

Balancing Benefits and Impacts at the Mouth of the Columbia River

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BUILDING STRONG®





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 3.5-4.5 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.

Channel Maintenance

Purpose: Maintain the location and depth of the navigation channel.

Passive Channel Maintenance (Jetties/Pile Dikes)

- Decrease Currents in the immediate vicinity of the structure, reducing erosion.
- Increase Currents near the navigation channel thus preventing lateral migration.

Active Channel Maintenance

- Hopper dredging the Federal Navigation Channel.



Mouth of the Columbia River

“CONSTRUCTED” 1885-1917



Pile Dikes

Jetty "A"

North Jetty

**MCR
Navigation
Channel**

6 miles long
2,640 ft wide
55/48 ft deep

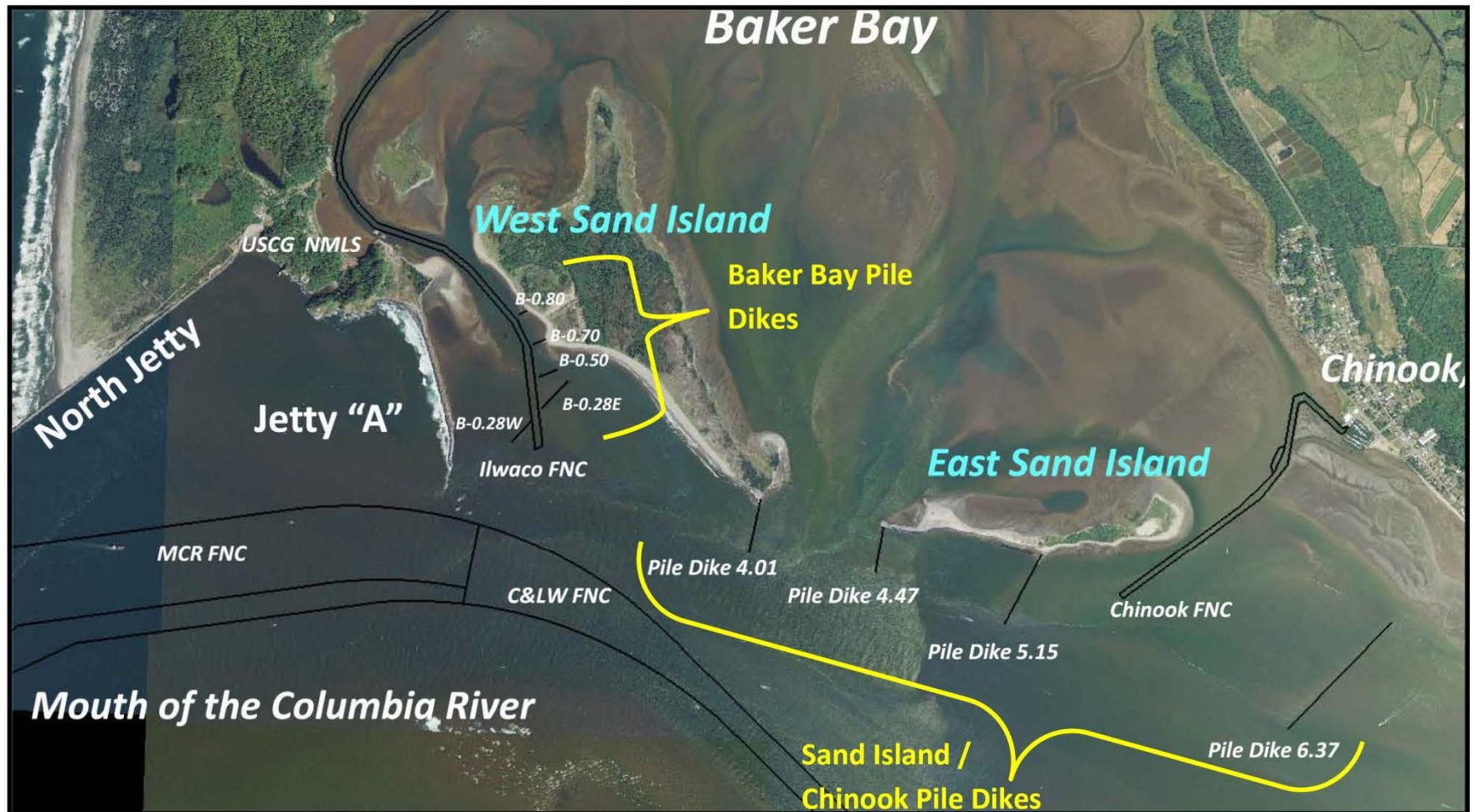
Clatsop Spit

South Jetty

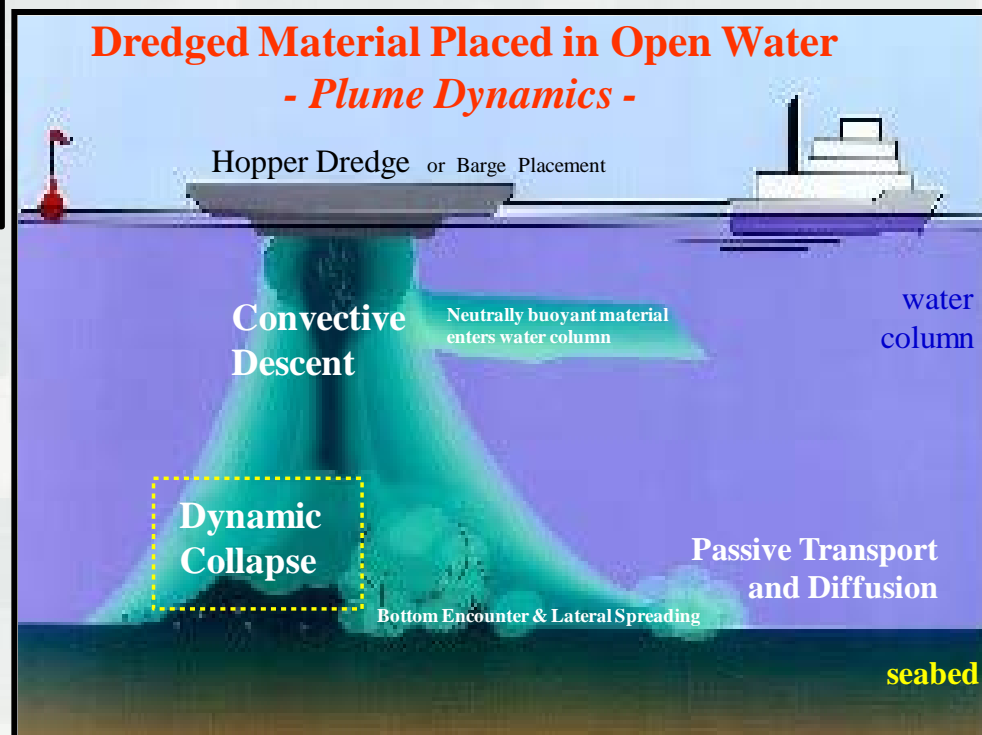
*Peacock
Spit*

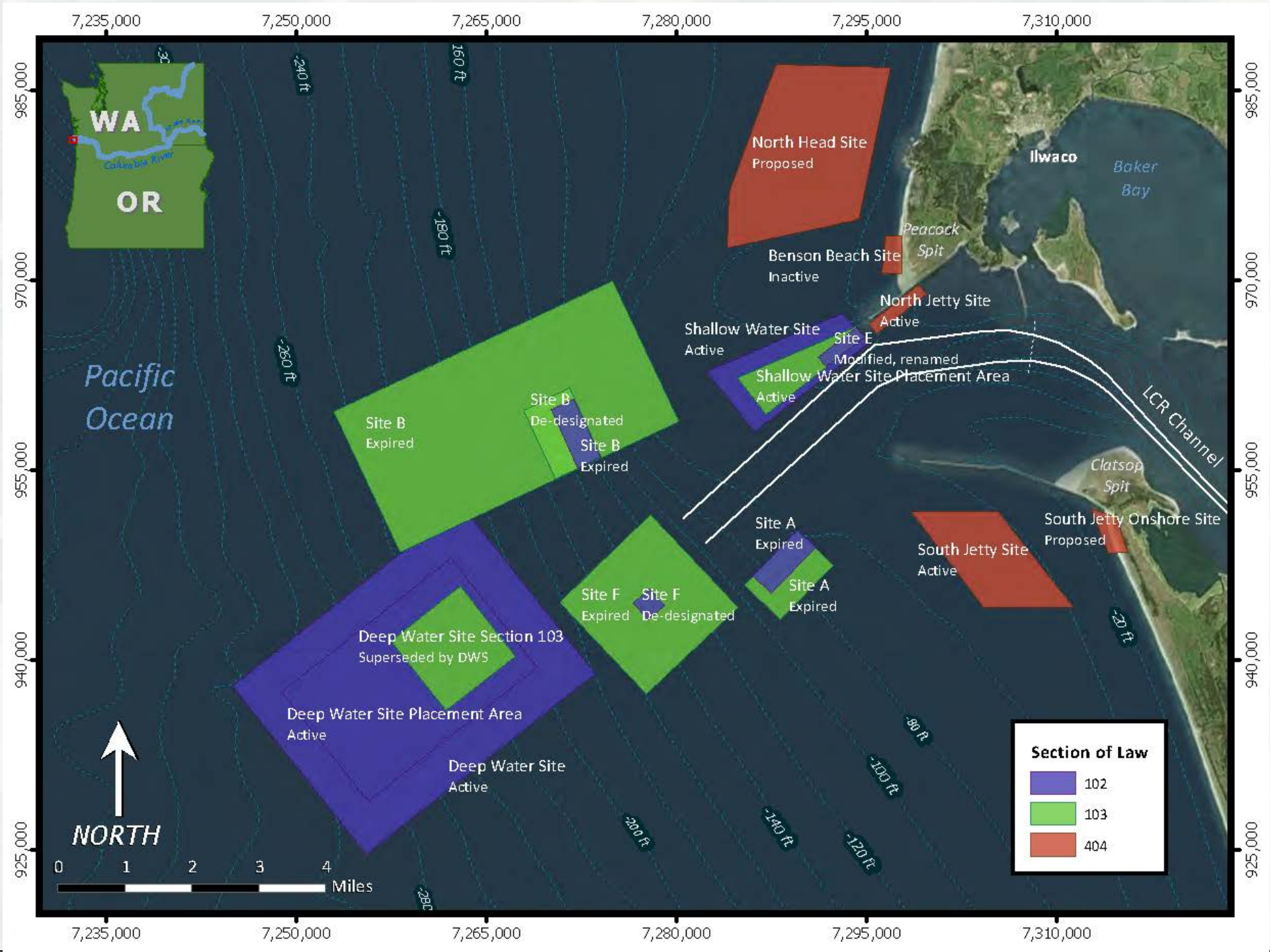
Pacific Ocean

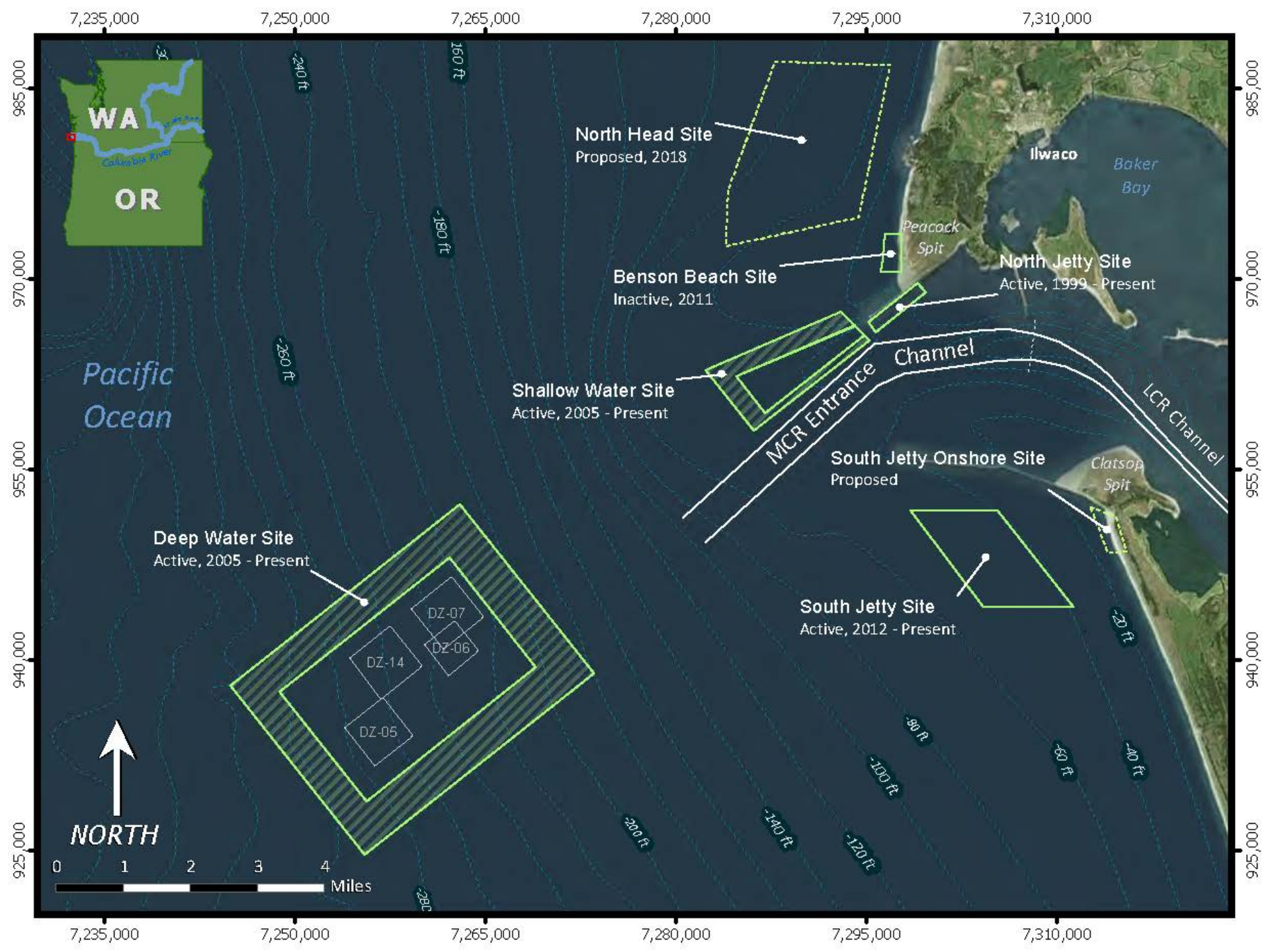
Passive Structures (Pile Dikes)



Active Channel Maintenance







Addressing Stakeholder Concerns

Methods used to meet concerns

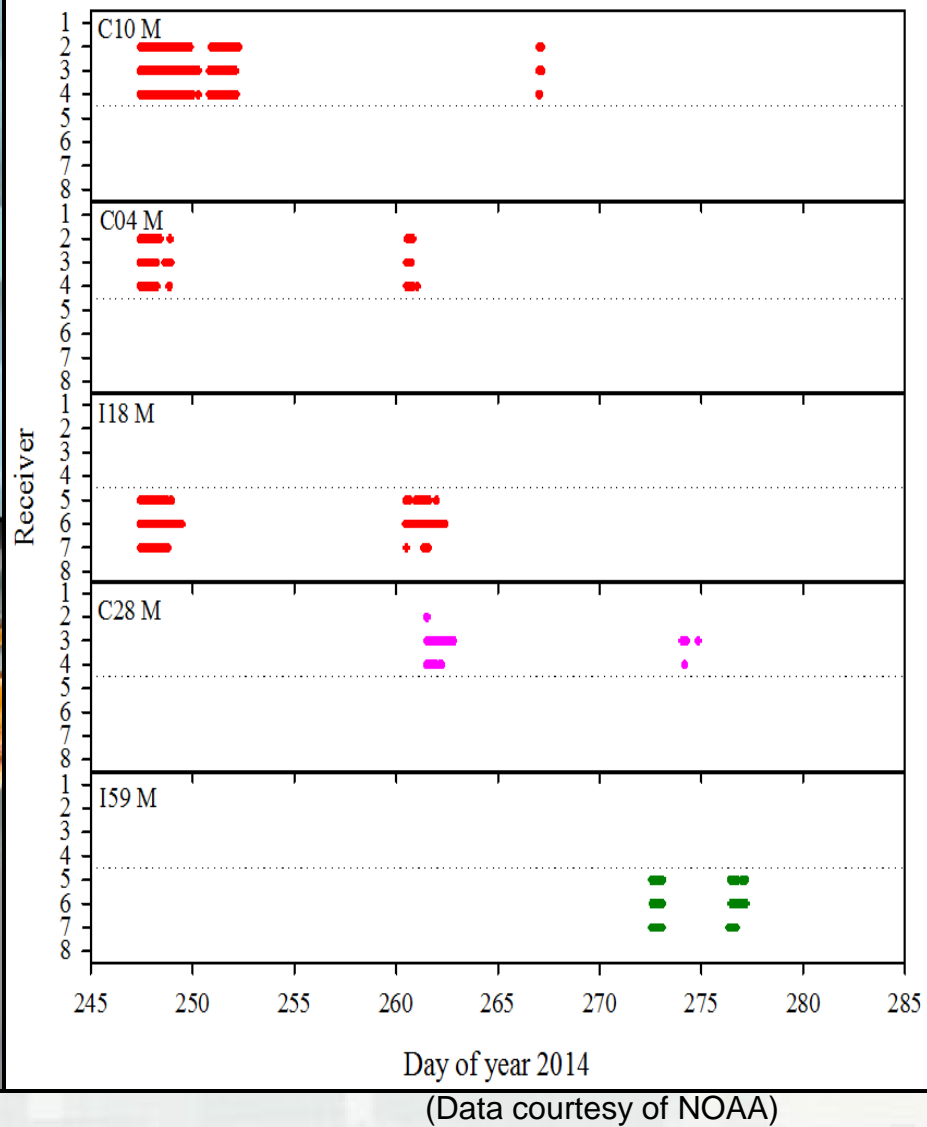
- Thin-layer placement with the Dredge ESSAYONS
- Benthic Video Sled
 - Presence/Absence of species
- Deposition Monitoring Instruments (CamPods)
 - Deposition
 - Acute crab response
- Acoustic Doppler Current Profiler (ADCP)
 - Dredge plume velocity, turbidity, etc
 - Deposition
- Acoustic crab tags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

Benthic Video Sled/AVEDac Software

- Replaces trawls
 - Less invasive than traditional methods, no take
- MBARI/ERDC developing Automated Event Detection and Classification (AVEDac) Software



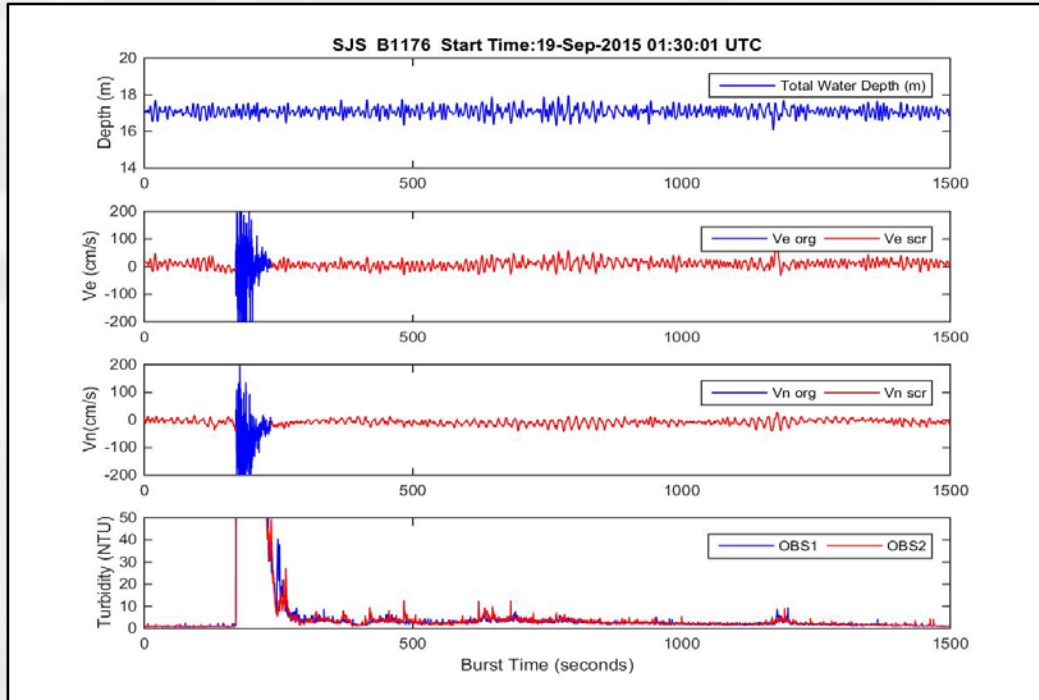
Acoustic Crab Tags



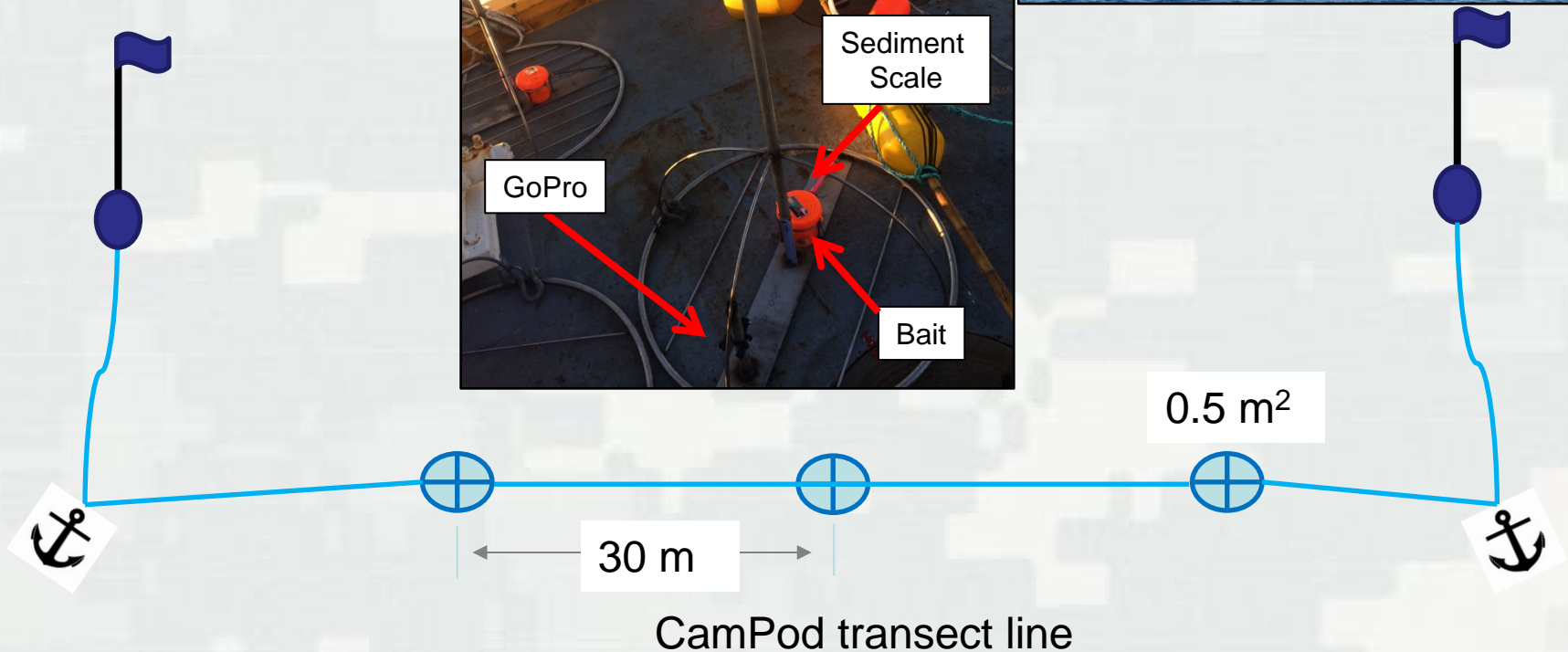
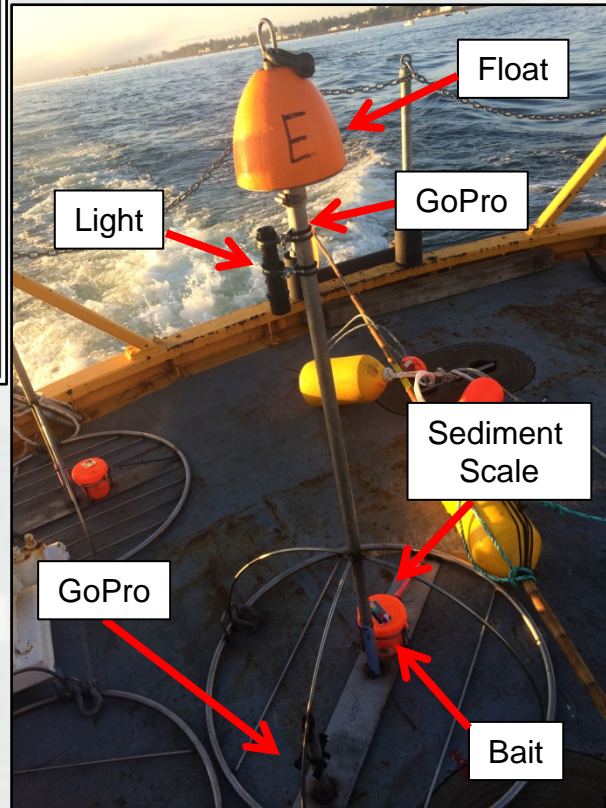
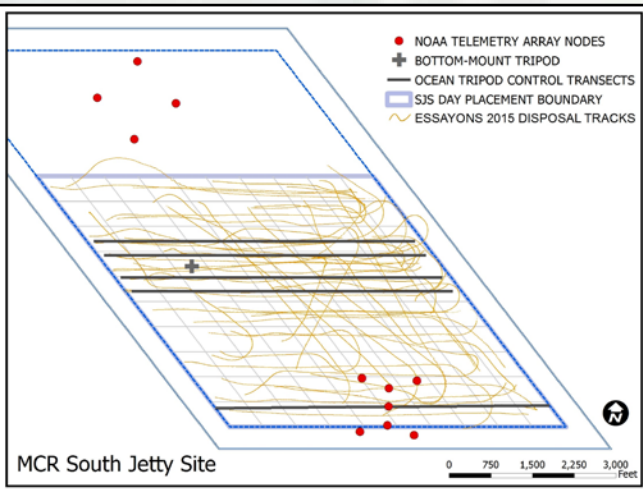
ADCP Data Collection

Data collection includes:

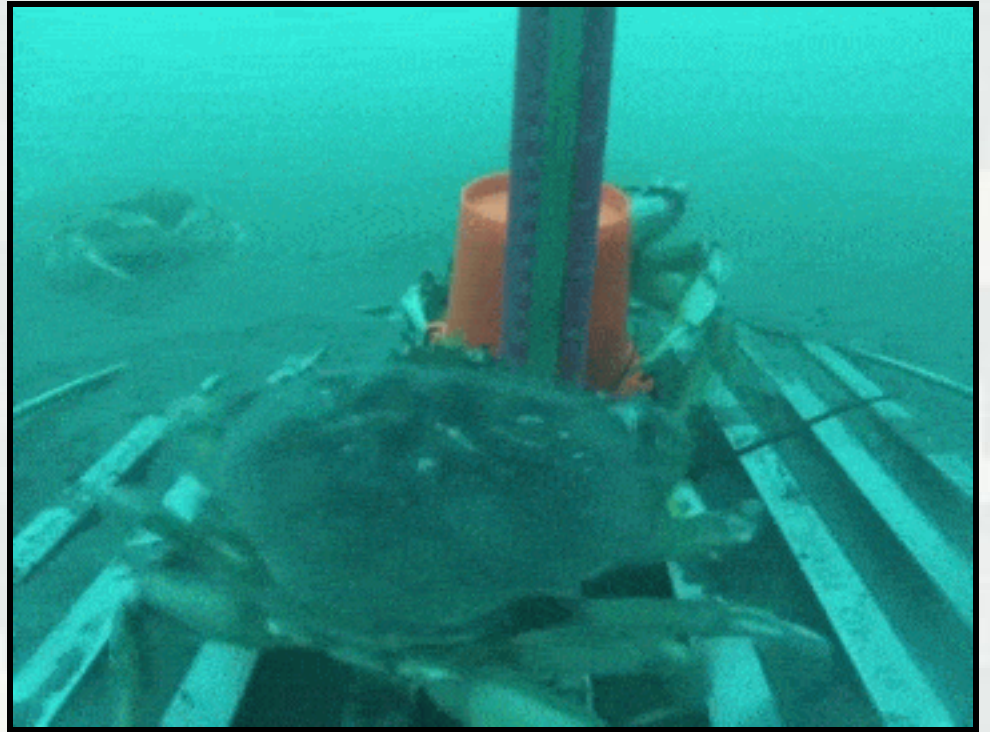
- Measured currents through the water column
- Directional waves
- Suspended sediments
- Bottom current regime

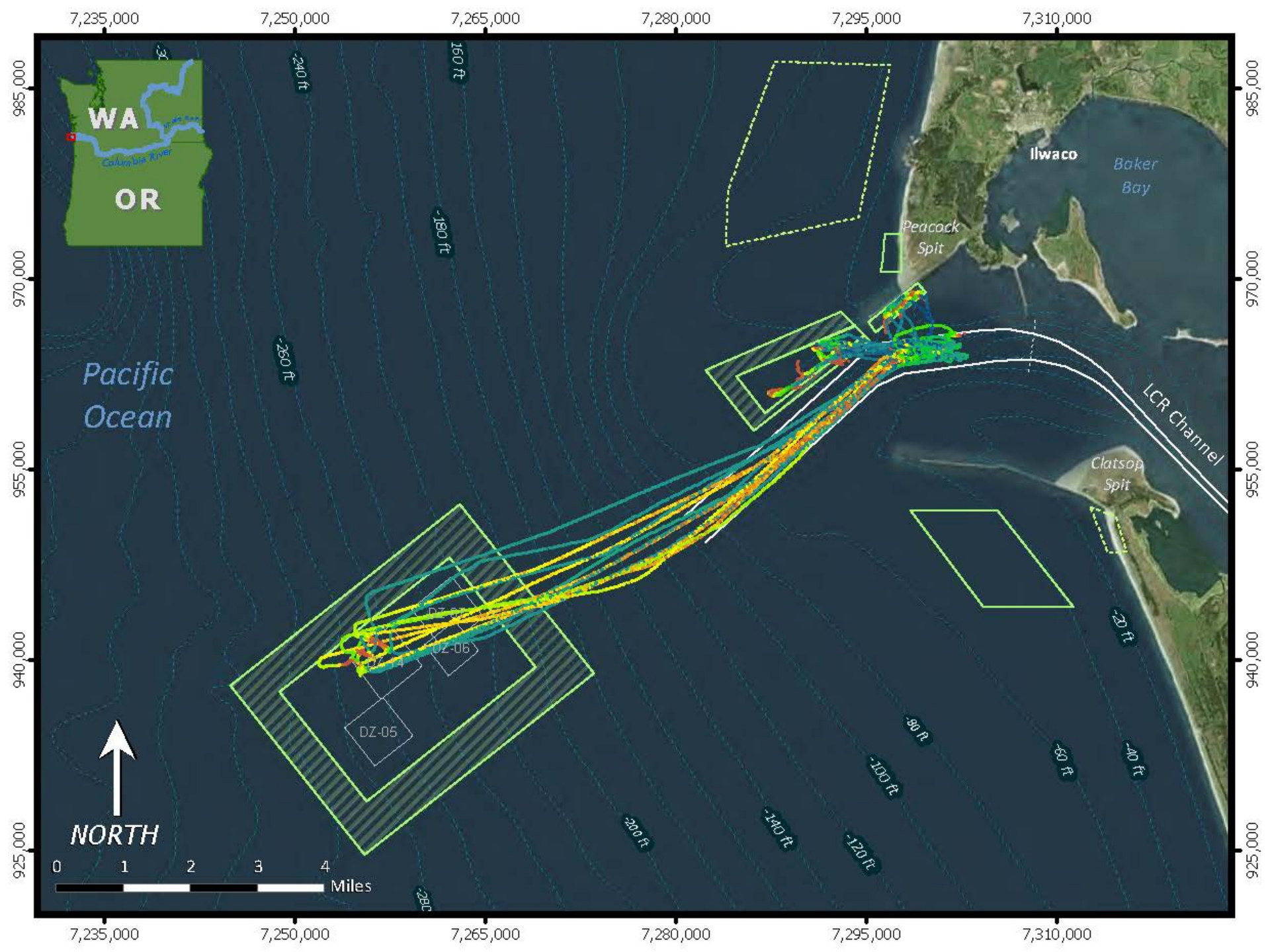


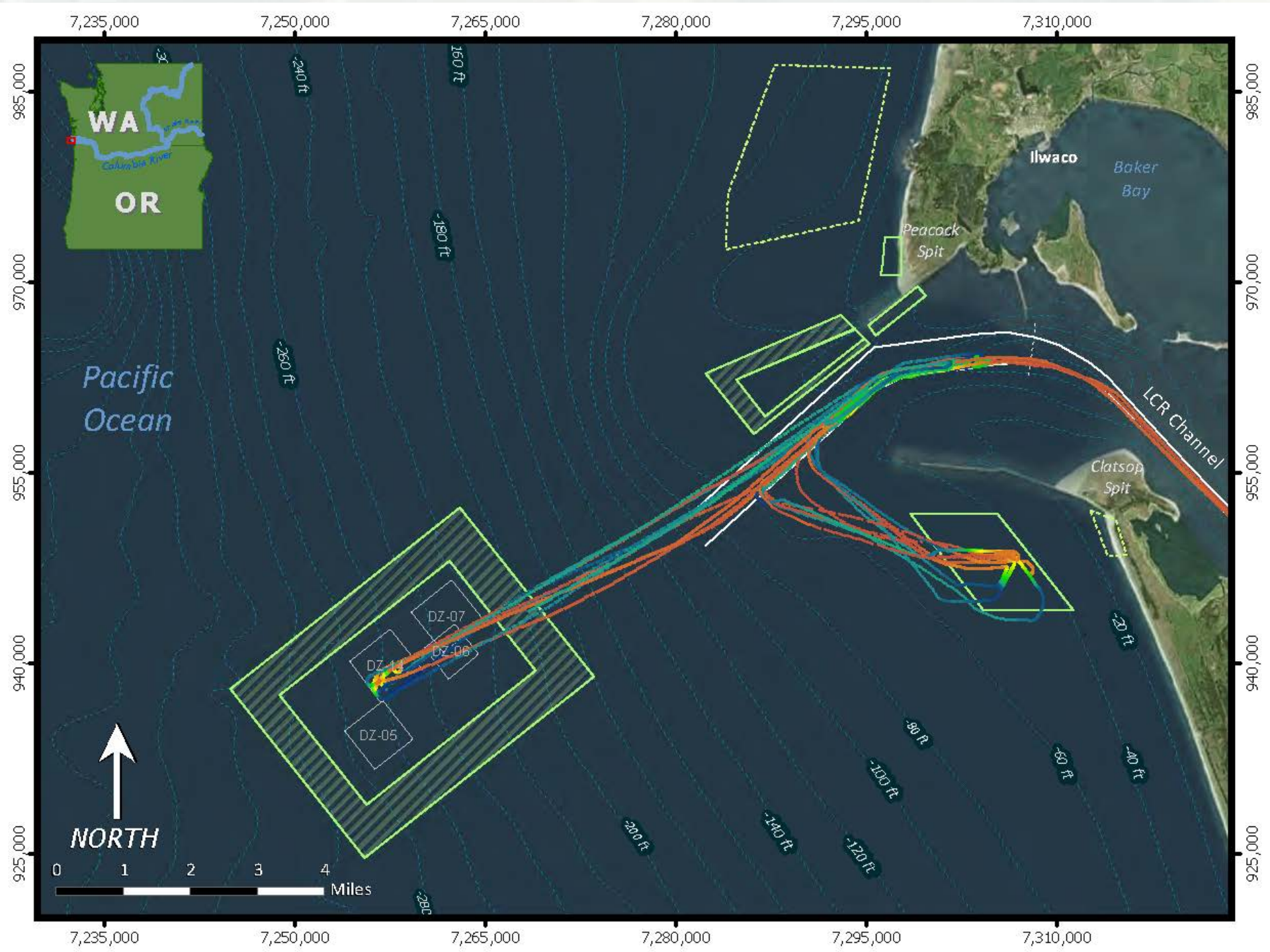
Deposition Monitoring Instruments (CamPods)



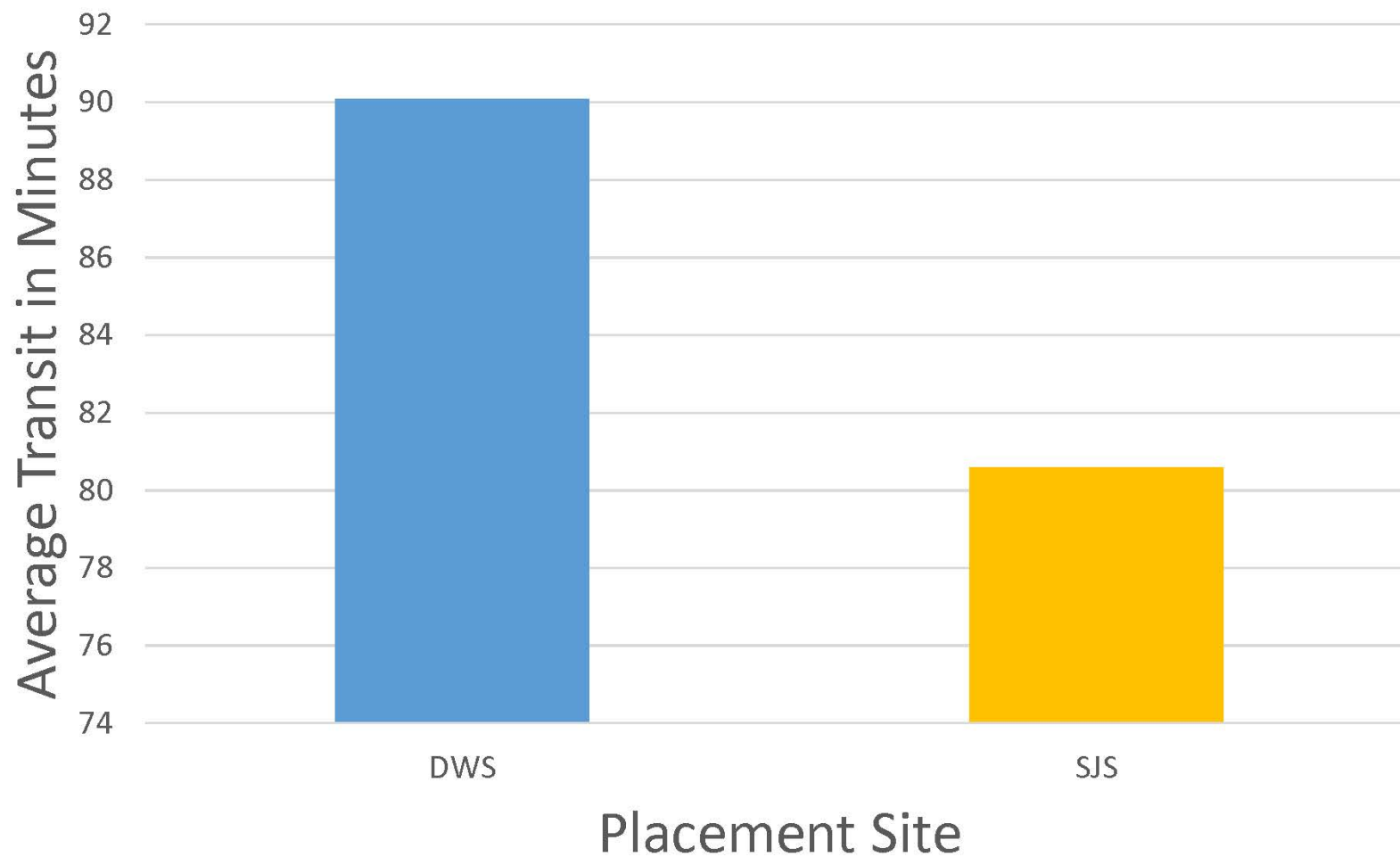
(Courtesy of Curtis Roegner-NOAA)



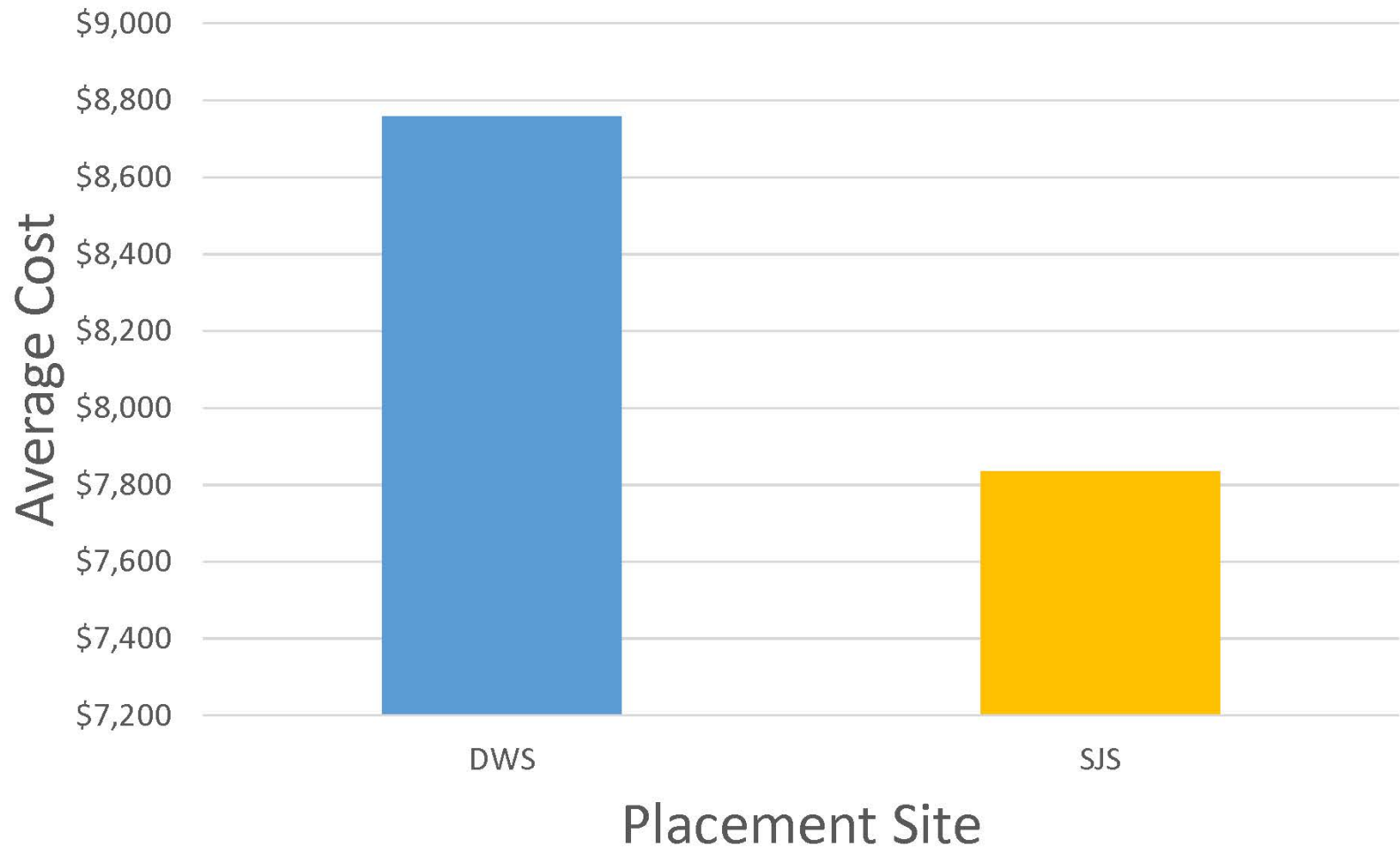




2015 Placement Site Average Transit Time for the Mouth of the Columbia River



2015 Average Transit Time Cost to Placement Site for the Mouth of the Columbia River



Conclusions/Limitations

- Critical need for on-going stakeholder engagement
- Quantifying benefits of nearshore placement
 - Increased efficiency in the dredging program
 - Material remaining in the littoral cell
 - Protecting public investment (South Jetty)
- Displaying low impacts
- Alleviate stakeholder concerns
- Expand network of nearshore sites
 - Reduce localized impacts by having a large network of sites
- AVEDac software needs work to be fully operational
- Quantifying the migration of material from the nearshore site to the beach
- Passive detections
 - Green Sturgeon (*Acipenser medirostris*),
 - Great White Shark (*Carcharodon carcharias*)

