

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

## RSM Bi-Monthly Call

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USACE Portland District

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Portland, OR



US Army Corps of Engineers  
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# Mouth of the Columbia River– Gateway to the Columba-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

# Mouth of the Columbia River RSM 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





Pacific  
Ocean

Ilwaco

WA

Baker Bay

Peacock  
Spit

NJS

SWS

Entrance

Channel

LCR

Columbia  
River Estuary

Clatsop  
Spit OR

DWS

MCR-07  
drop zone

MCR-14  
drop zone

CR-05  
drop zone

MCR-06  
drop zone

SJS

Depth, m

82.0  
74.0  
66.0  
58.0  
50.0  
42.0  
34.0  
26.0  
18.0  
10.0  
2.0



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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

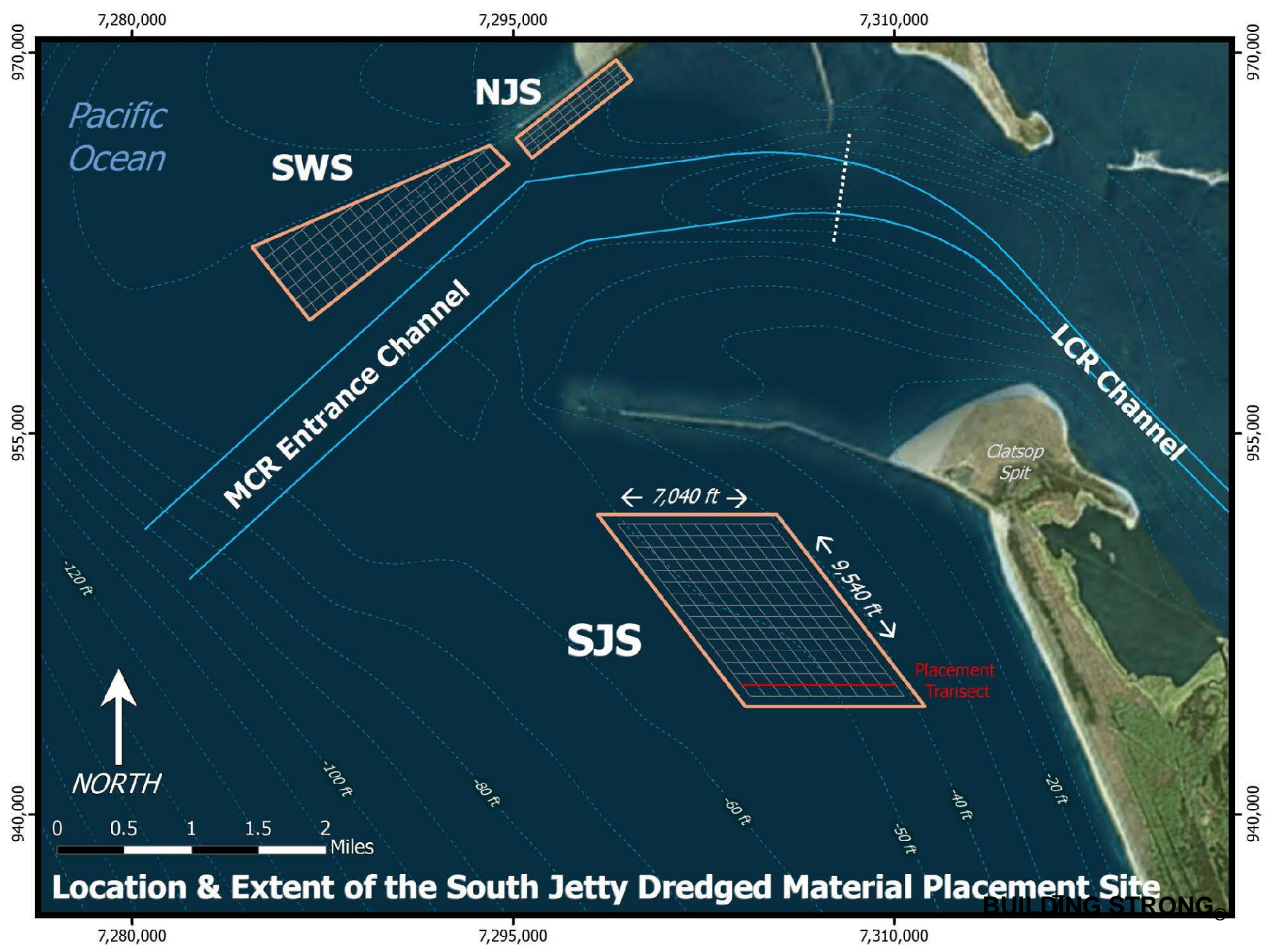
## Models, Tools, Databases, etc

- 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

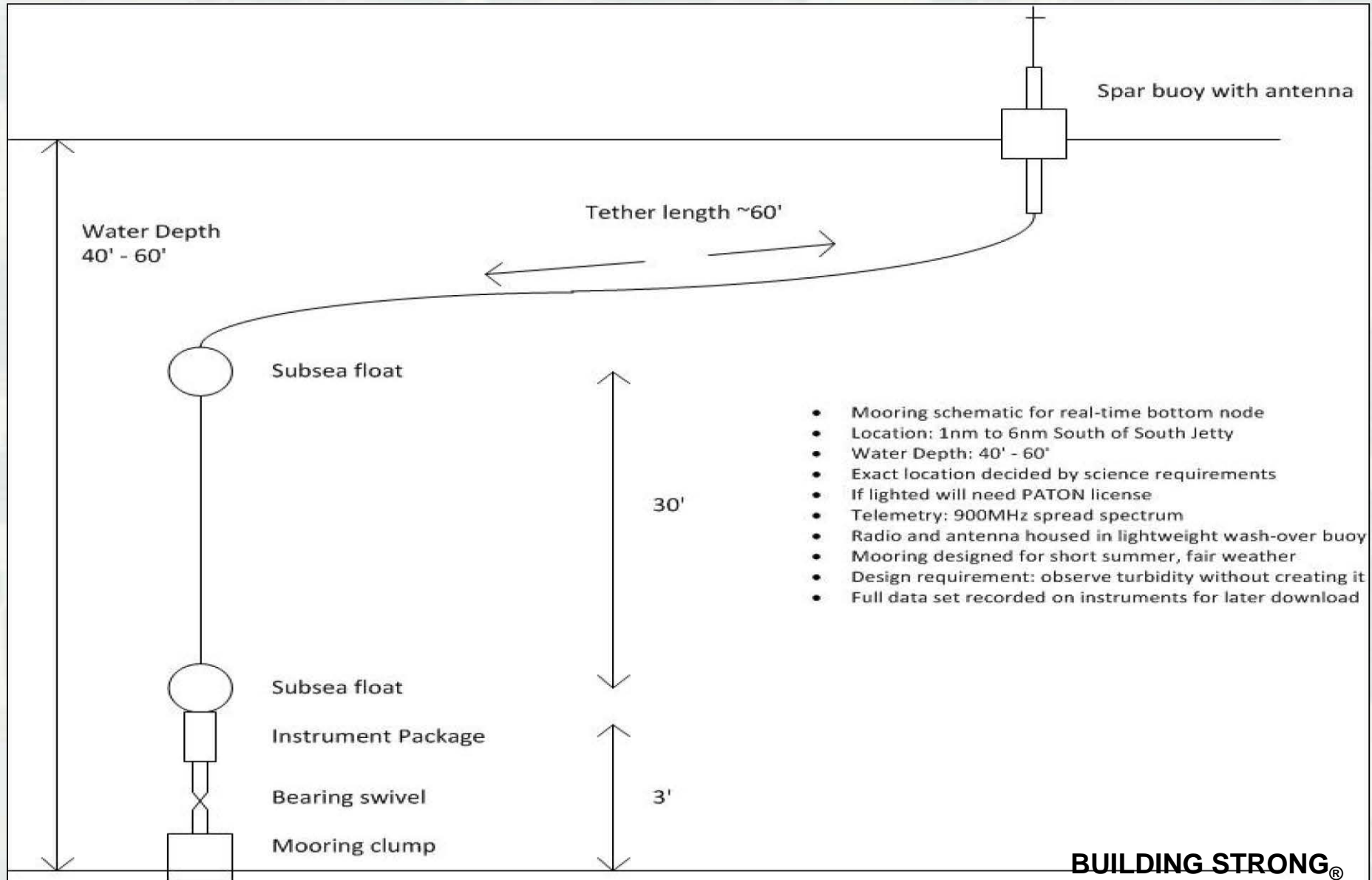
## **Reporting Properties:**

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

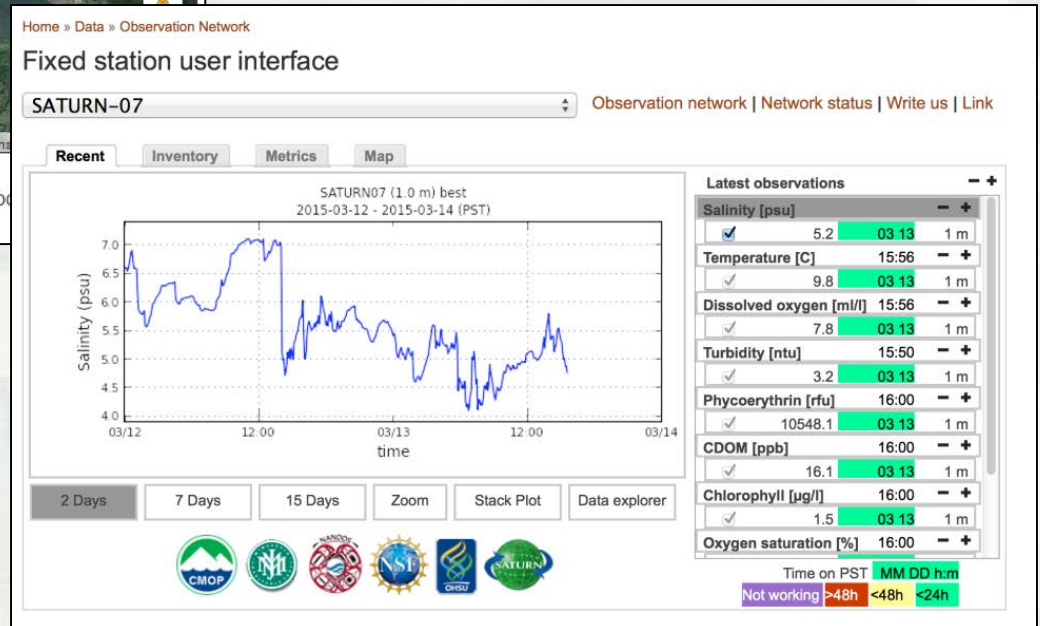
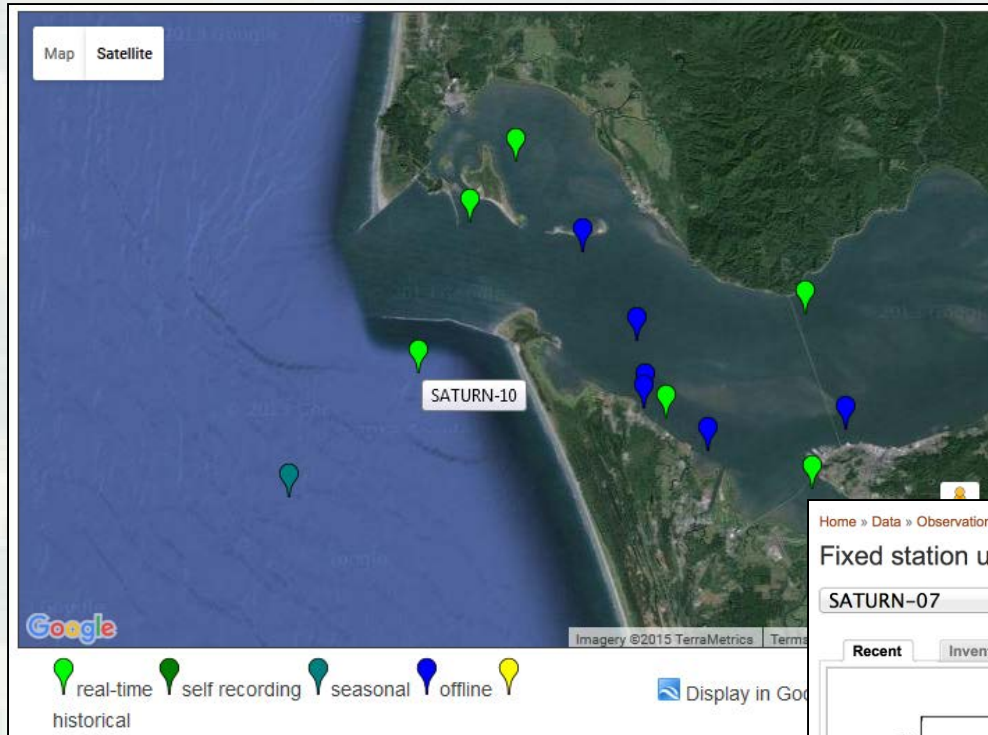




# Environmental Buoy

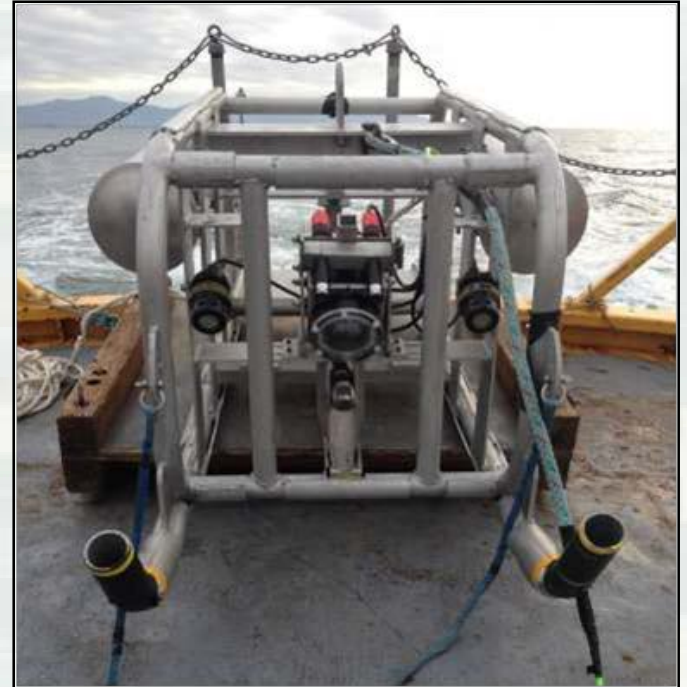


# Environmental Buoy



# Benthic Video Sled Surveys

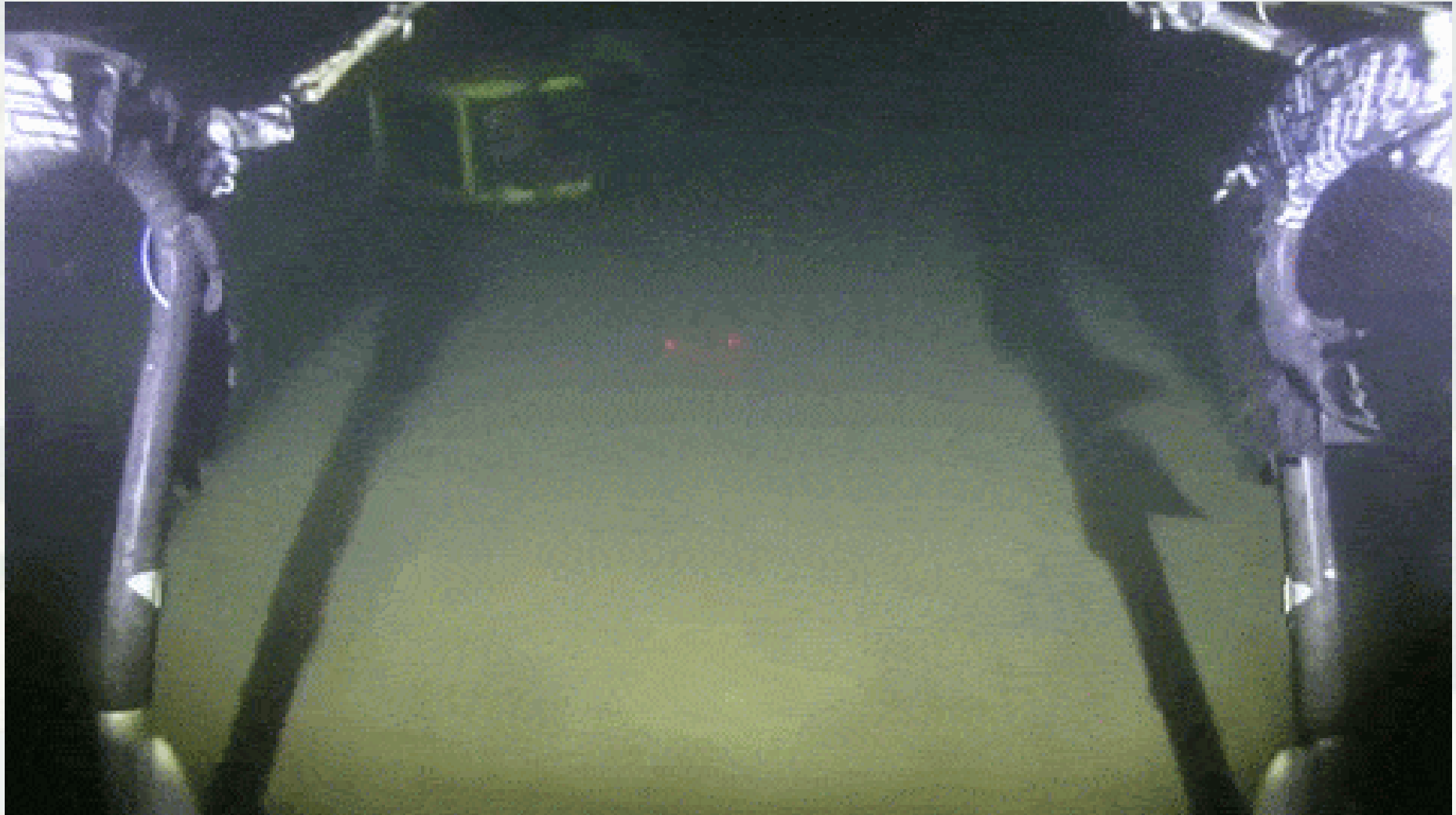
- Use of the NOAA benthic video sled to enable qualitative view of macrofaunal abundances and distributions.
- Conduct benthic surveys at control and dredge material deposition sites spanning the operations period.
- Analysis includes extracting organism abundance data from digital video logs and testing 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



Marine Water Video/Information Sled under construction at NOAA Research Facility

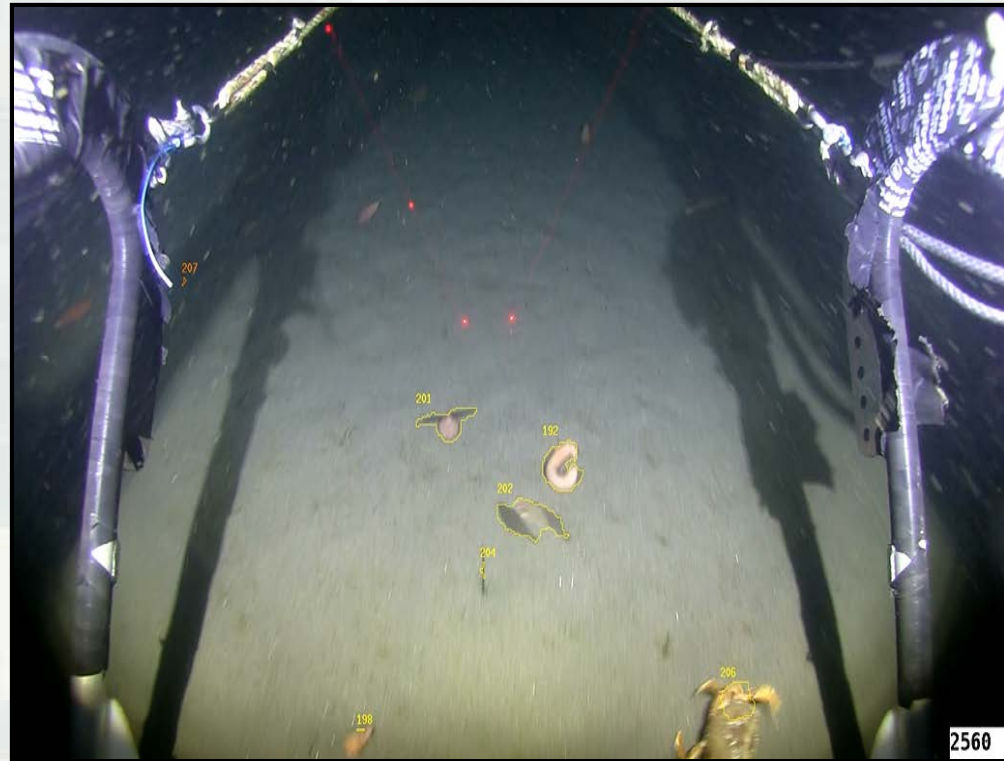


## Benthic Video Sled



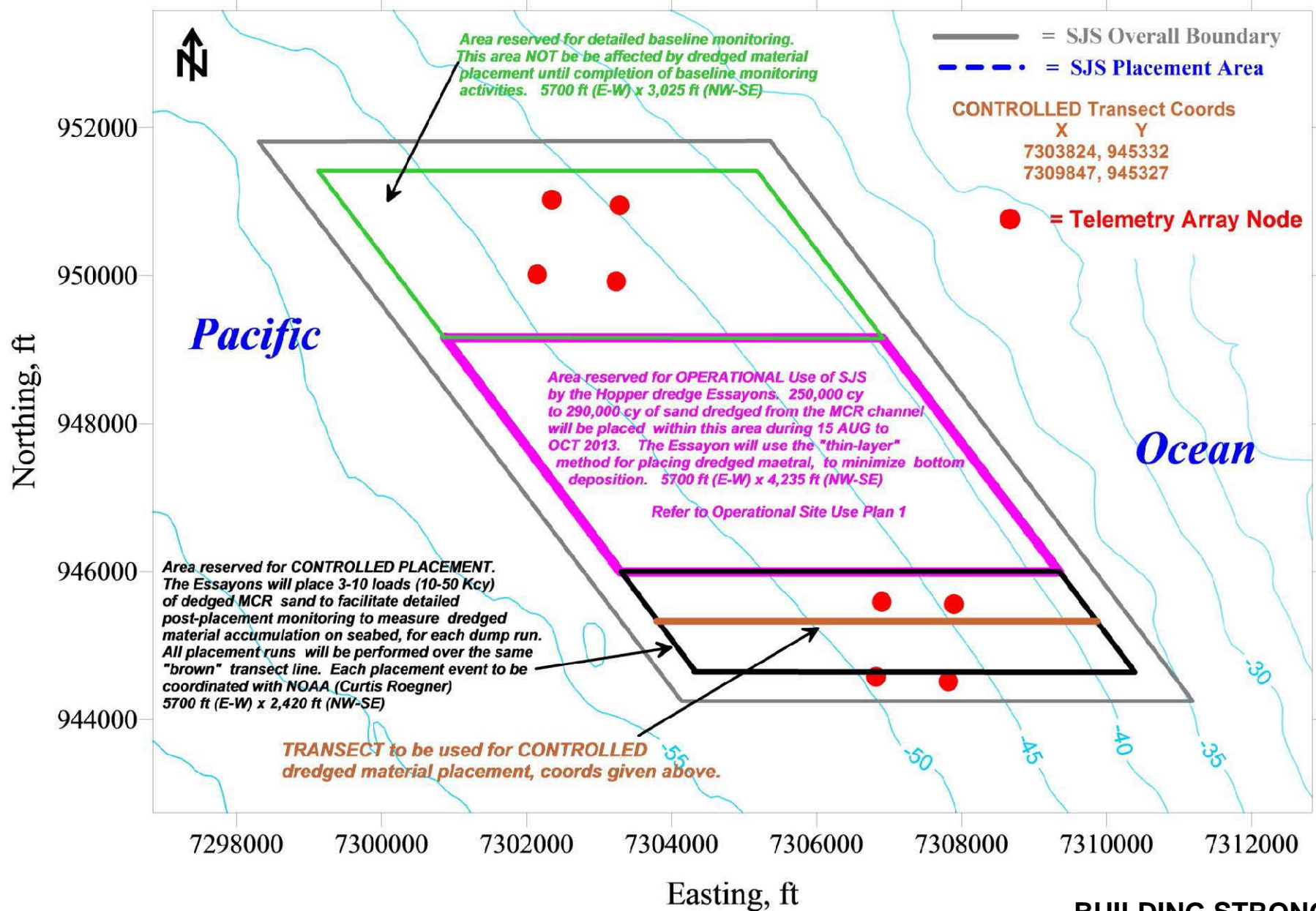
# Automated Event Detection and Classification (AVEDac) Software

- 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



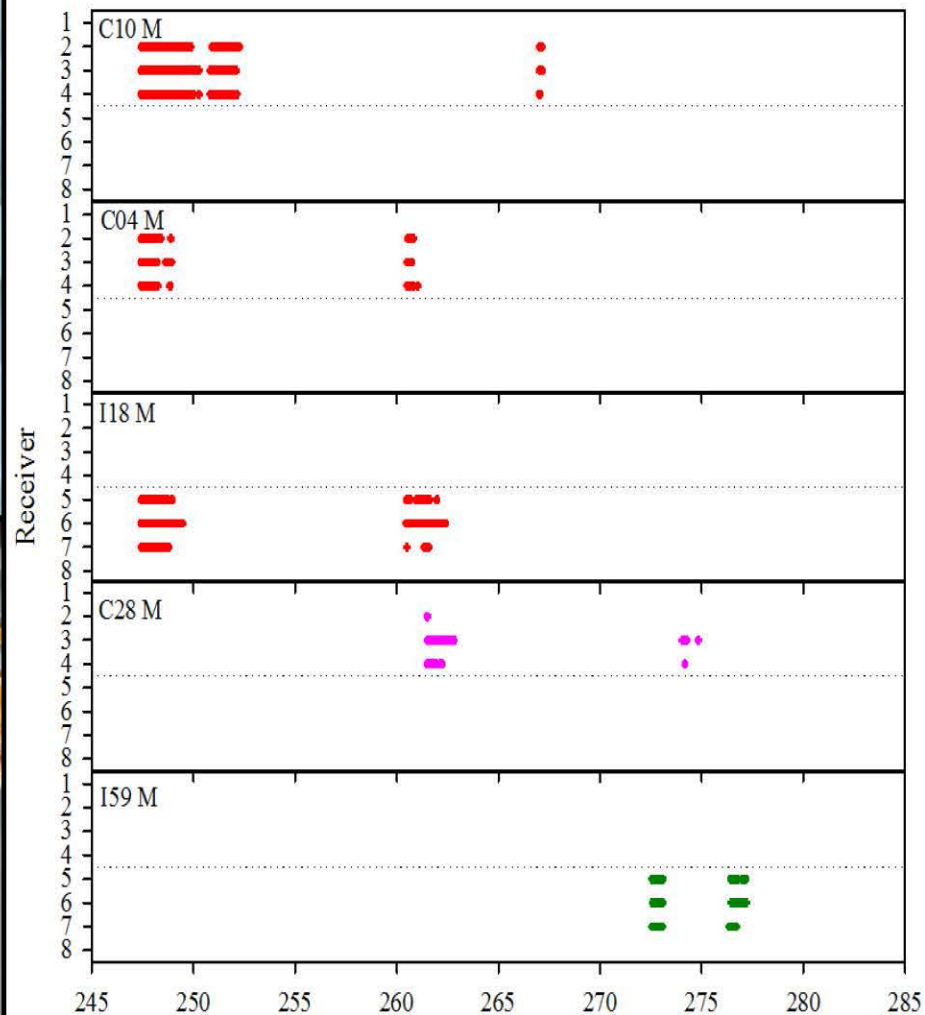
# MCR South Jetty Site - SJS (CWA 404)

## Layout For Phased Implementation of Initial Site Utilization & Monitoring Plan 2014



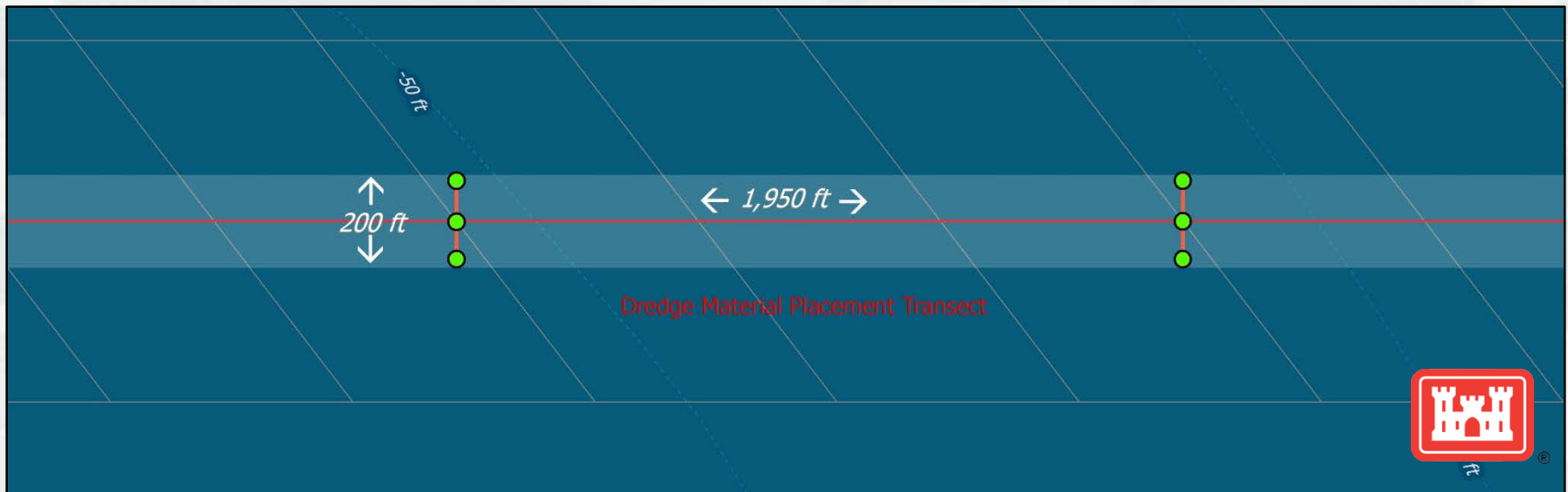


# Acoustic Crab Tags



# 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





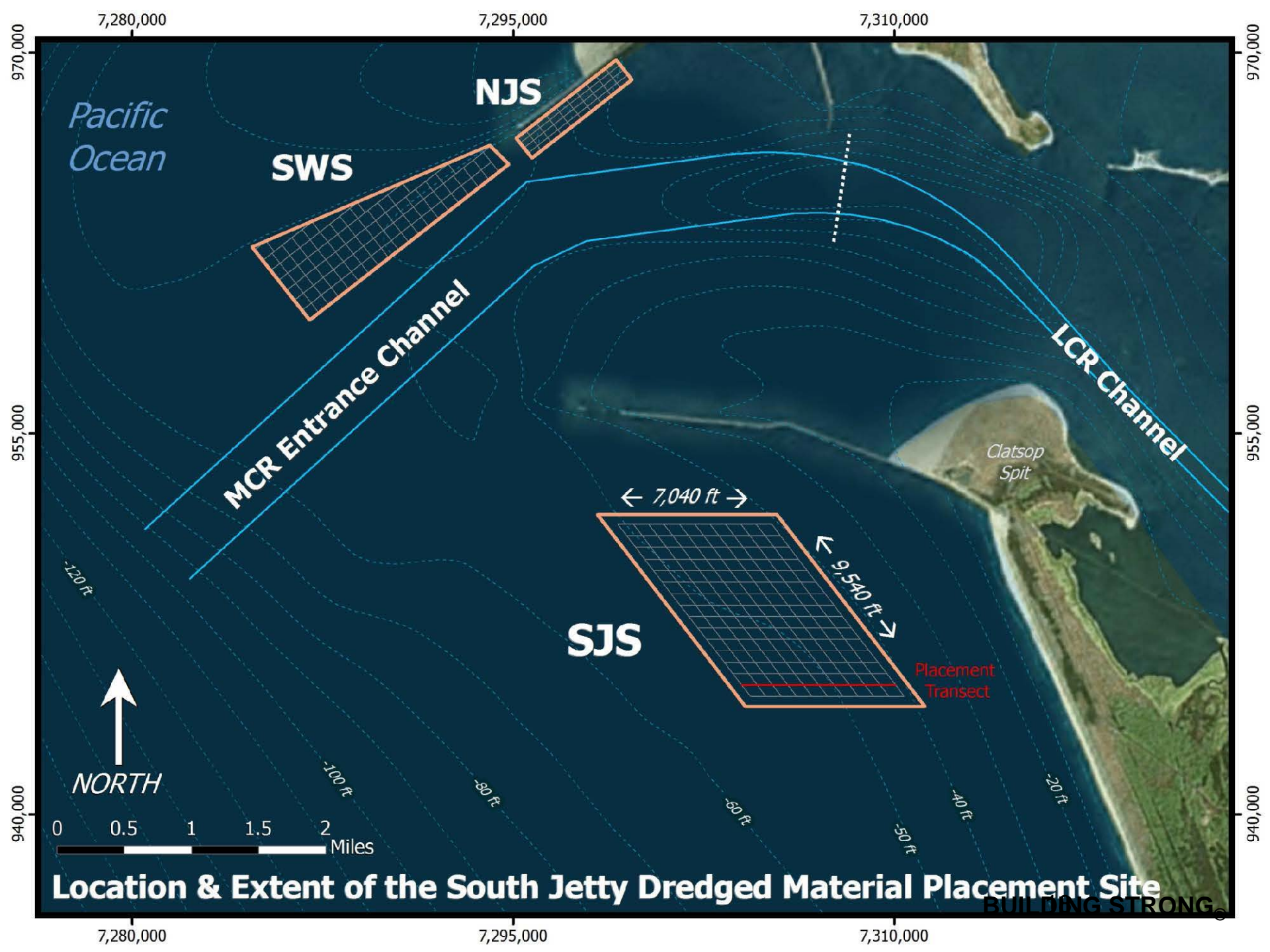
Prototype deployable deposition meter,  
via Curtis Roegner-NOAA. These are  
designed to go “over the side” and be  
retrieved like crab traps.

A Gopro camera, attached to the  
deposition meter mount, can record the  
deposition event.



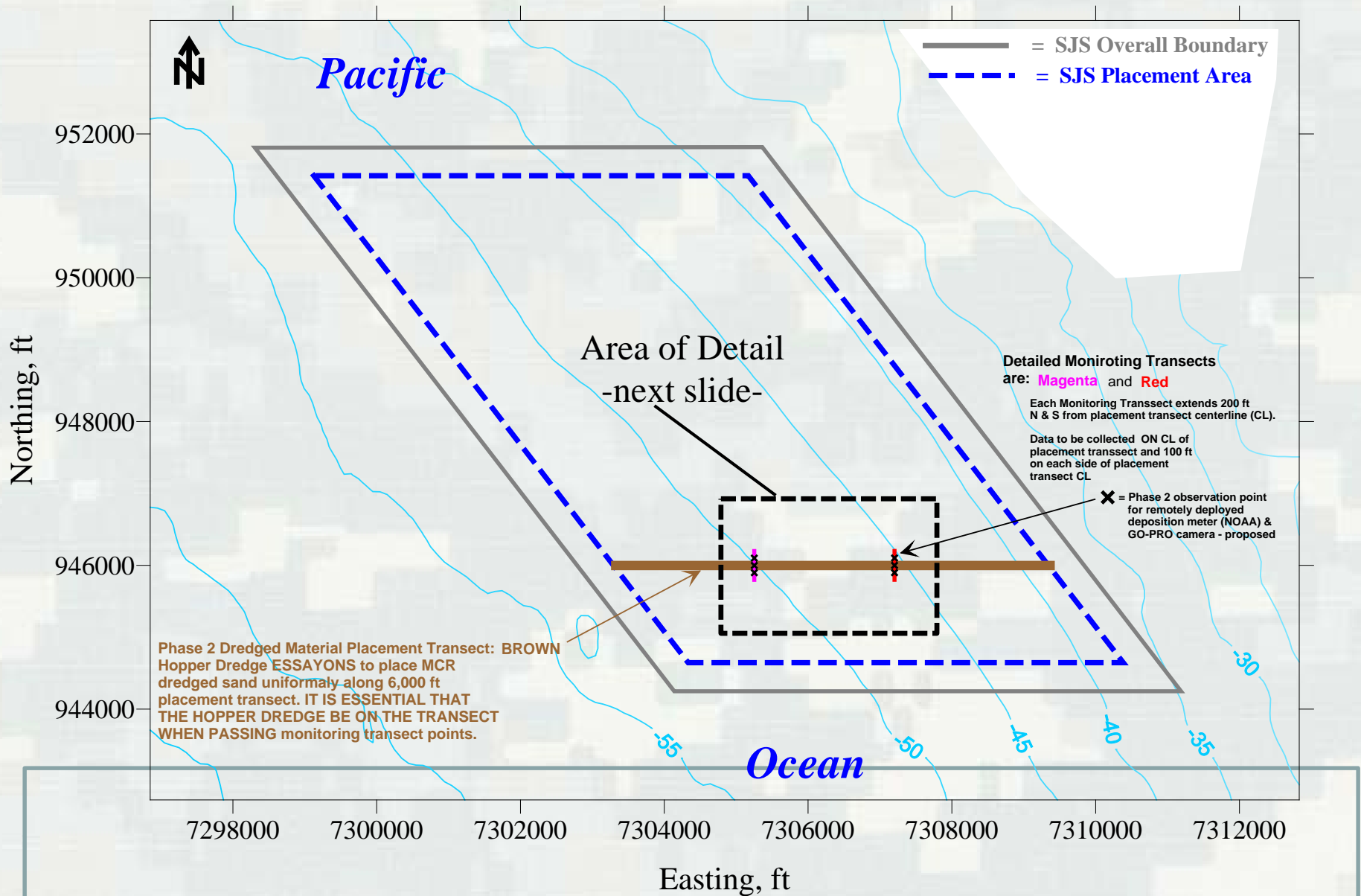
COURTESY OF CURTIS ROEGNER-NOAA





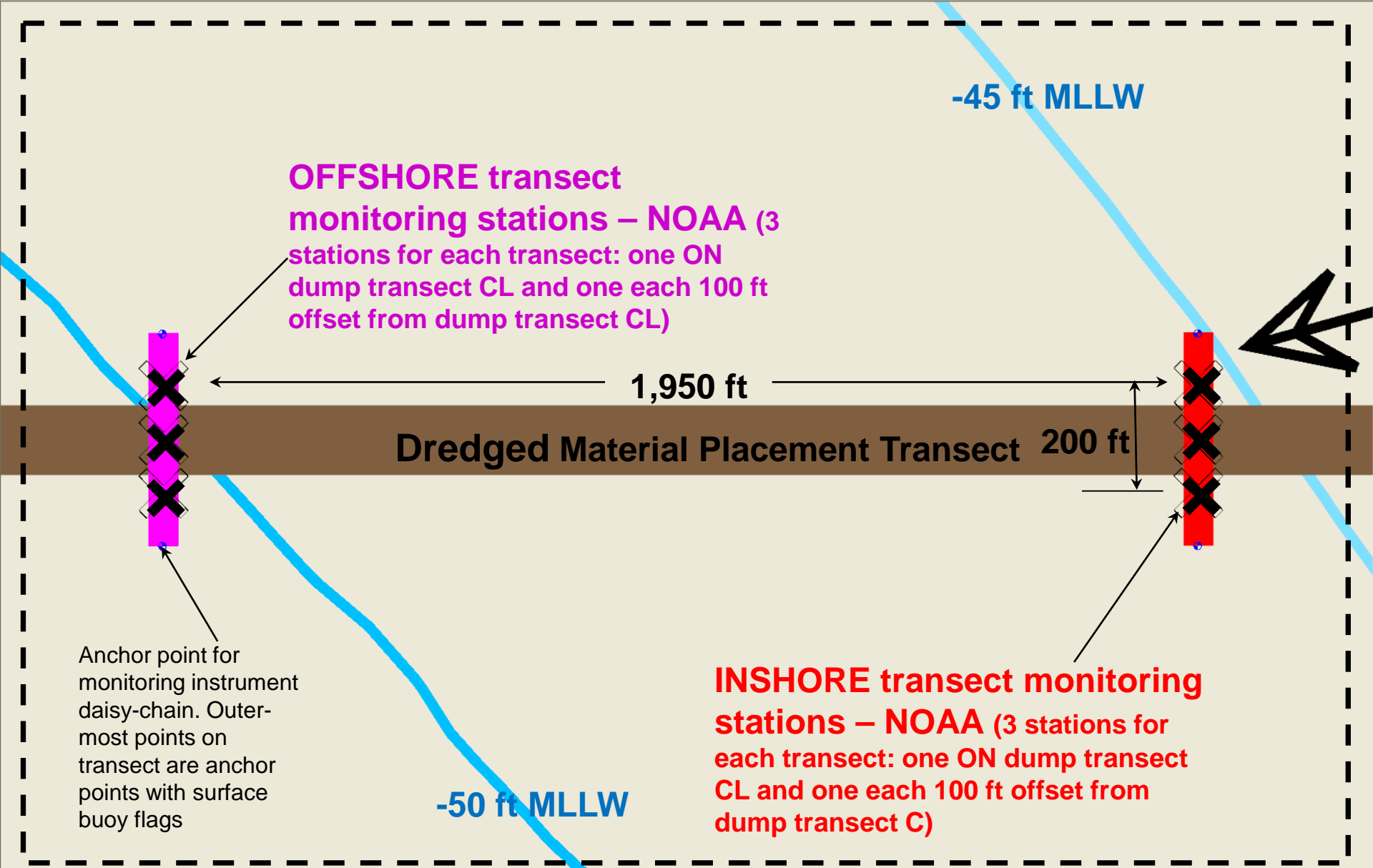
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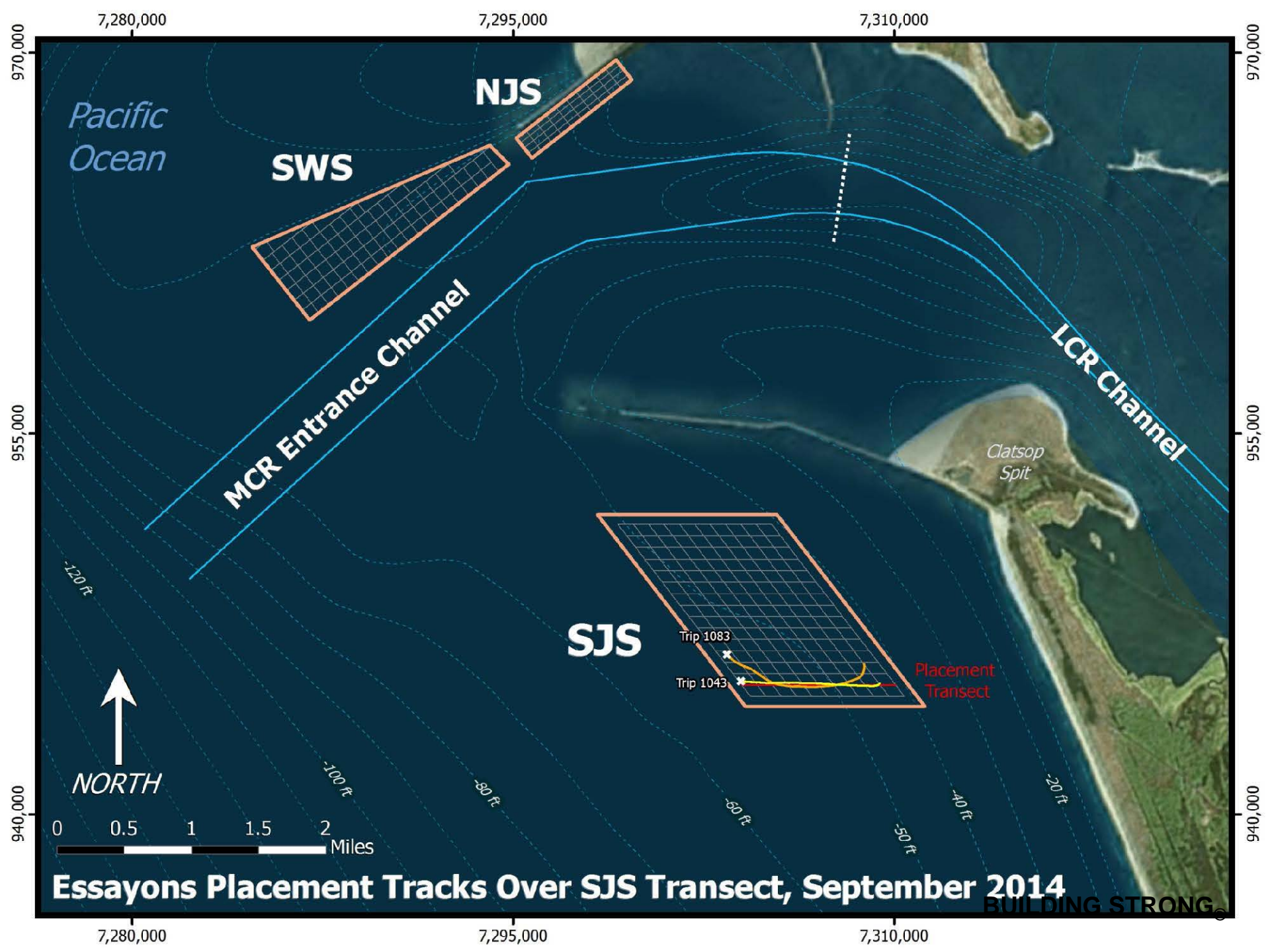
coordinates are SPCS Oregon, north, ft NAD83  
elevations are in ft, below MLLW, data = Aug 2012, contour interval = 5 ft

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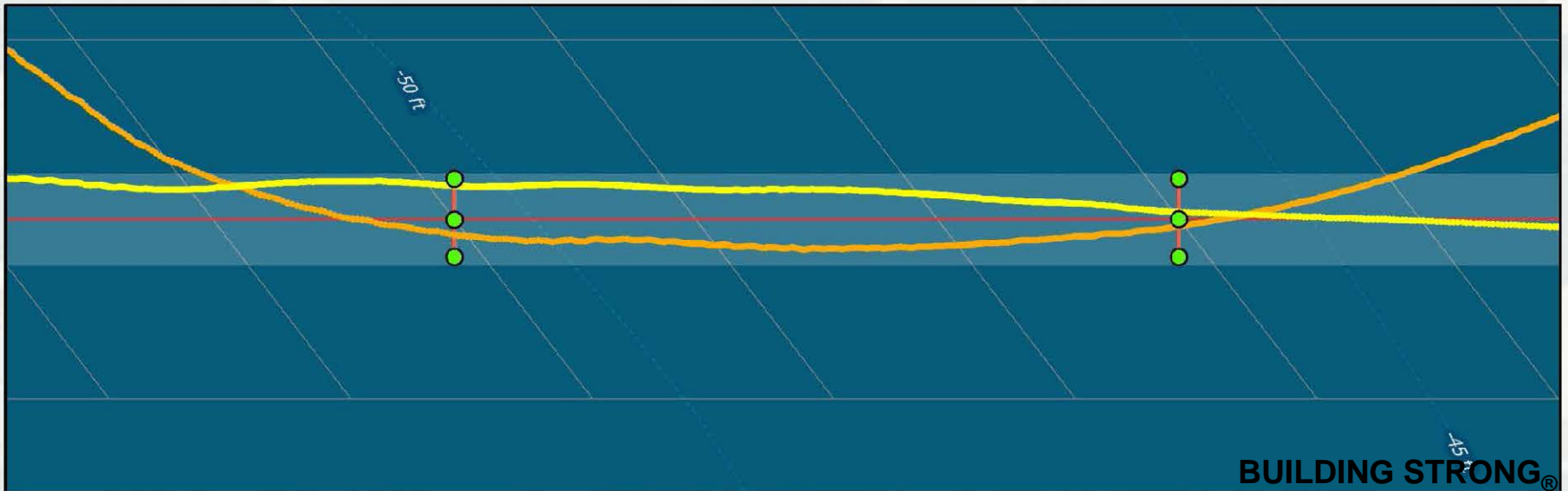
**Close-up View of SJS Phase II - Monitoring Transect Details**



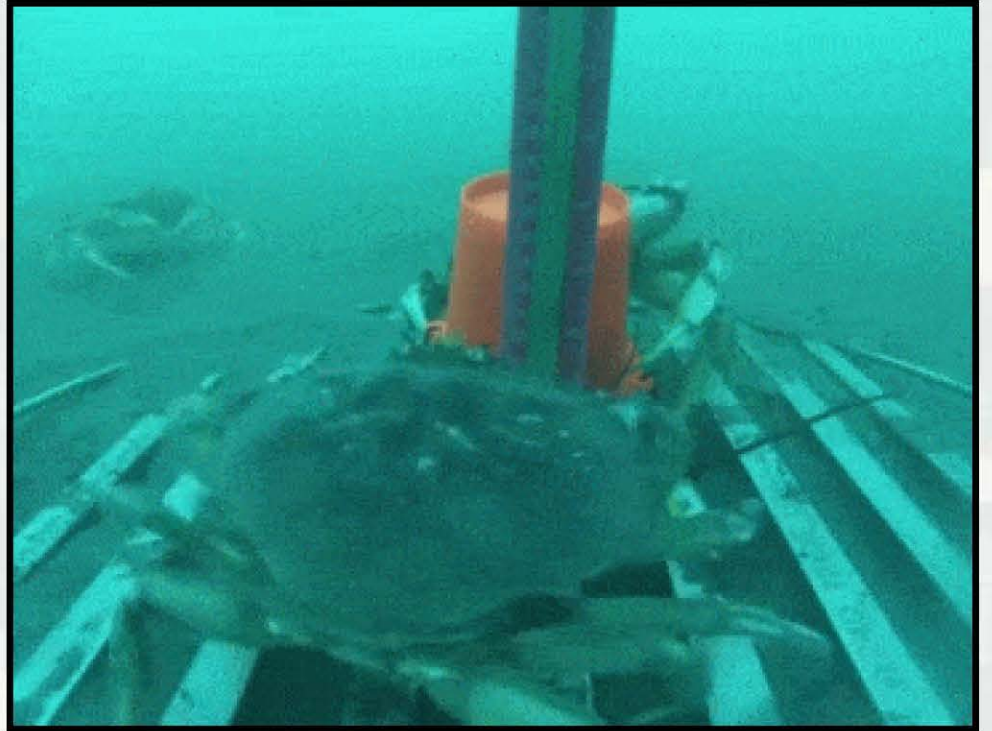




MCR vids









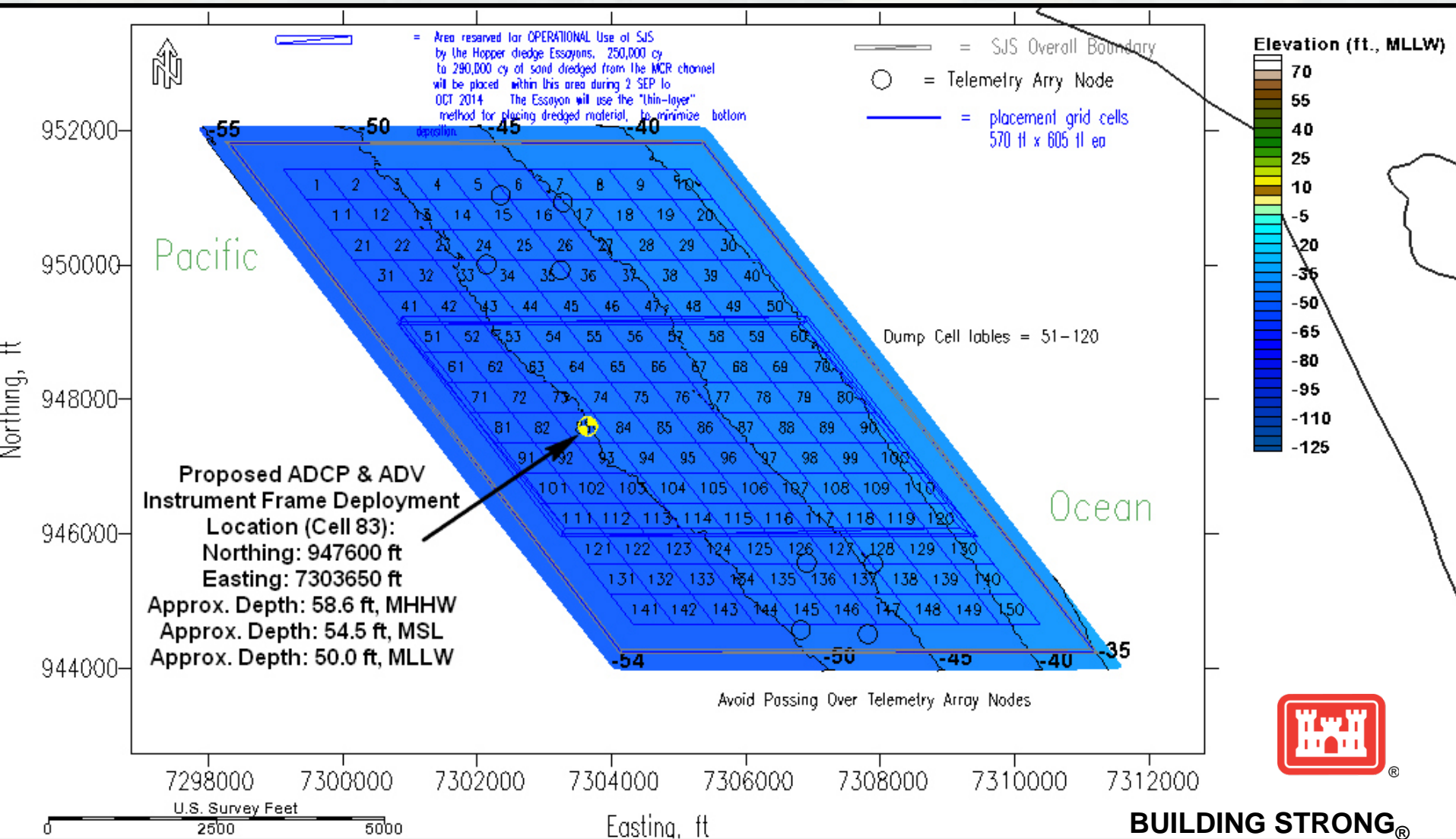
# ADCP Data Collection

Data collection includes:

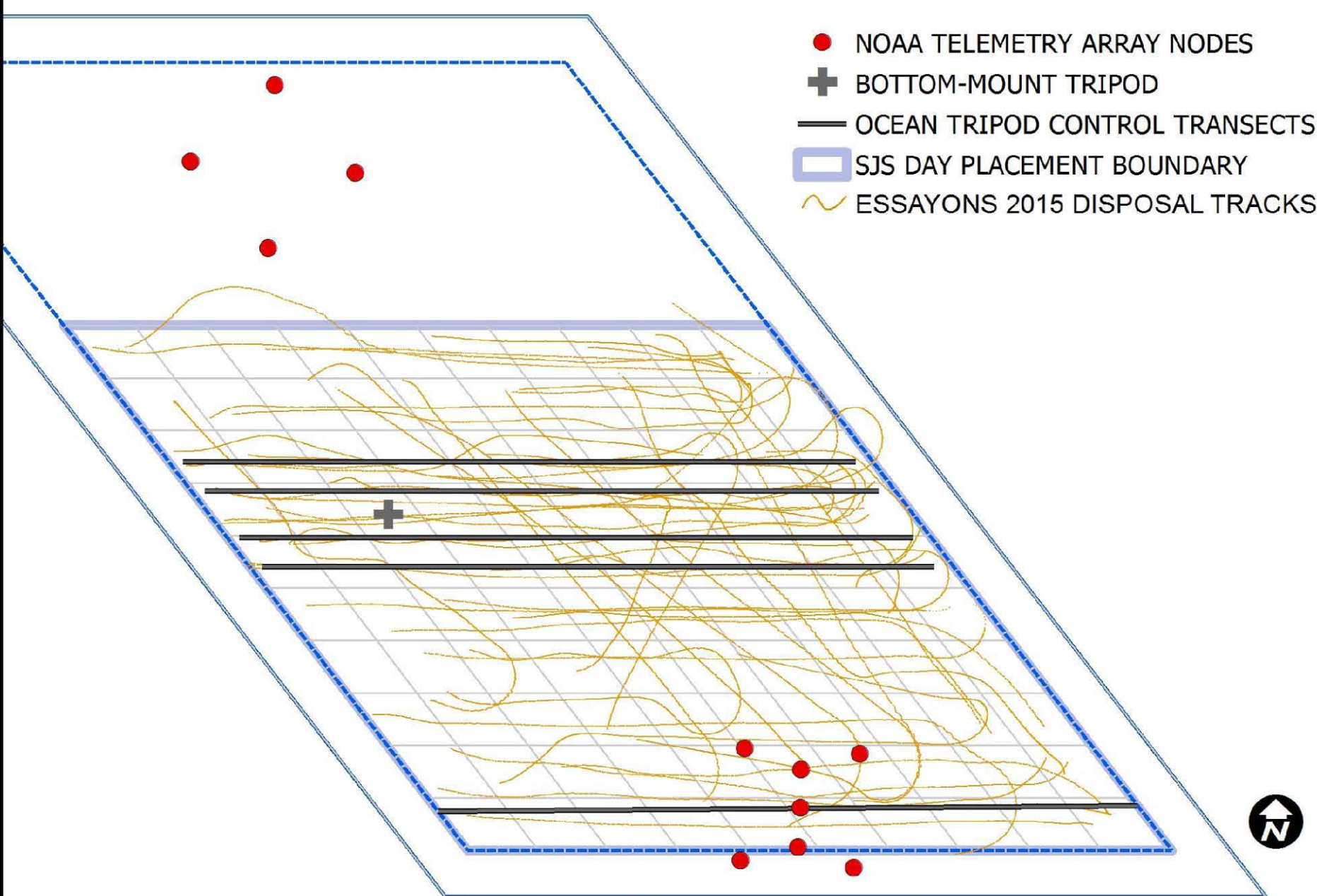
- Measured currents through the water column
- Directional waves
- Suspended sediments
- Bottom current regime
- The intent of the data collection is to measure dredge material plume velocities and suspended sediments
- Infer impacts to benthic communities based on lab results



# Acoustic Doppler Current Profiler (ADCP)



- NOAA TELEMETRY ARRAY NODES
- ⊕ BOTTOM-MOUNT TRIPOD
- OCEAN TRIPOD CONTROL TRANSECTS
- ▭ SJS DAY PLACEMENT BOUNDARY
- ~ ESSAYONS 2015 DISPOSAL TRACKS



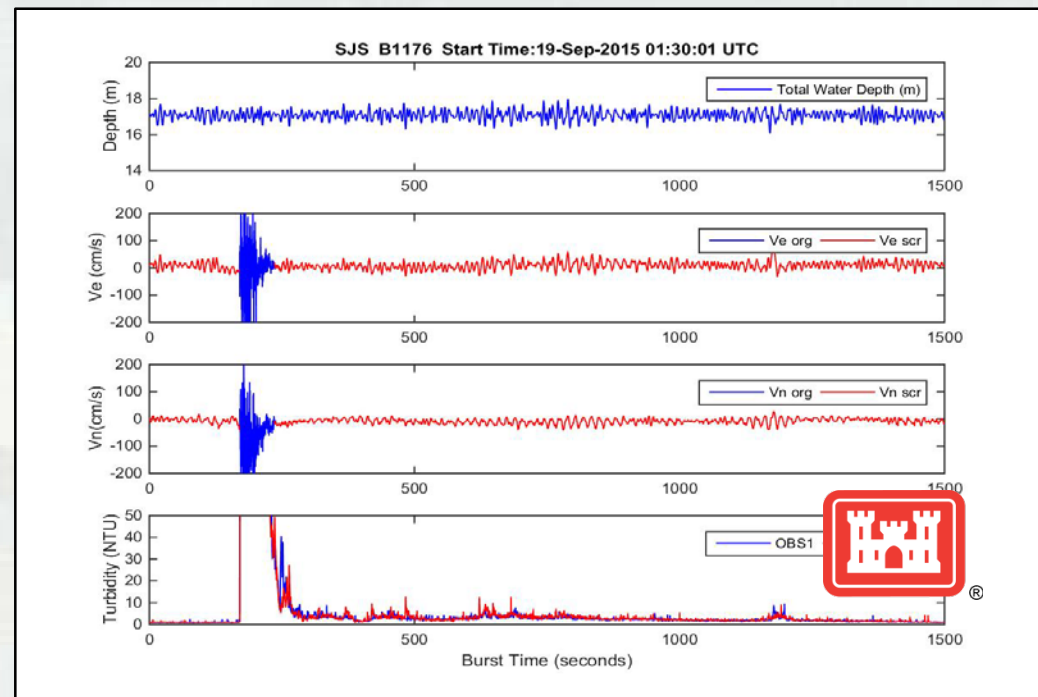
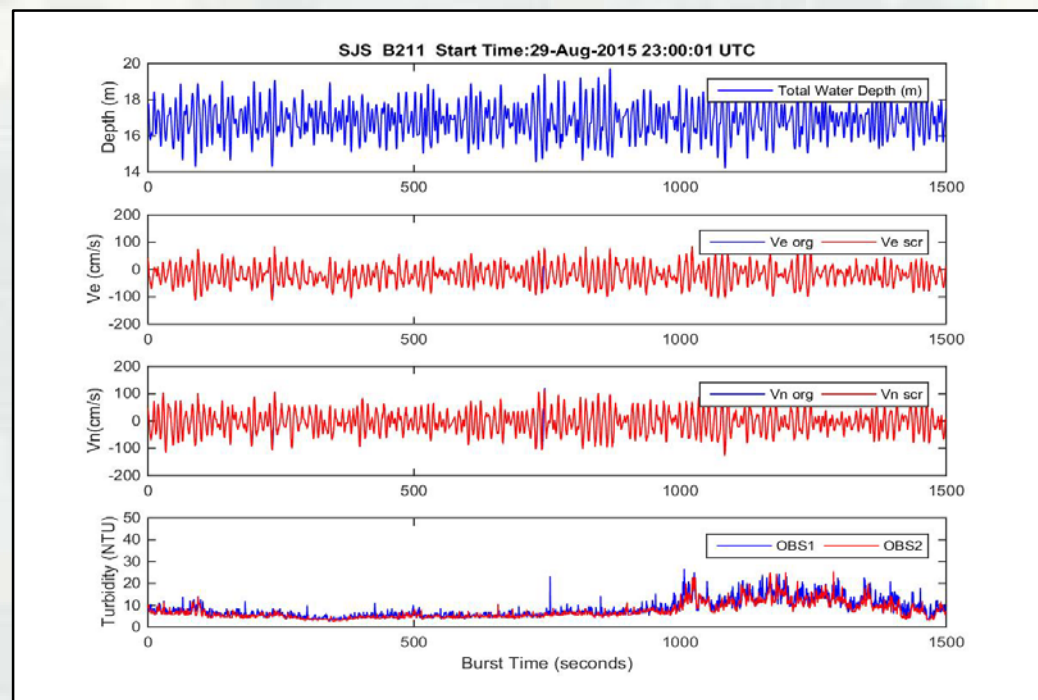
MCR South Jetty Site

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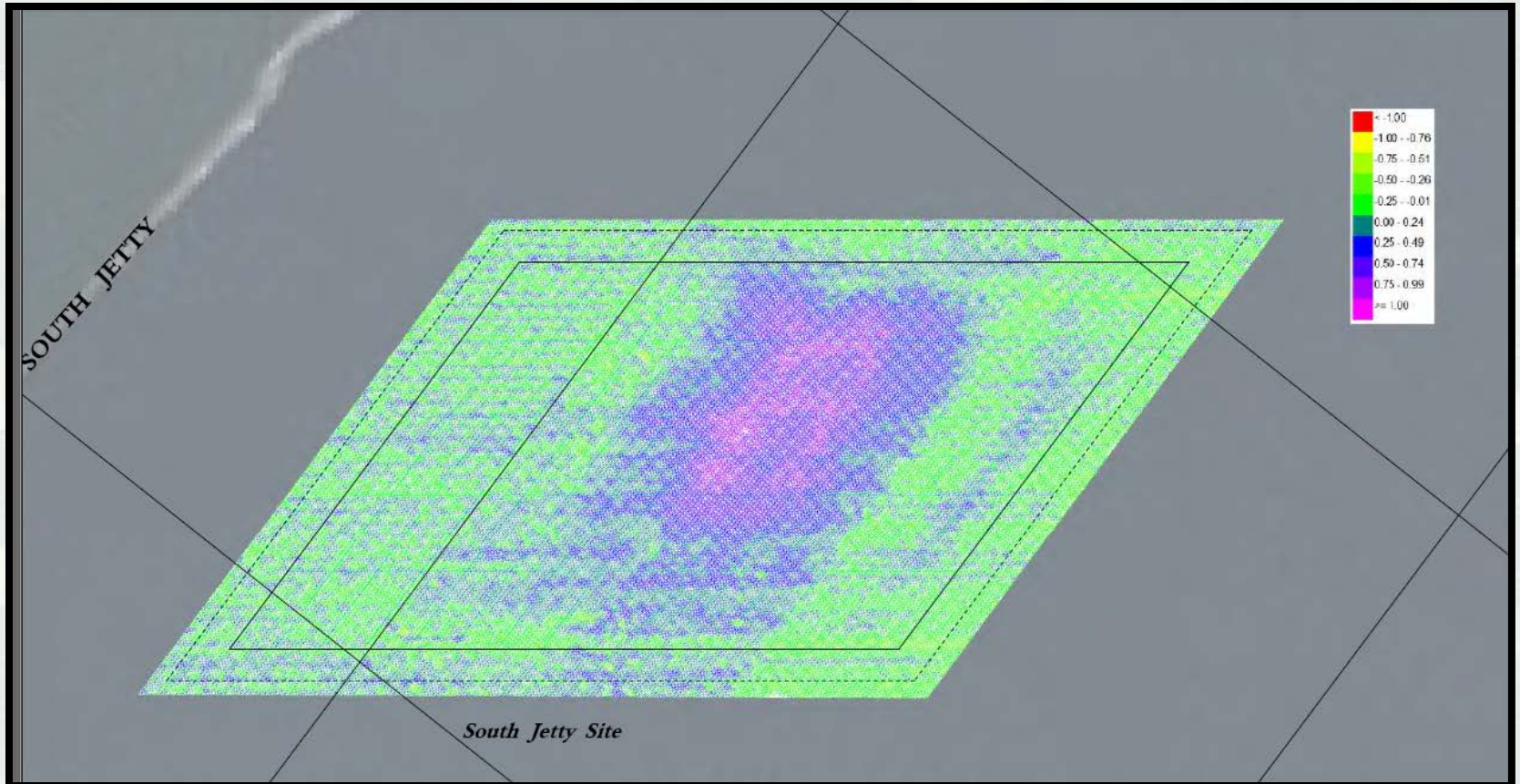


# Big Waves

# Placement Event



# SJS Difference Plot 2014



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# 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 300kcy annually
- AVEVac 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

