

Southwest Washington Littoral Drift Restoration Project: Design, Construction, and Monitoring

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USACE Portland District

October 28, 2010

WEDA Pacific Meeting
Monterey, CA

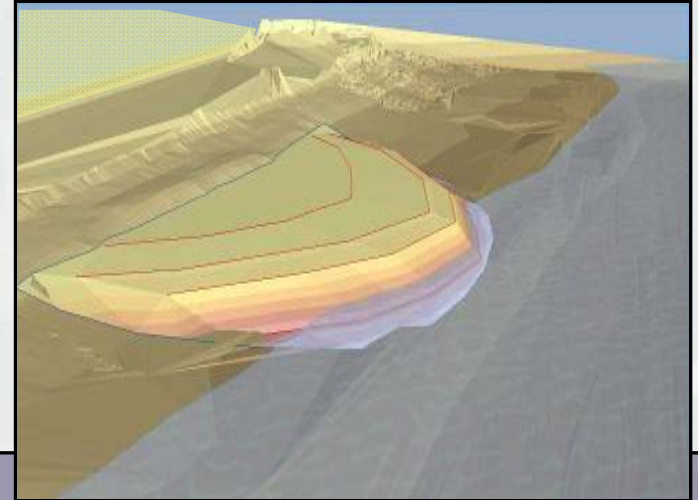


US Army Corps of Engineers
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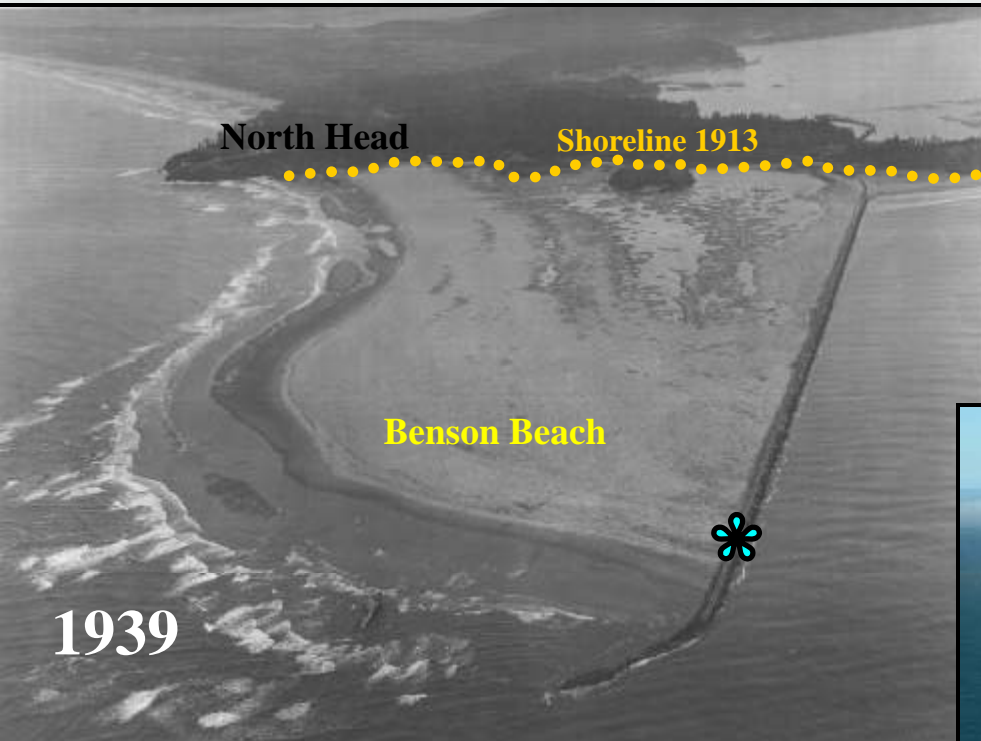


Outline

- Historical Background
- Project Purpose
- Design
- Construction
- Monitoring
- Future



Historical Background



Now, there is no longer
enough sediment supply to
overcome natural erosion

Construction of the MCR
jetties produced dramatic
sand accretion along the
Benson Beach shoreline

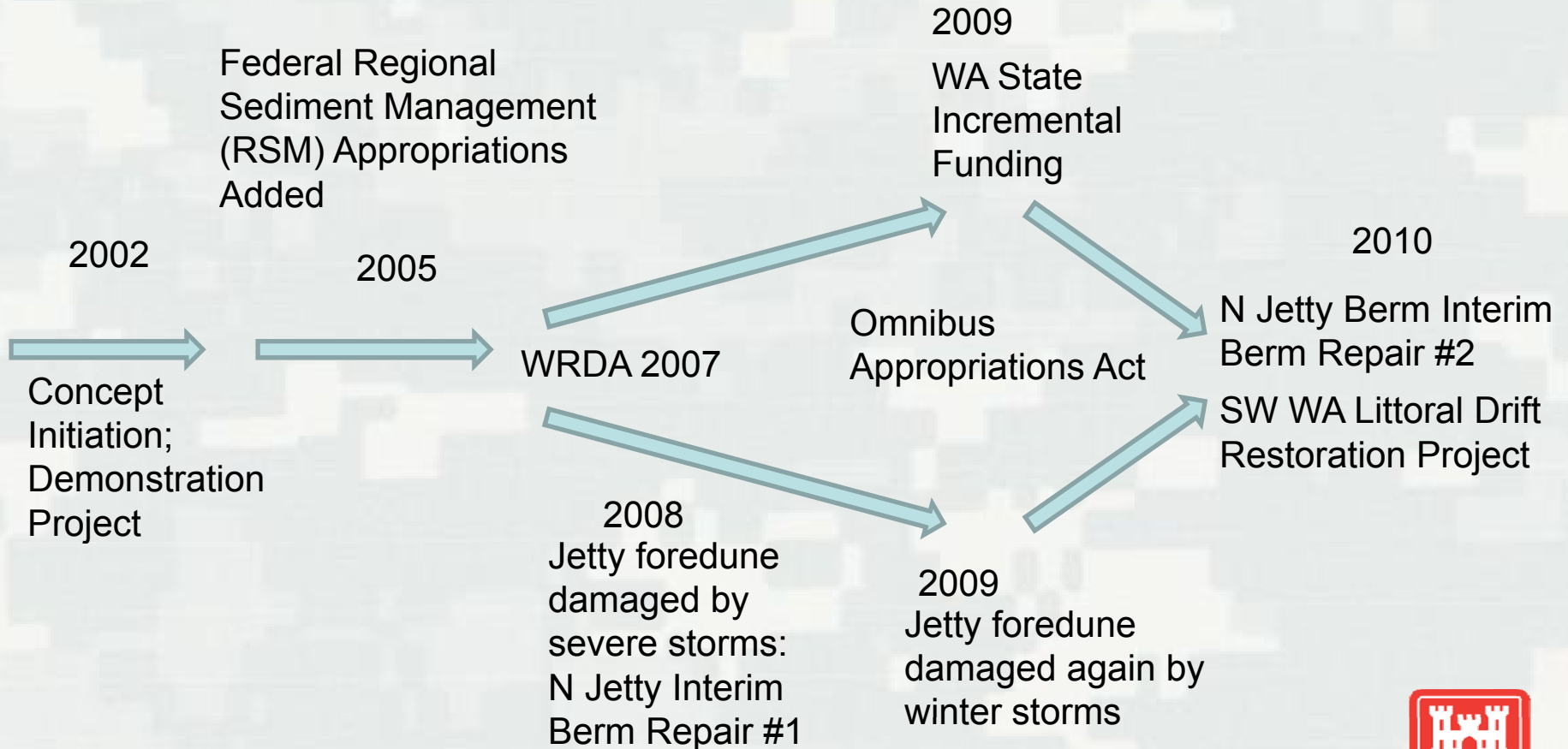


Project Purpose

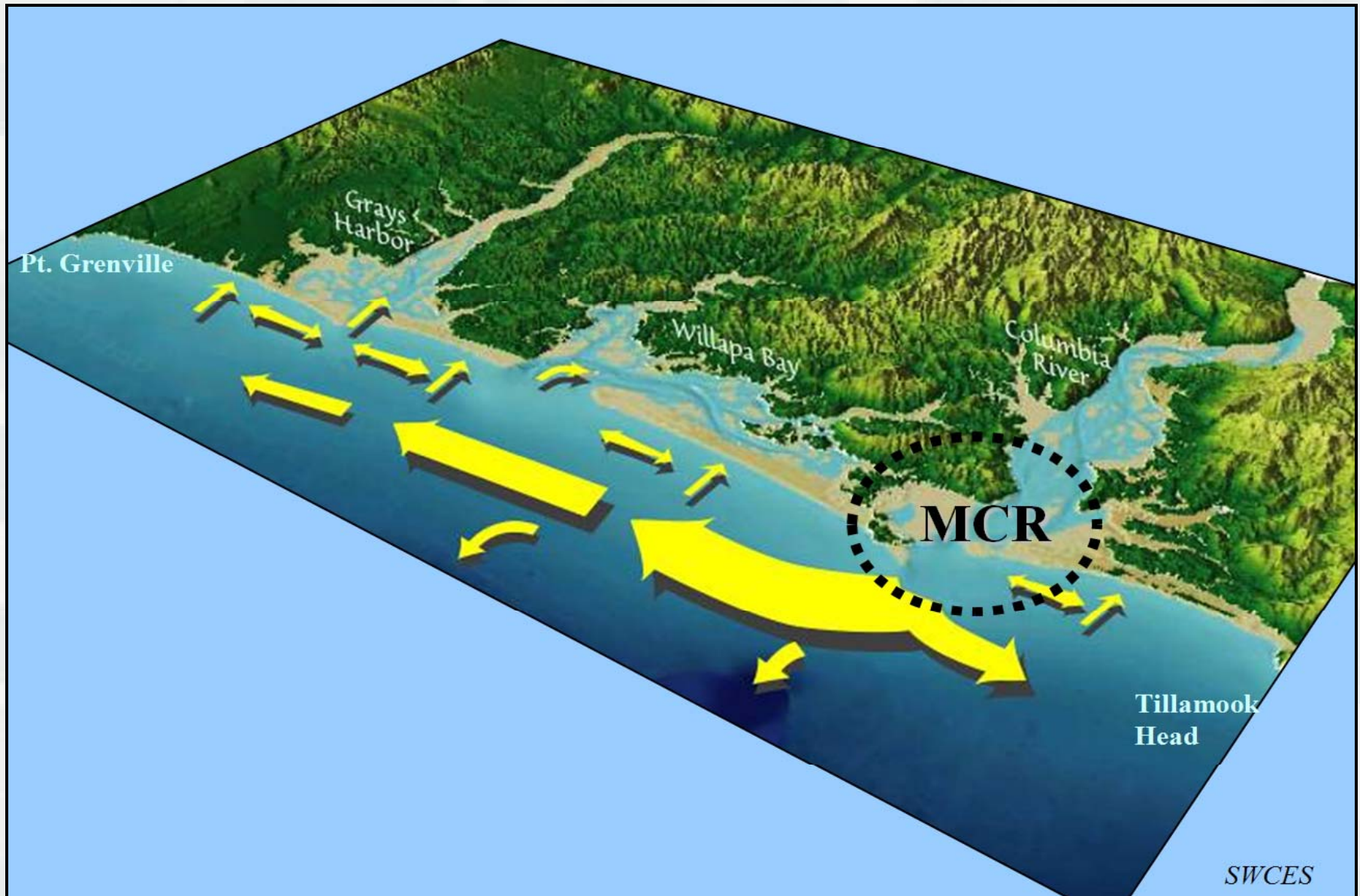
- Pump material directly into the intertidal zone
- Monitor how effectively the placed material remains within the overall littoral sediment budget
- Compare the effectiveness and efficiency of this method with conventional nearshore open water placement
- Ultimate objective:
Determine the best placement method to support the littoral zone sediment budget at the Mouth of the Columbia River (MCR)

A decade in the making

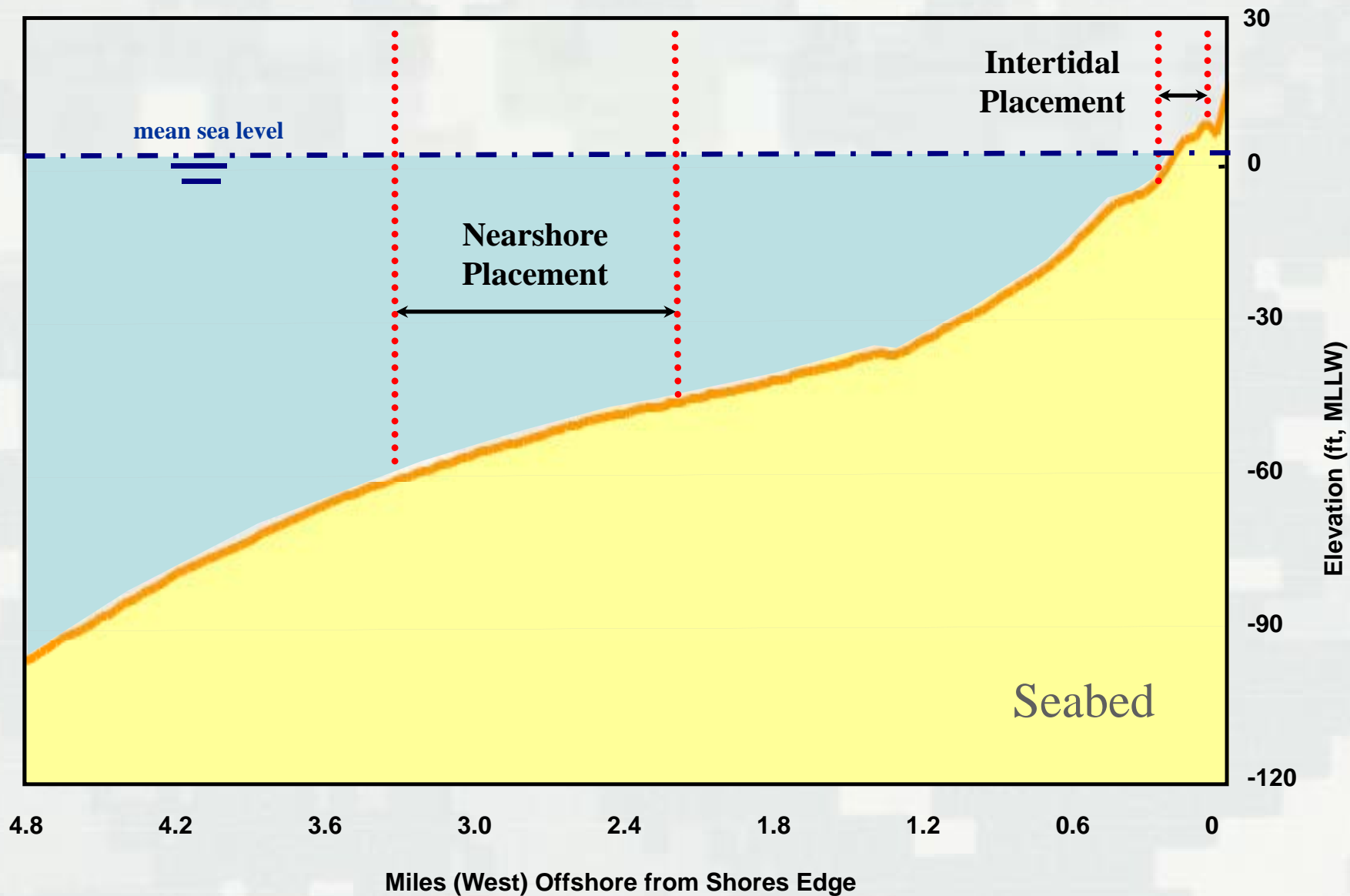
Timeline of Events

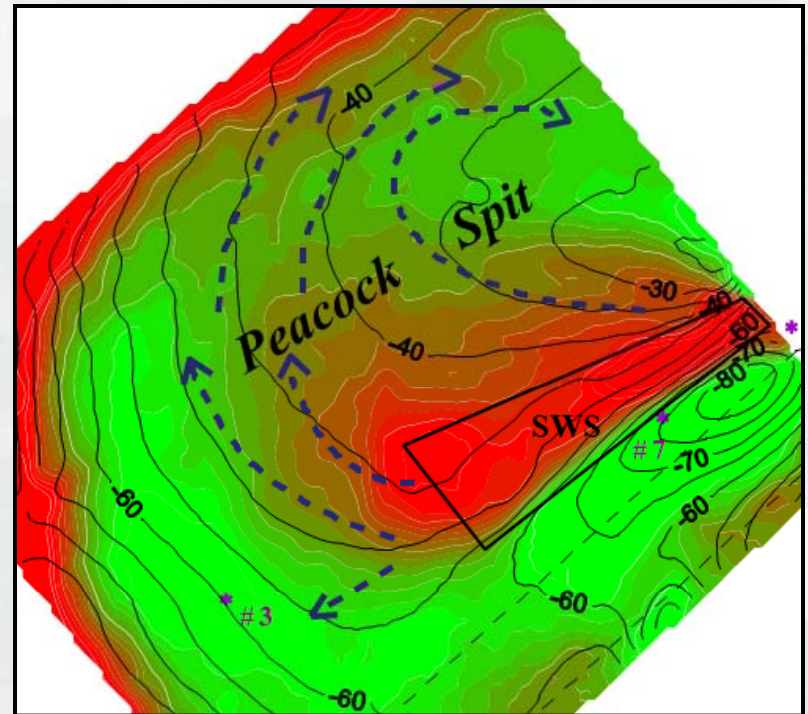
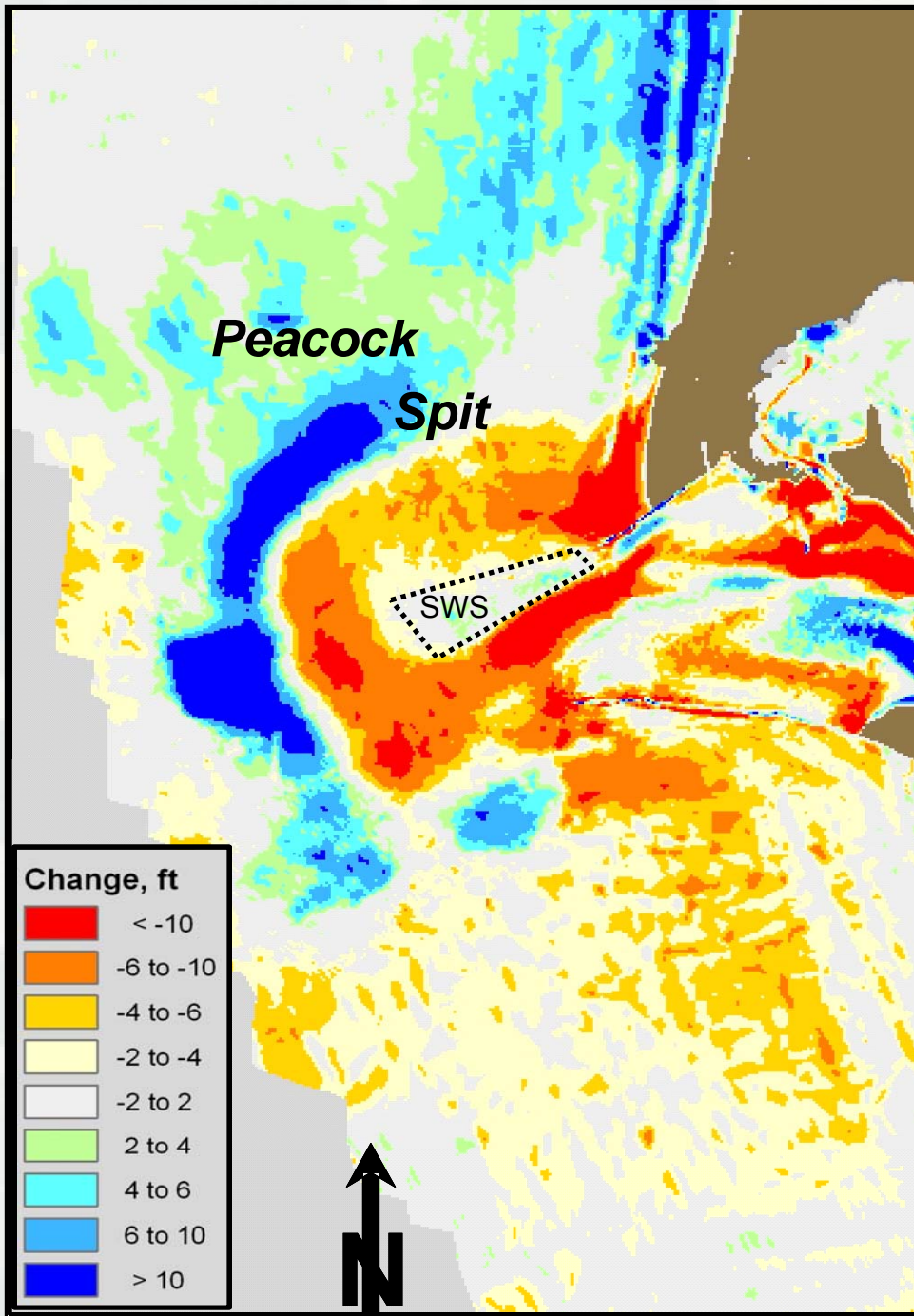


Present Concept for Sediment Budget



Cross-Shore Profile – Nearshore vs. Intertidal Placement





View to the
Northwest

Peacock

NORTH HEAD

Spit

Littoral Drift Project
Placement Area

SWS ODMDS

NJ Site

NORTH JETTY

MCR Channel

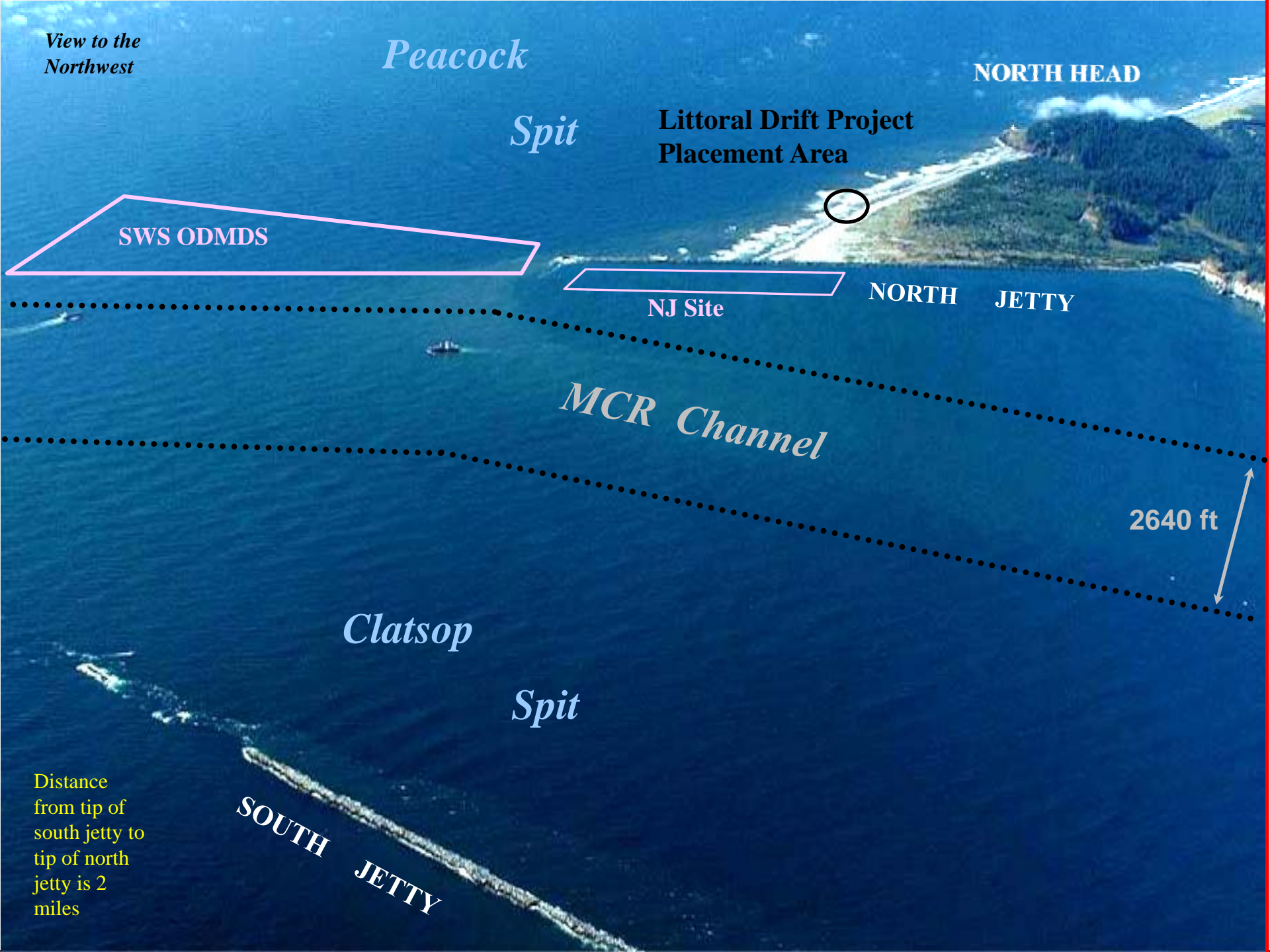
2640 ft

Clatsop

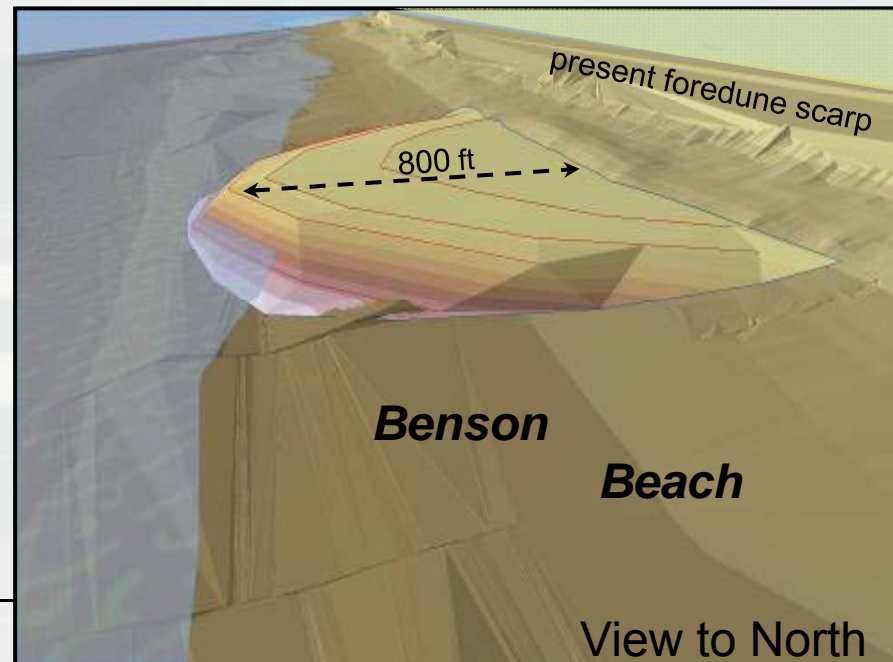
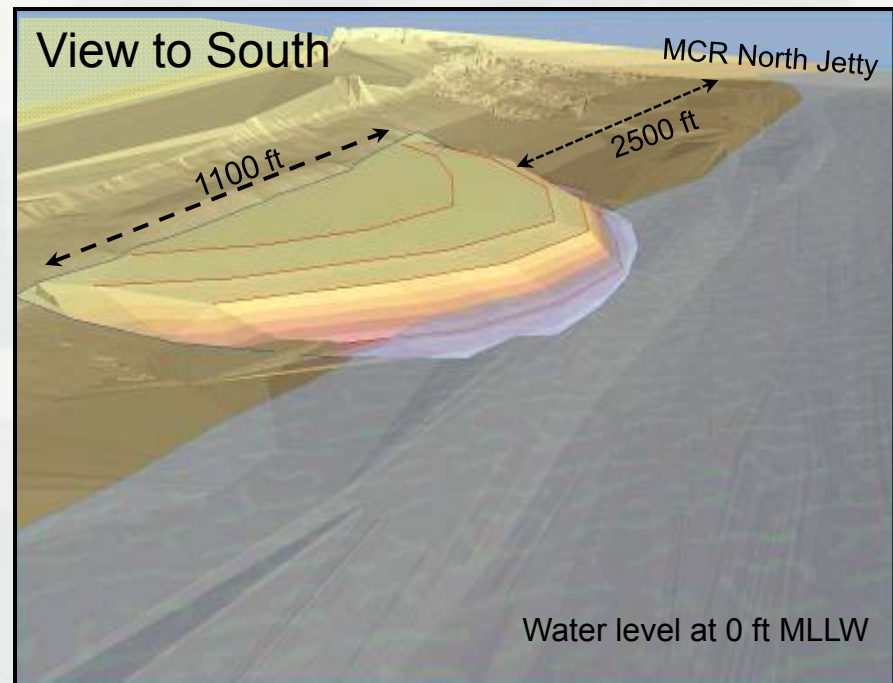
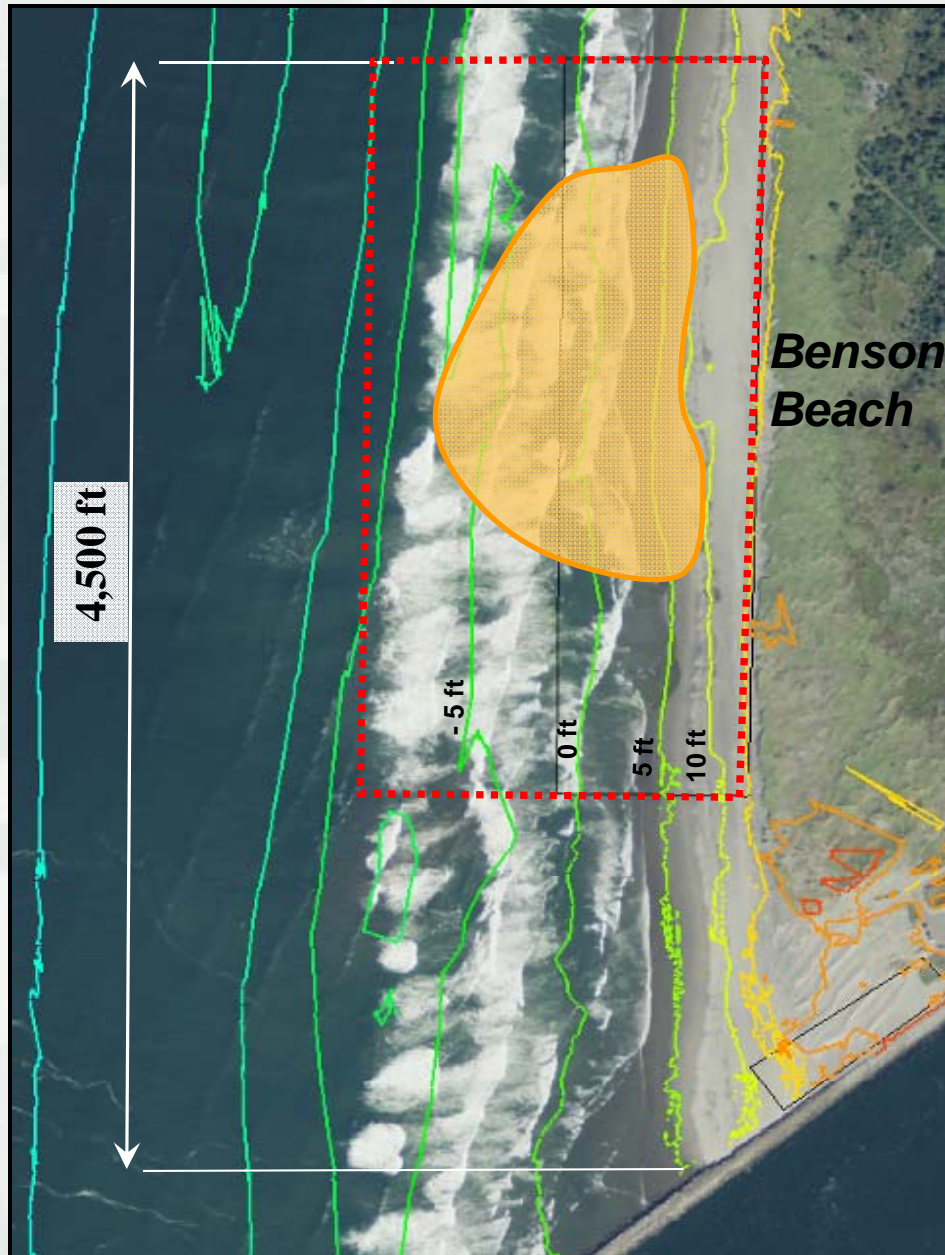
Spit

SOUTH JETTY

Distance
from tip of
south jetty to
tip of north
jetty is 2
miles



Project Design



Construction – Dodge Island hopper dredge pumping material over the North Jetty

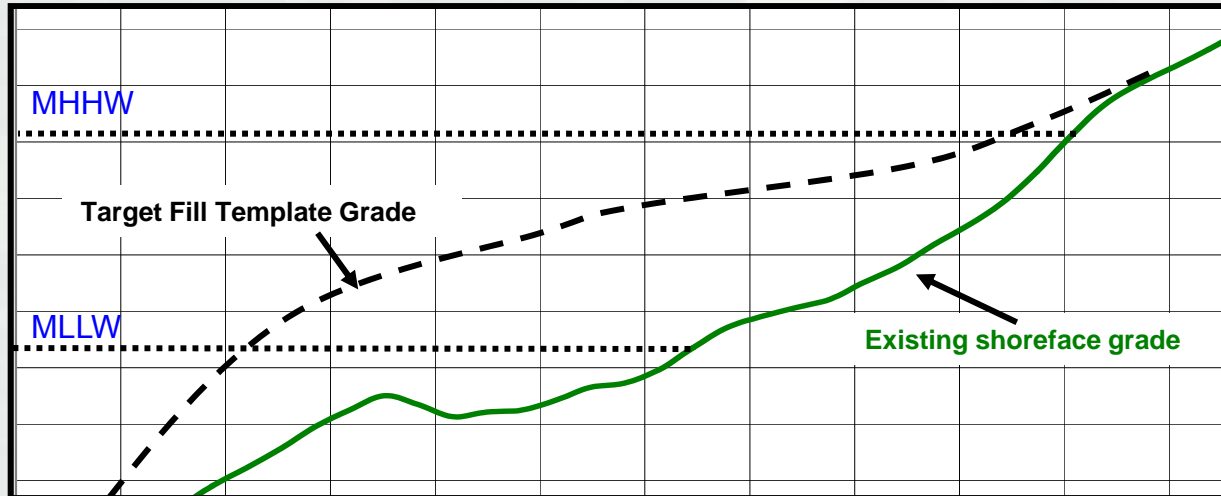


Construction – Placement of material in surf zone

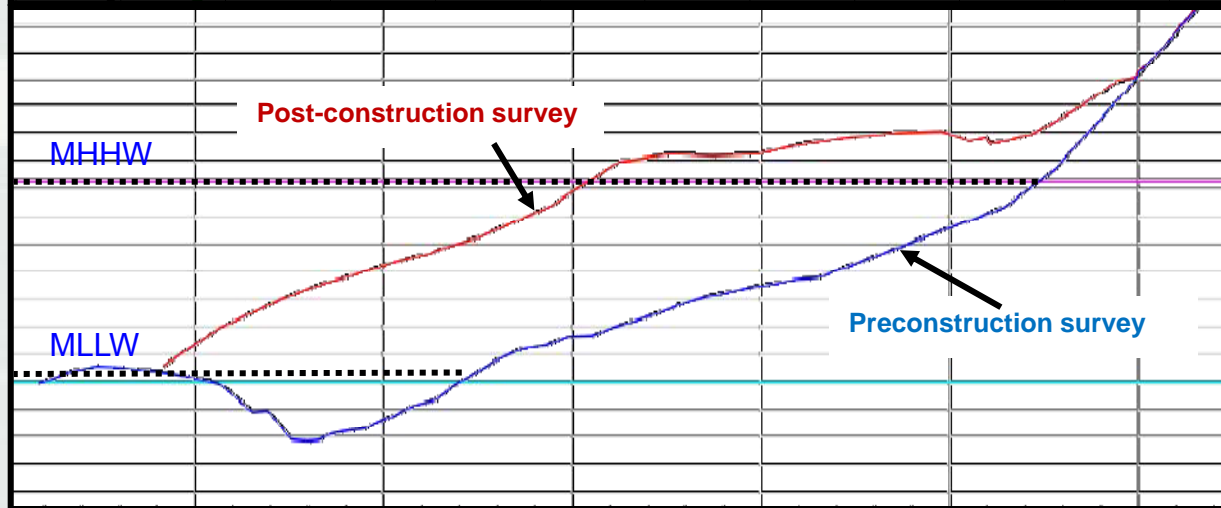


Construction Results

- Design Cross Section

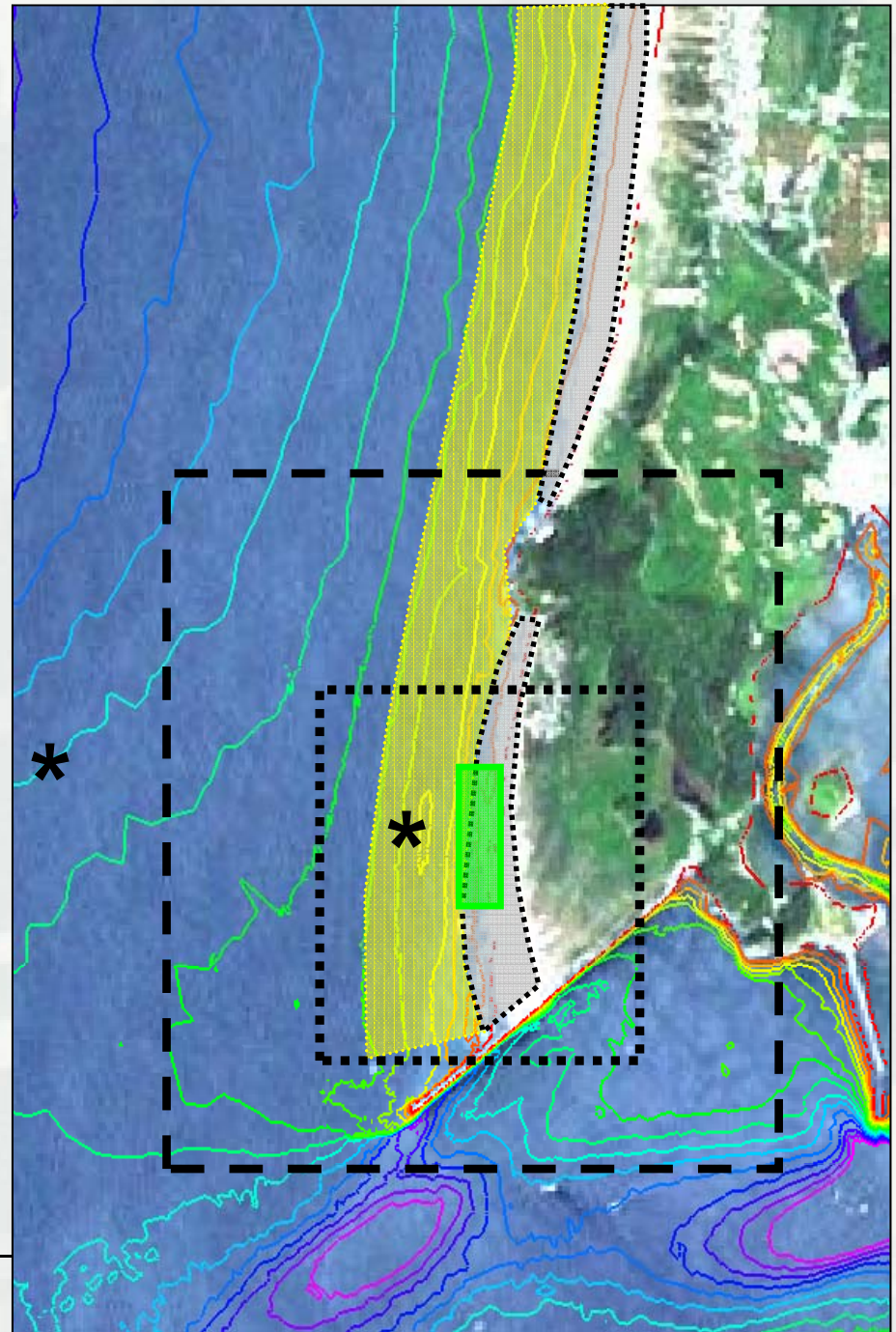


- As-Built Cross Section



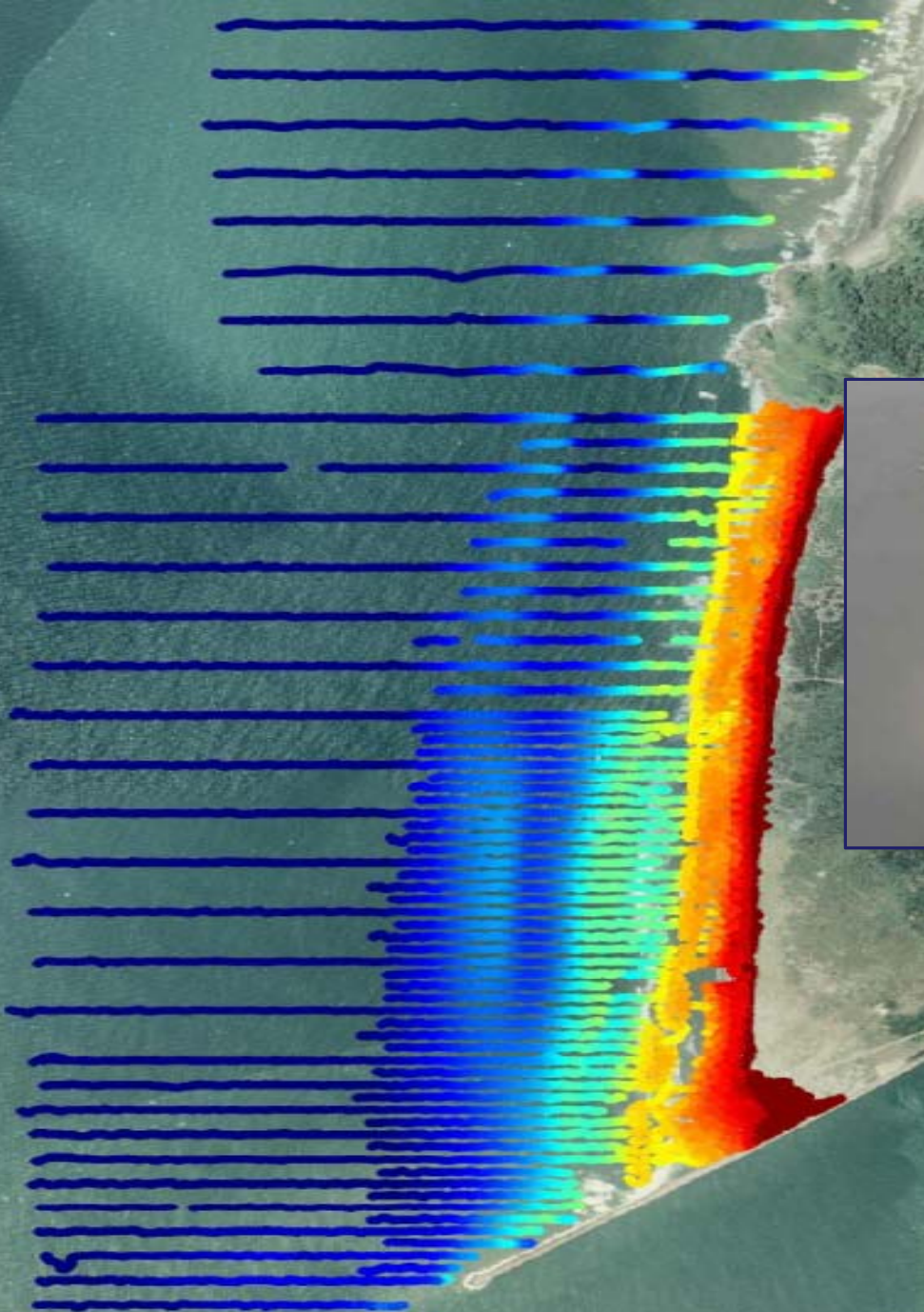
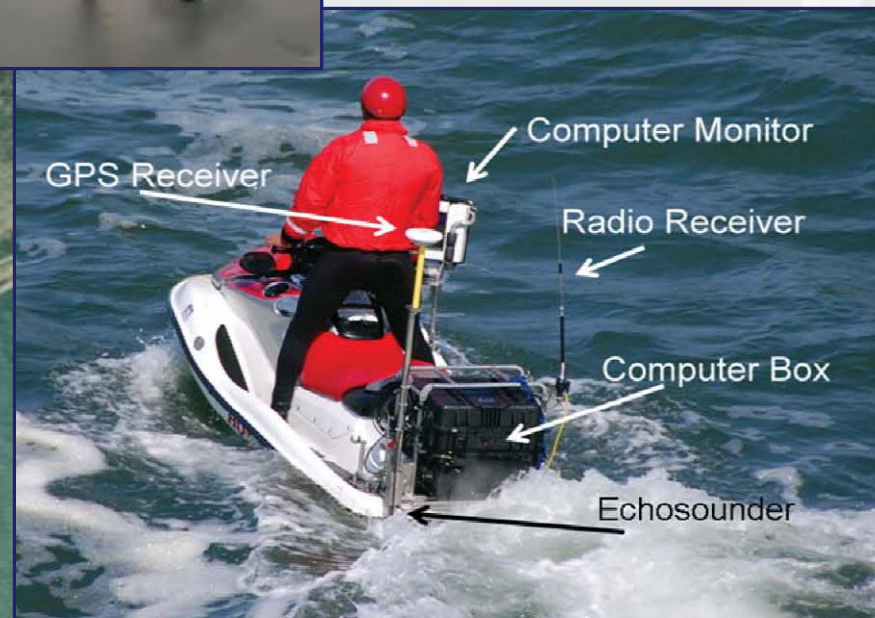
Monitoring

- Topo/Bathy Surveys
- ARGUS beach monitoring system
- Wave/Current/Suspended Sediment Pods
- Sand Tracer Study
- SWAN & Delft-3D Models
- Aerial Photography
- CLARIS survey

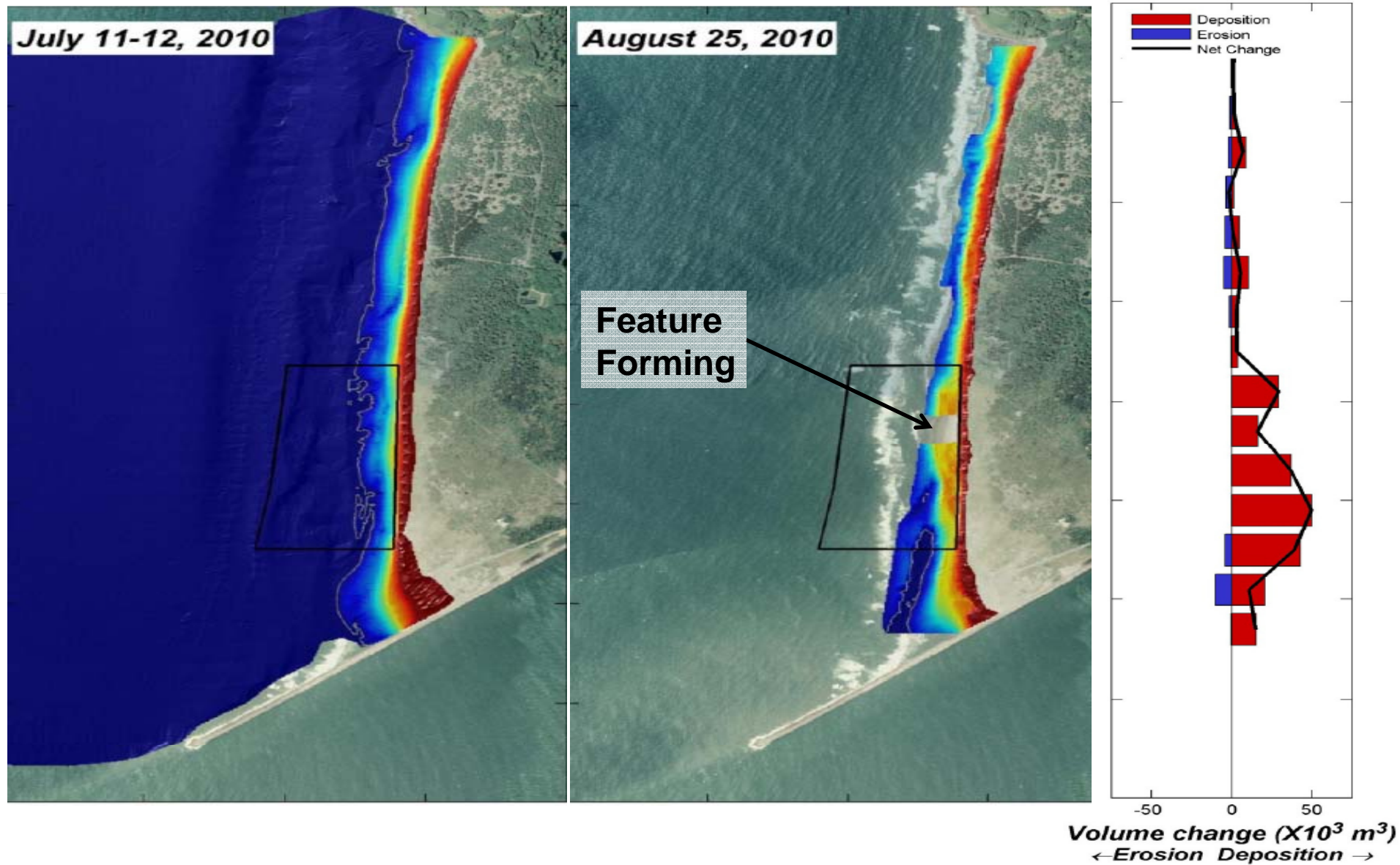


Monitoring – Topo/Bathy Surveys

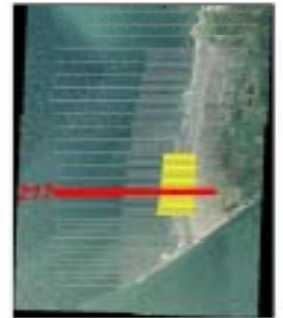
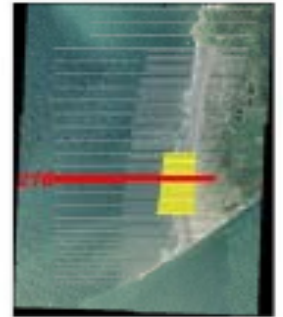
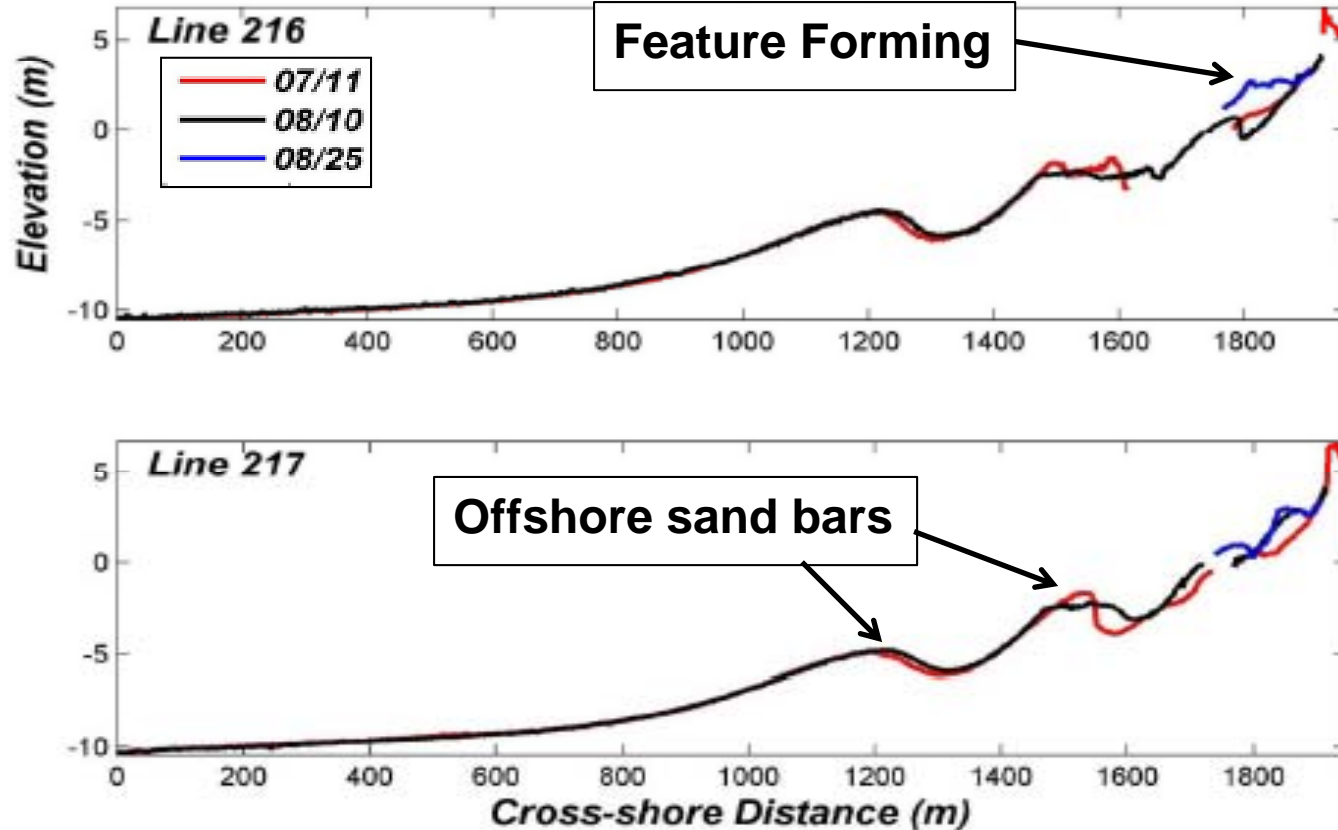
- WDOE, OSU, USGS
- June 2010 –
December 2011



Survey Results



Monitoring Morphological Changes



ARGUS Beach Monitoring System



- NW Research Associates
- June 2010 – December 2011

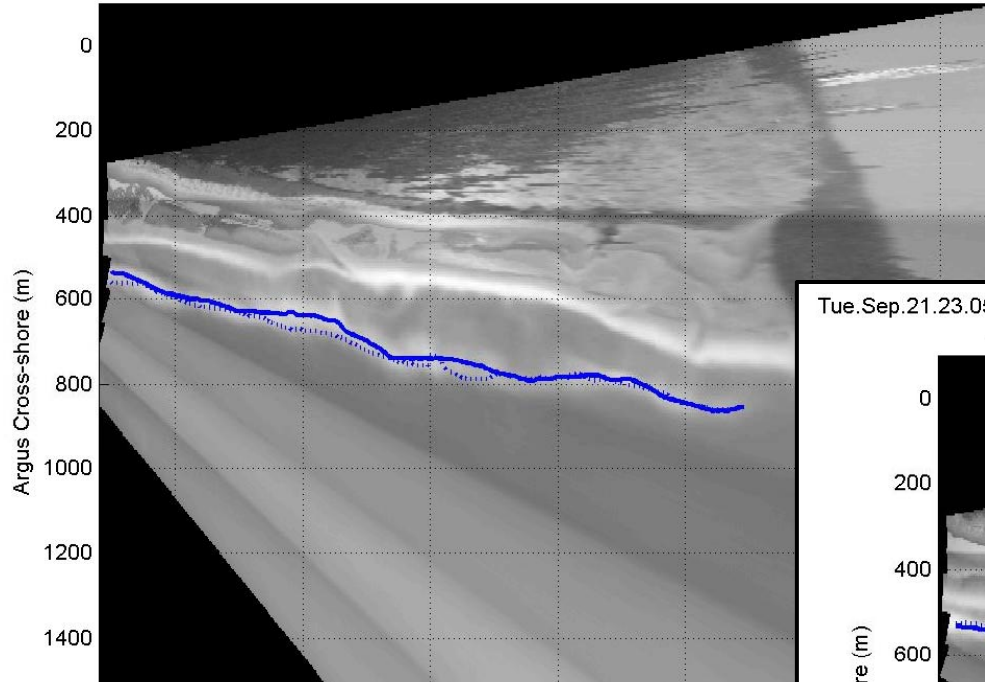


Monitoring Foreshore Dynamics

Sun.Aug.08.15.05.00.GMT.2010

Argus Along-shore (m)

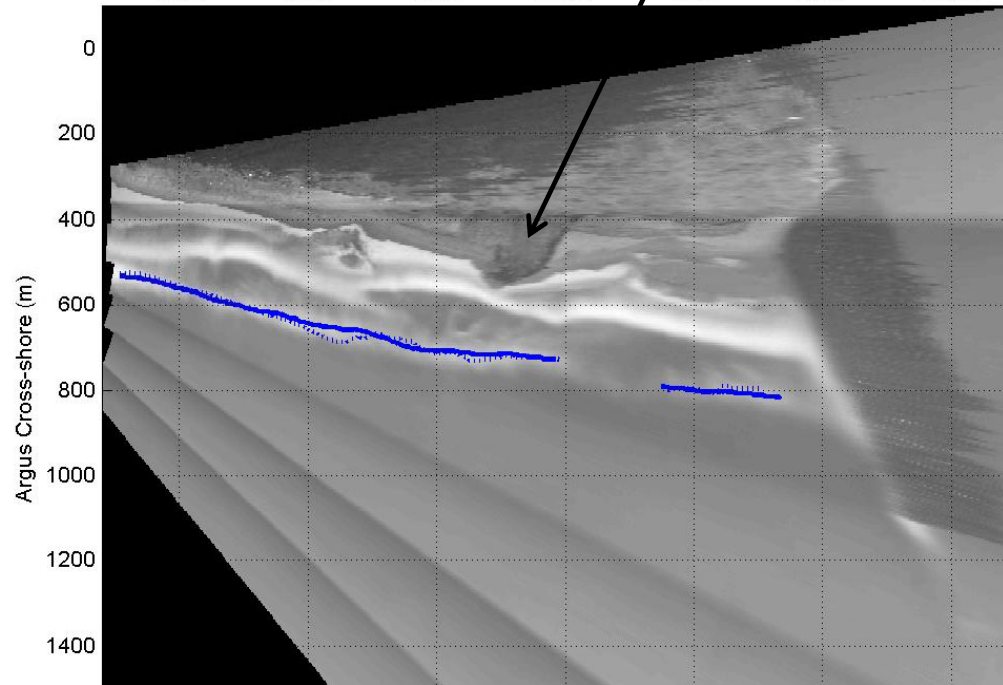
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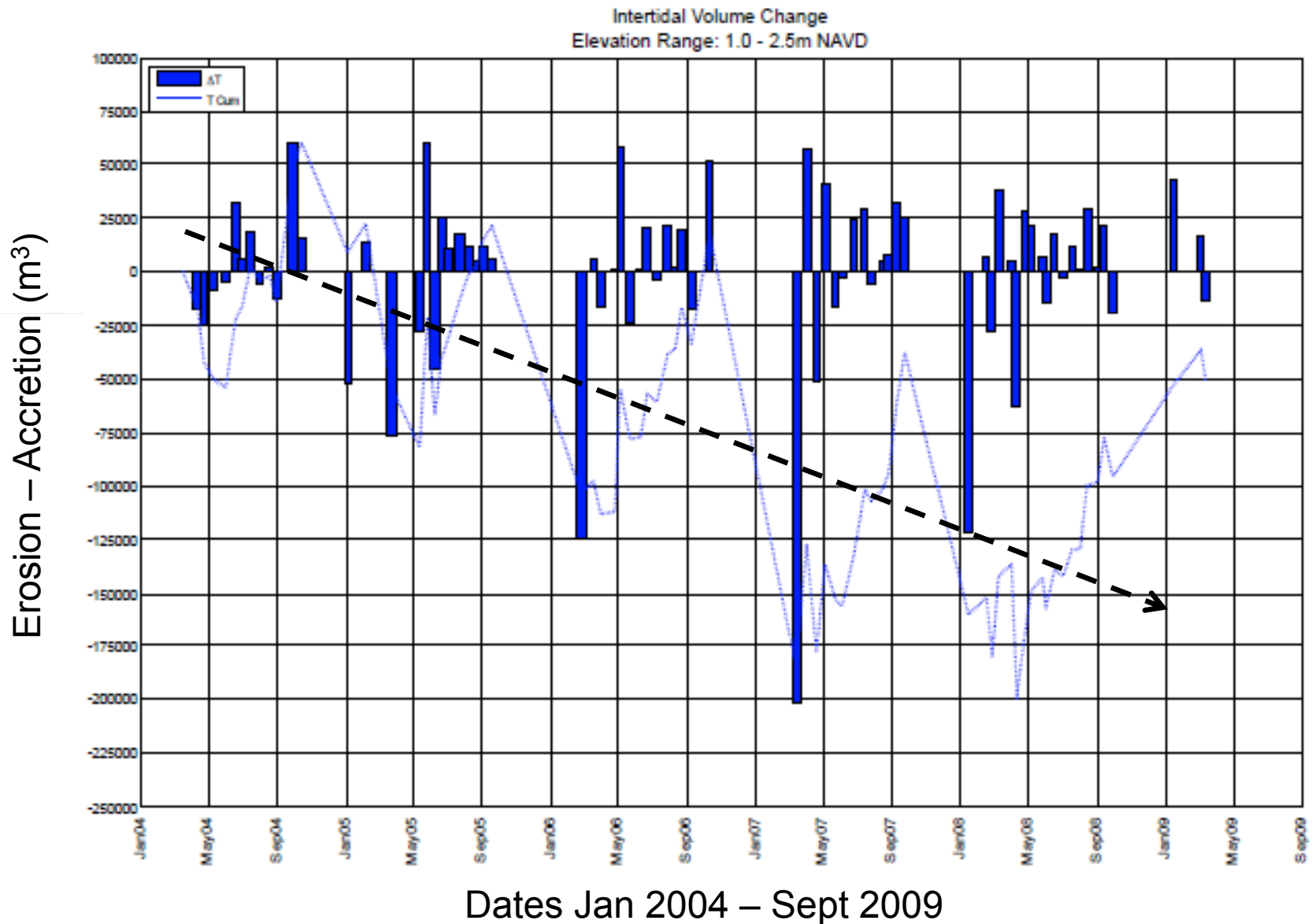
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Argus Along-shore (m)

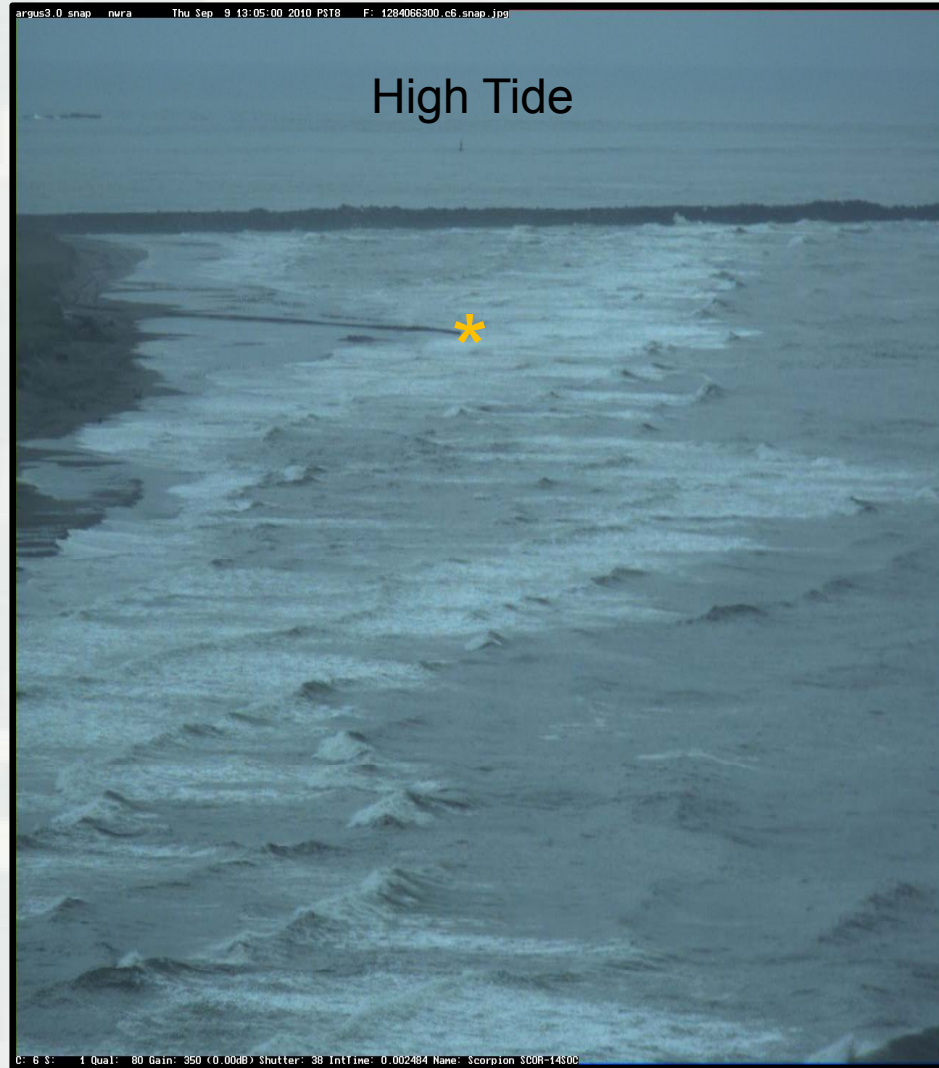
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Intertidal Volume Change



ARGUS Cameras Results



Mid-construction September 9, 2010

Monitoring – Wave, Current, and Suspended Sediment Pods

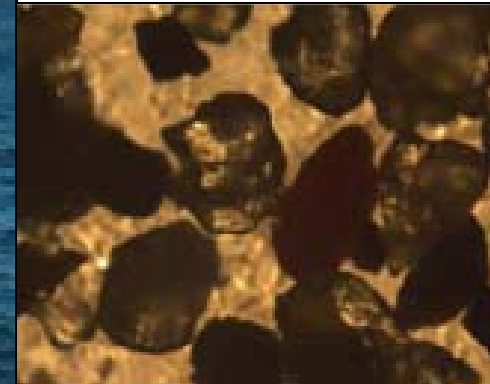
- WDOE, Golder Associates
- June 2010 – December 2010



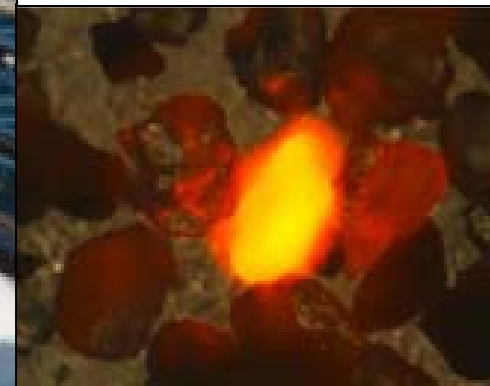
Monitoring – Sediment Tracer



Tracer particle in native sand
with white light...



...now with
Fluorescence illumination



- Science Applications International Corporation (SAIC), Evans-Hamilton, Inc. (EHI)
- June 2010 – Spring 2012

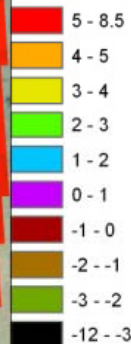


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2010 Tracer Release Sites

Bathy Survey Sept. 22, 2010

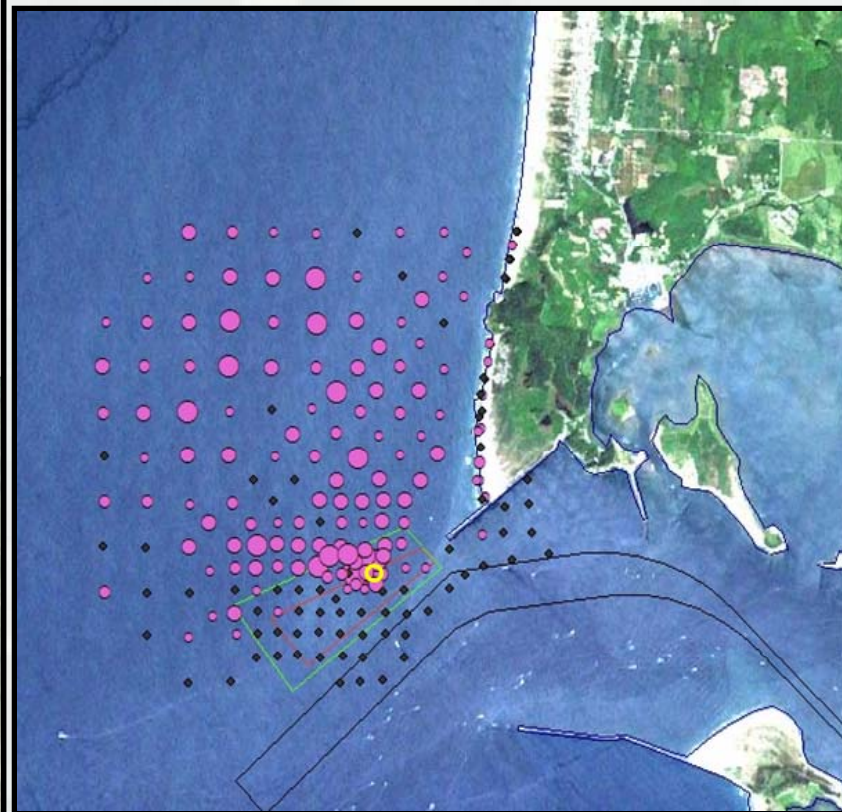
meters



Tracer Deployment Sites



0 80 160 320 480 640 Meters

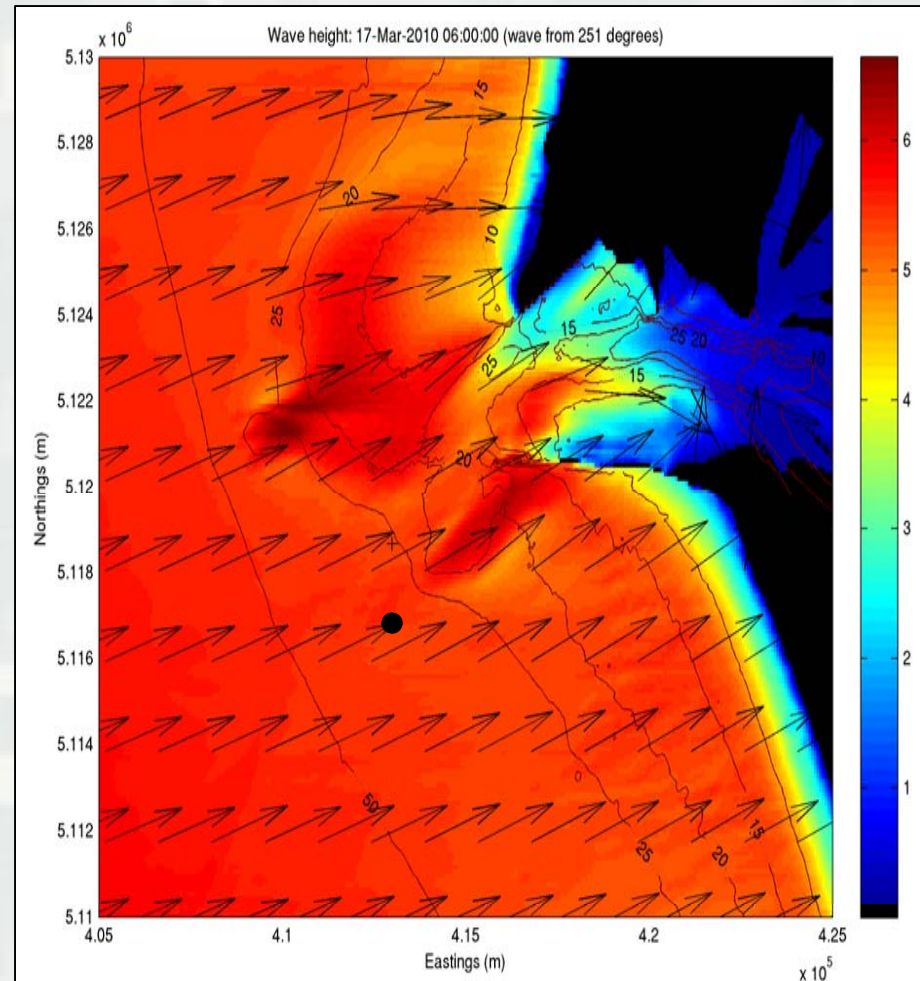
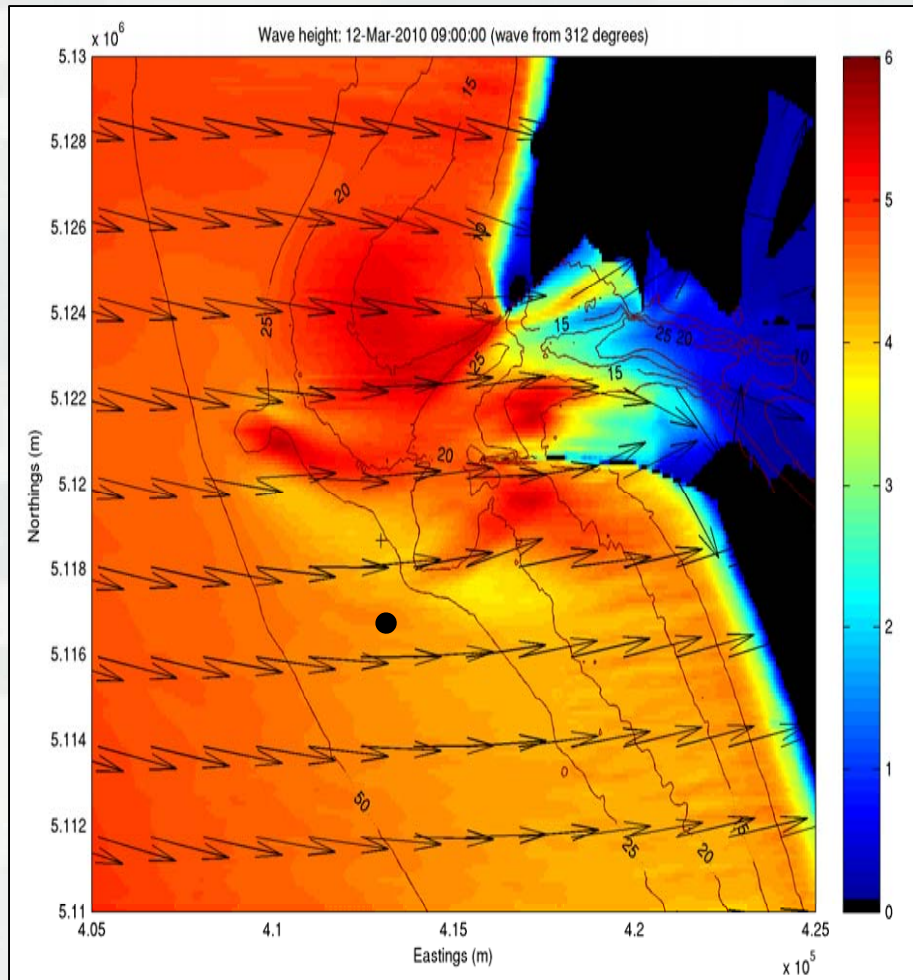


Sediment Tracer Study Results
Nearshore placement site – 2007

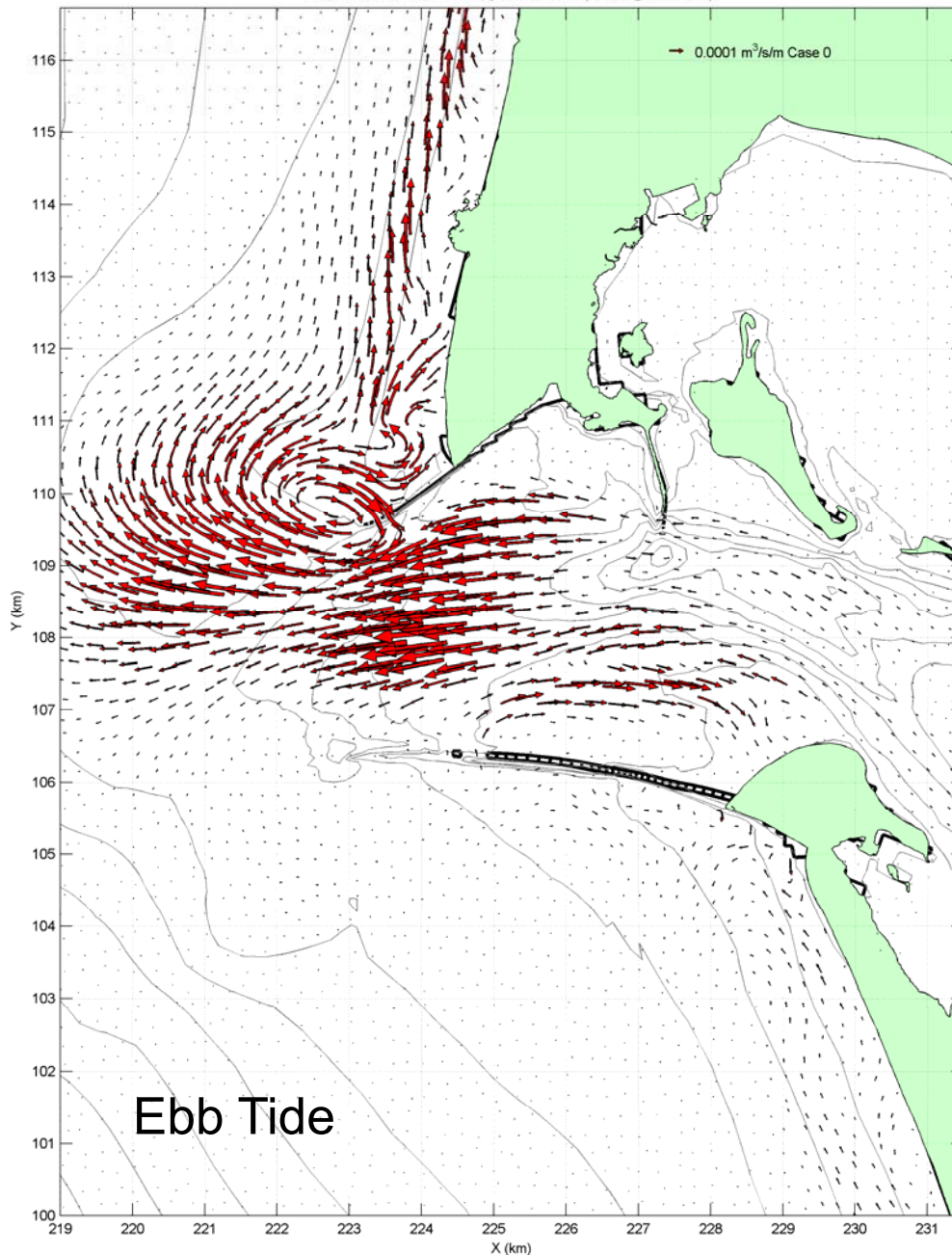
Monitoring – SWAN Model

Simulating WAVes Nearshore

-Wave height with bathymetry contours and directions-



Residual total-load transport, case 0 (existing situation)



Monitoring – Delft-3D Model

Hydrodynamic,
Sediment Transport,
& Morphological
Modeling

- USGS
- June 2010 to spring 2012



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2010-078

CE WP

30 JUNE

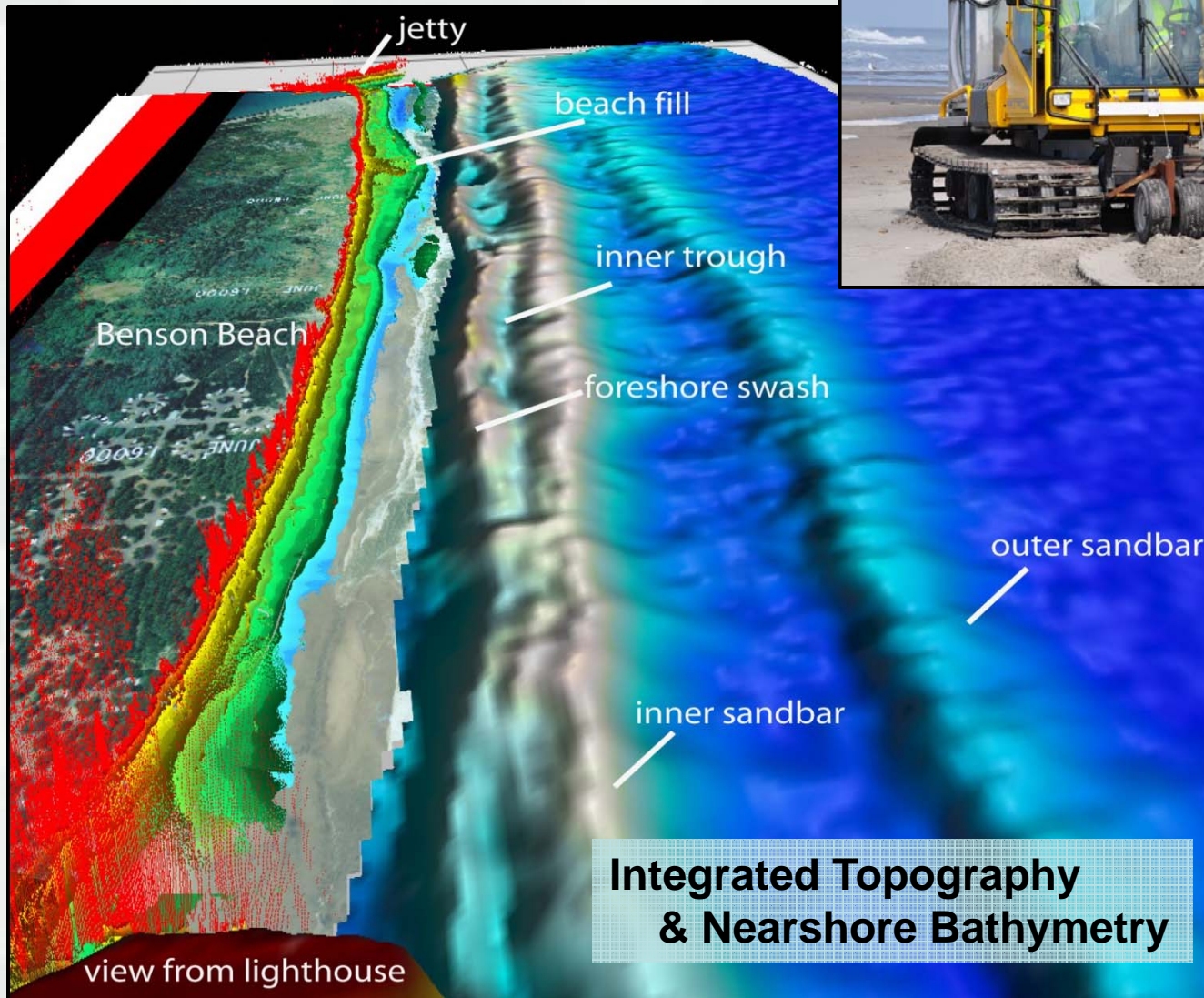
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Monitoring – Aerial Photos

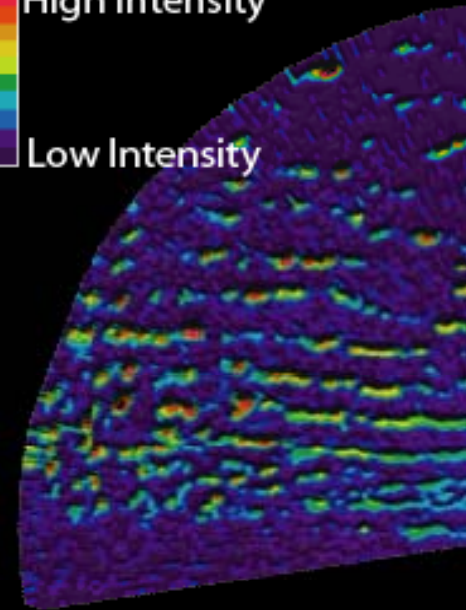
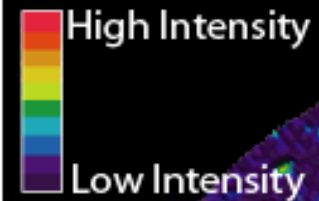
- June 2010 – November 2010

0800

USACE ERDC – CLARIS Survey



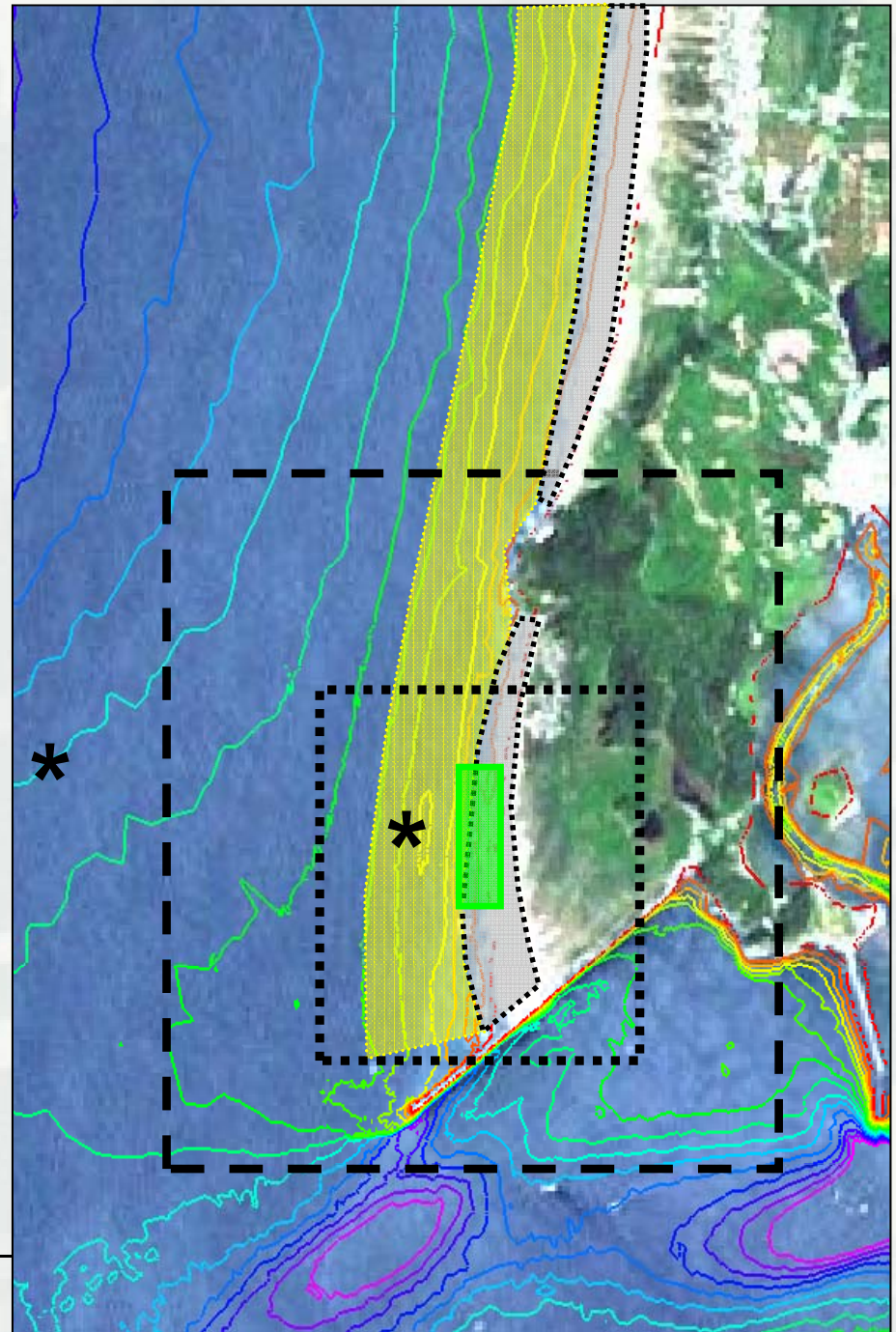
Coastal Lidar And Radar Imaging System



Radar Image

Monitoring

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- ARGUS beach monitoring system
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Future



Pre-construction
7/17/10



Construction complete
9/22/10



Post-construction
10/20/10

Feature is already dispersing...

Future

- Monitoring continues thru Spring 2012
- Analysis report will include findings and recommendations for future placement
 - ▶ Nearshore placement every year
 - ▶ Intertidal placement every year? every few years?
- Final Report: Summer 2012



Questions?

