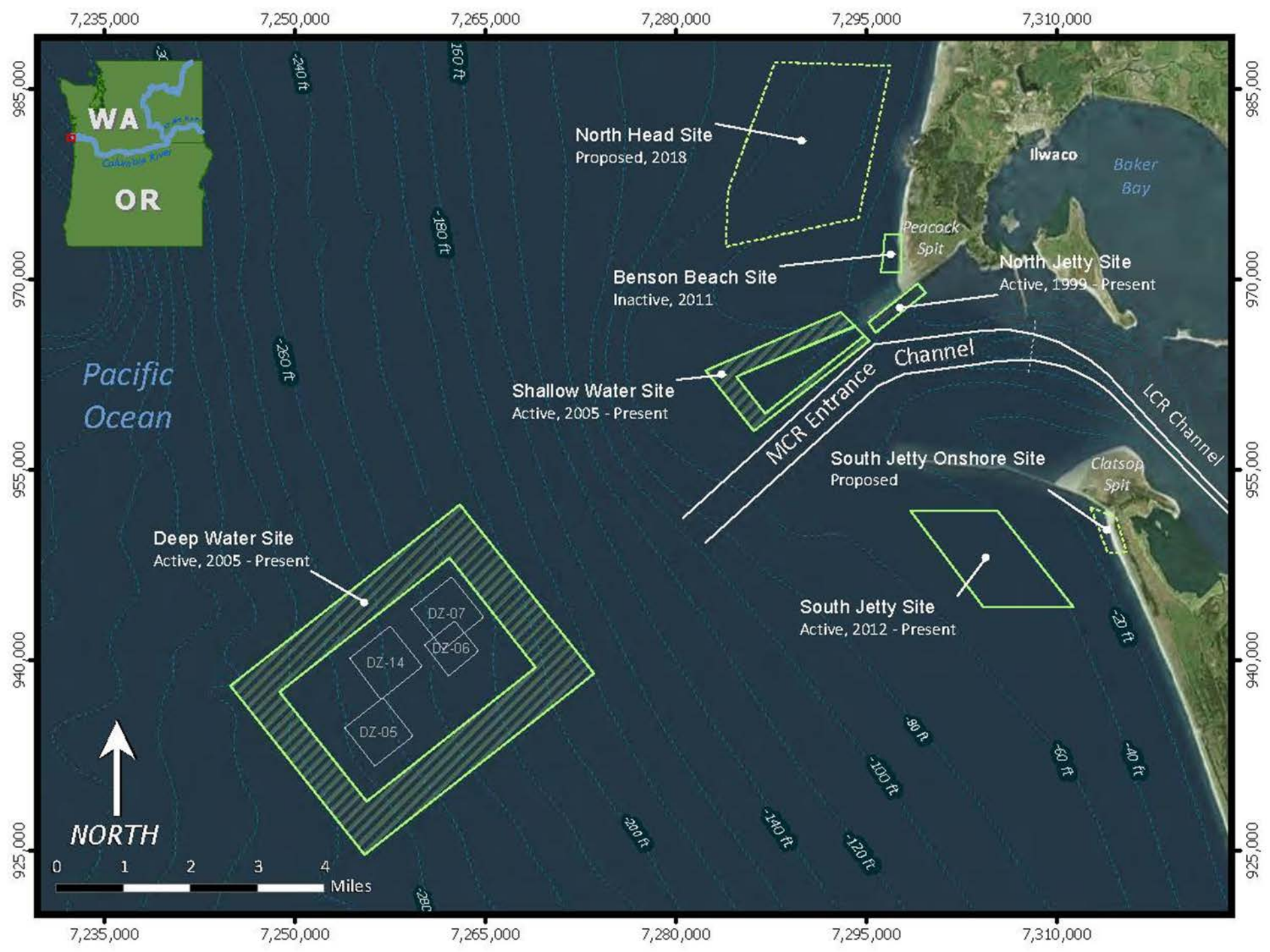


MCR Nearshore Network

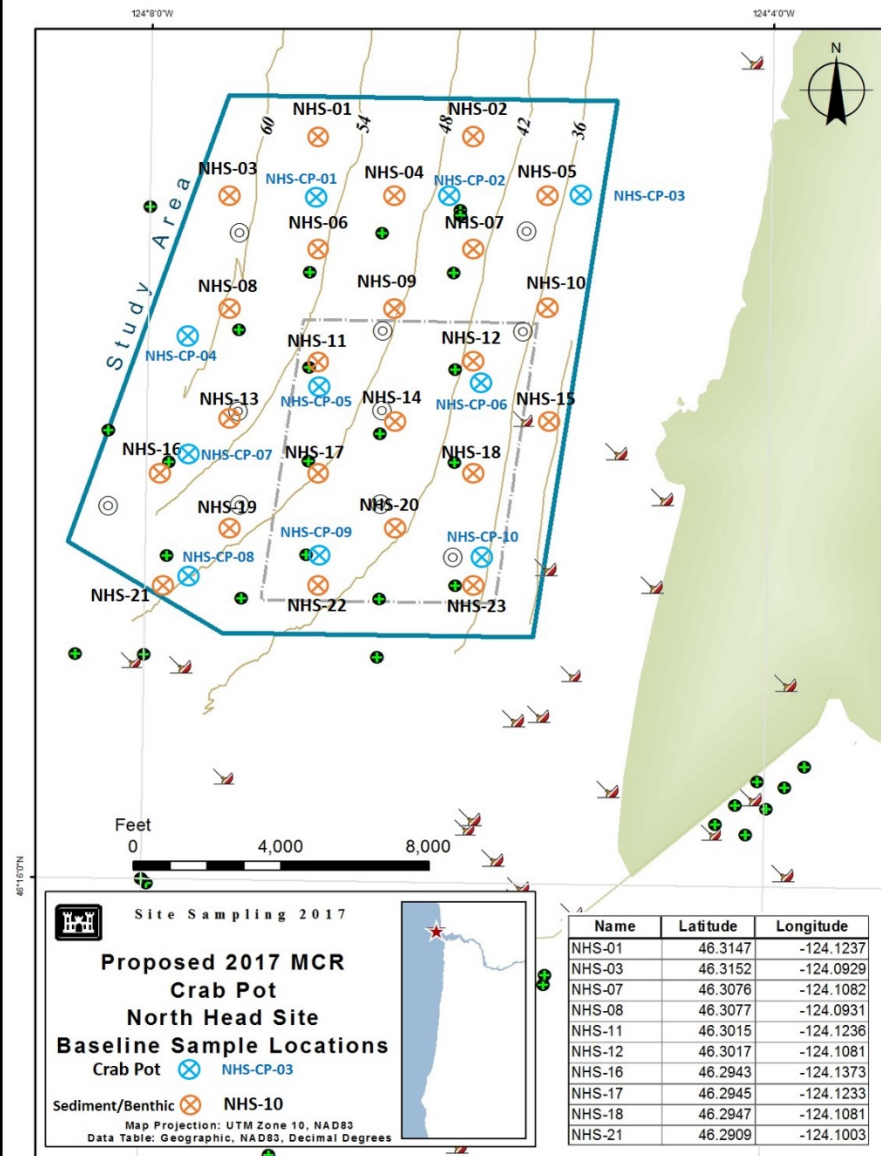
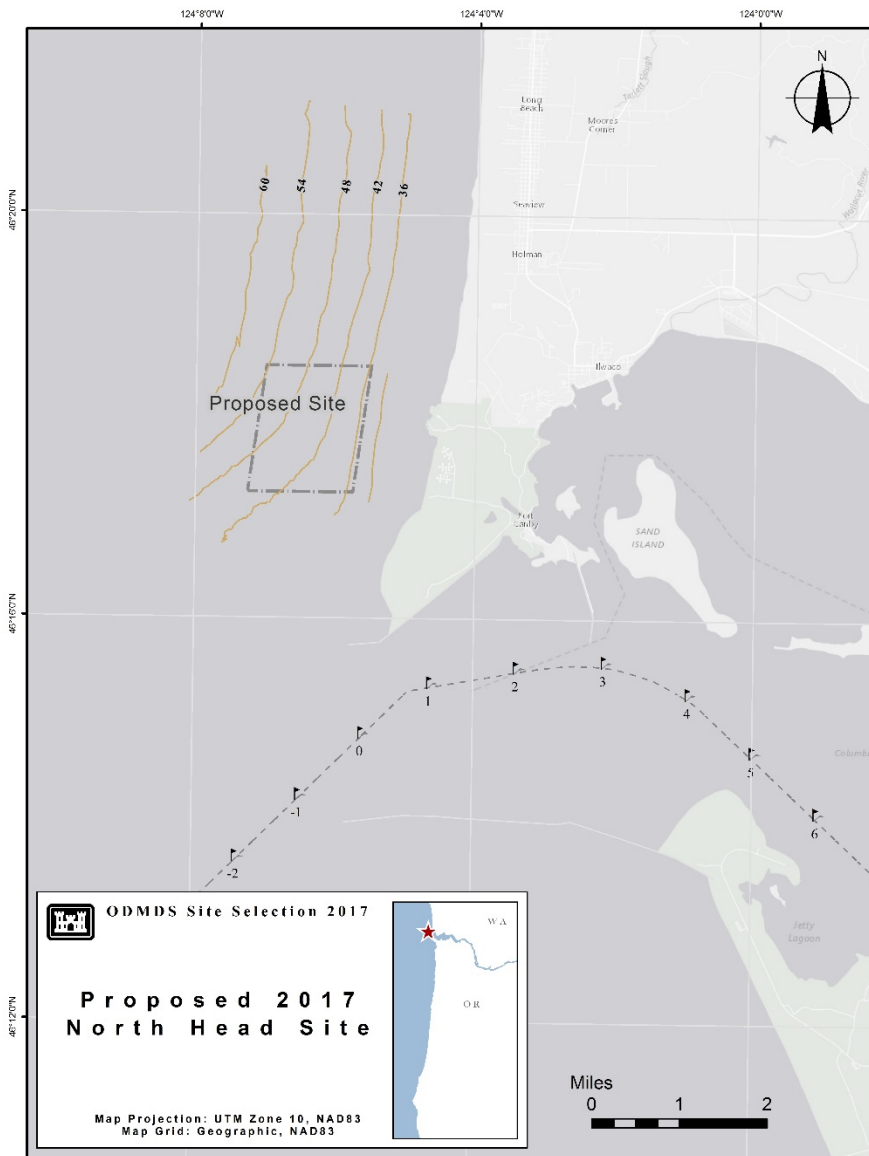
Nearshore Sediment Placement

- Placement of sediment within the depth of closure
- Thin layer placement
- Coordination between dredges for nearshore use
- Multiple nearshore options
- Allow natural nearshore process to distribute material within the littoral cell
- Minimize impacts to benthic communities and critical resources
- Lower cost than taking material off-shore
 - ▶ Roughly \$10k/day in savings
- Protect a public investments





MCR North Head Site



ADCP Data Collection

Data collection includes:

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



Questions?

