



**U.S. ARMY**

# NEARSHORE NOURISHMENT ADVANCEMENTS INLET GEOMORPHOLOGY

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## COASTAL INLETS RESEARCH PROGRAM

*FY20 IN PROGRESS REVIEW*

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### Sediment Mobility Tool (SMT)

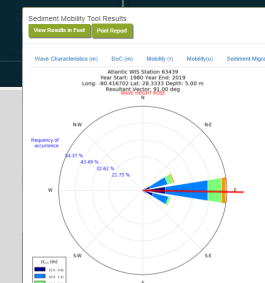
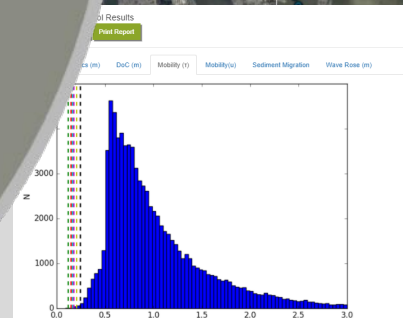
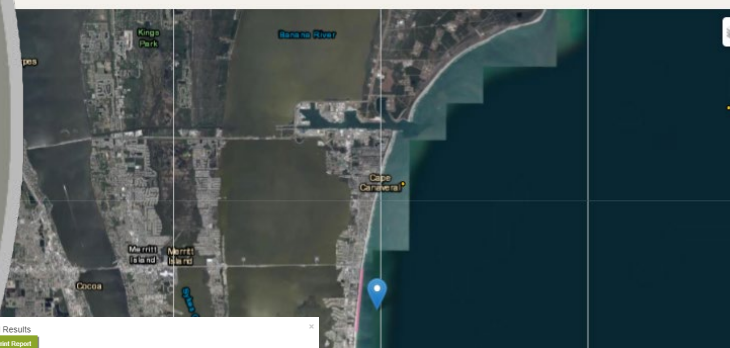
Sediment Mobility Tool (SMT)—Scoping-level tool that displays Depth of Closure (DoC) and sediment mobility data for the US coastline to help in determining how best to use dredge material and where to site nearshore placement areas. Click help for additional details.

to the appropriate 2. Draw Shoreline Angle 3. Select Placement Site Or Latitude: 28.340647553430923 4. Find WIS / Calculate Angle  
Longitude: -80.5975914001465

Angle: 186° Closest WIS ID: 63439

Shore Placement Depth Current 1m (~3ft) above the bed Temperature Salinity  
0.6 m 0.6 m/s 75 °F 35 psu

6. Submit



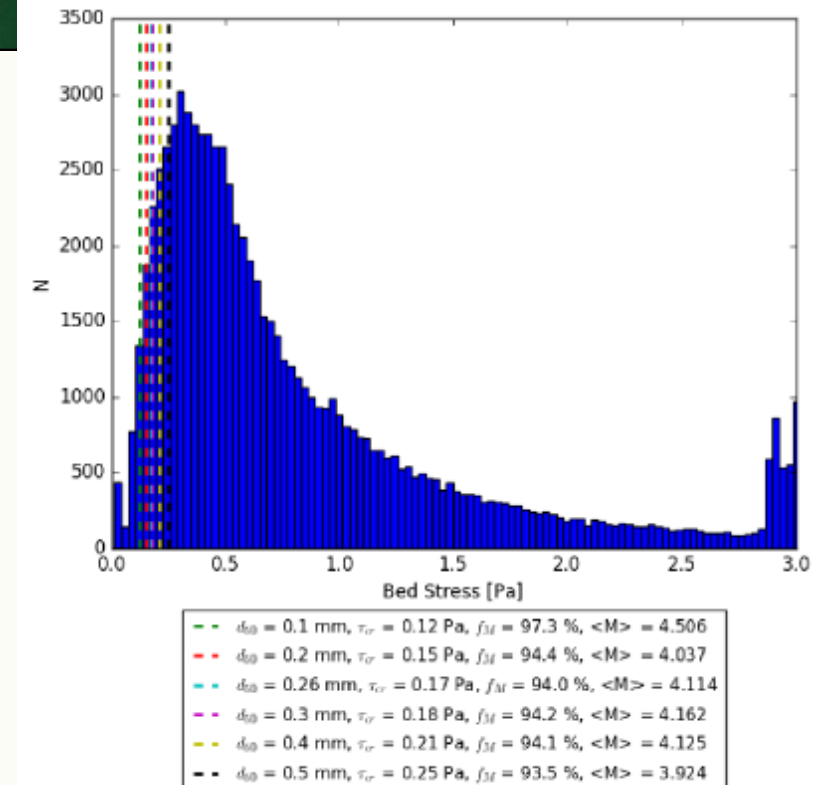
**US Army Corps  
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**ERDC**  
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# Problem Statement

- Nearshore nourishments are an important method to beneficially use dredged sediment in support of coastal resilience. Scoping level tools such as the Sediment Mobility Tool remain an important part of the planning process. As users continue to apply the SMT, potential areas for improvement have come up.
- As sediment is increasingly beneficially used in nearshore placements, the potential to learn from similar placements also increases. Nearshore placement adjacent to coastal structures is an important strategy which limited information has been compiled about.



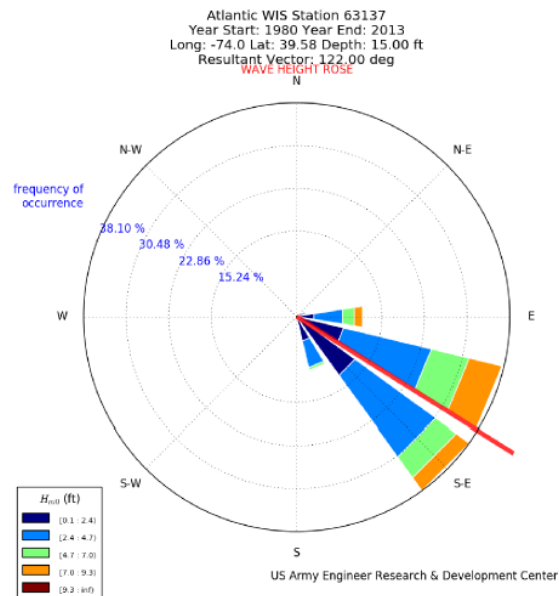
# SONs

- **2016-N-04 Quantifying wave and current driven sediment transport at nearshore dredge disposal sites**
- **2017-N-69 Cross-shore Sediment Sorting of Mixed-sediment Nearshore Placements**
- **2017-N-70 Analysis of Shoreline Response to Nearshore Placement Geometry**
- **2019-N-1386 Strategic Nearshore Placement of Dredged Material to Sustain Coastal Beach & Dune Resilience**
- **2020-N-1564: Increasing Beach Nourishment Lifespan with Nearshore Nourishments**
- **2020-N-1481: Improving scoping level estimates of the lifespans and deflation rates of nearshore nourishments**

# Capability and Strategic Impact Statement

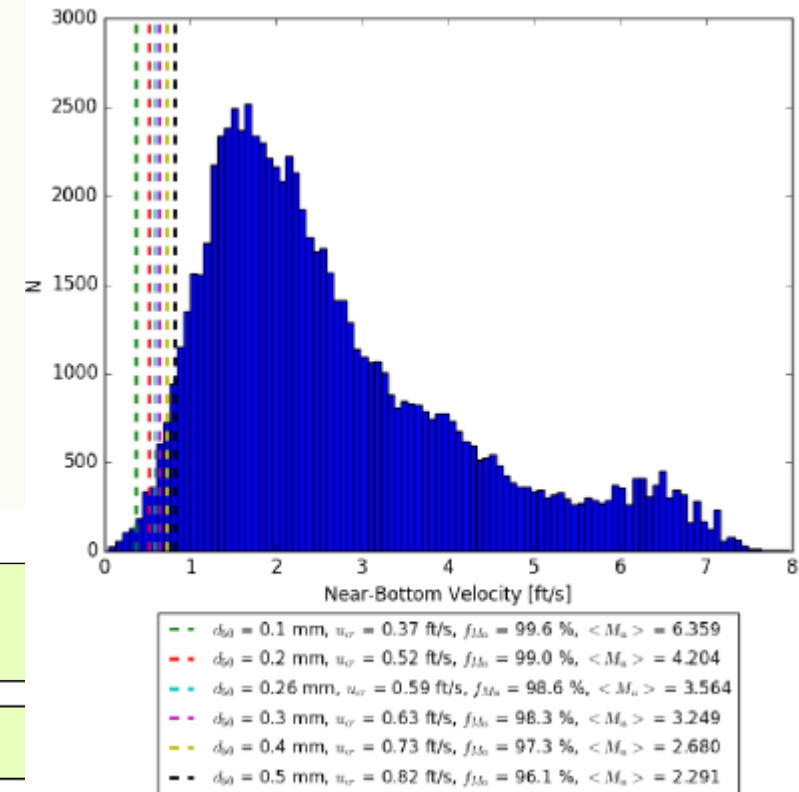
- Updates and improvements to the Sediment Mobility Tool help users better address key scoping level questions.
- Nearshore placements adjacent to coastal structures can optimize sediment impact on erosive areas and transport distance.

## Wave Rose at Nearshore Placement Site:



## Calculated Depth of Closure:

Depth of Closure (1980 - 2013)	
WIS Station 63137, 209° Shoreline Angle, Nearshore Placement Depth: 15.00 ft	
Hallermeier Inner (ft)	20.28
Hallermeier Inner Simplified (ft)	30.55
Hallermeier Outer (ft)	71.94
Birkemeier (ft)	15.51
Birkemeier Simplified (ft)	14.45





# SMT ADVANCED DEMONSTRATION

1. Scroll to the appropriate location.

2. Draw Shoreline Angle

3. Select Placement Site Or

4. Find WIS / Calculate Angle

Latitude: 28.342560283207746  
Longitude: -80.59844970703126

Shoreline Angle: 188° Closest WIS ID: 63439

5. User Inputs.

$d_{50}$  0.44 mm

Nearshore Placement Depth 5 m

Current 1m (~3ft) above the bed 0.06 m/s

Temperature 75 °F

Salinity  
 Fresh Water  
 Salt Water

Advanced

6. Submit

Map labels: Sharpes, Park, Banana River, Cape Canaveral, Merritt Island, Merritt Island, Cocoa, Rockledge, Cocoa Beach, Lake Pointsett, Sugar Creek.

esri

Leaflet | Esri, DigitalGlobe, GeoEye, I-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

10:52 AM  
2/8/2017

# SMT ADVANCED DEMONSTRATION

1. Scroll to the appropriate location. 2. Draw Shoreline Angle. 3. Select Placement Site. Or 4. Find WIS / Calculate Angle.

Latitude: 28.342560283207746  
Longitude: -80.59844970703126

Shoreline Angle: 188° Closest WIS ID: 63439

5. User inputs.

$d_{50}$ : 0.44 mm Nearshore Placement Depth: 5 m Current 1m (~3ft) above the bed: 0.06 m/s Temperature: 75 °F Salinity: 35 psu

6. Submit

This process can take up to two minutes.

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2/8/2017

US Army Corps of Engineers • Engineer Research and Development Center • Coastal and Hydraulics Laboratory

# SMT ADVANCED DEMONSTRATION

Research and Development Center, Coastal and Hydraulics Laboratory, Coastal Engineering Branch.

1. Scroll to the appropriate location. 2. D

Shoreline Angle: 188° Closest

5. User Inputs.

$d_{50}$  Nearshore Place

0.44 mm 5 m

Sediment Mobility Tool Results

View Results in Meters Print Report

Wave Characteristics | DoC (ft) | Active/Stable | Mobility (r) | Mobility (u) | Cross-shore Migration | **Transport Rate** | Wave Rose (ft)

Nourishment Transport Rate  
WIS Station 63439, 188° Shoreline Angle  
Nearshore Placement Depth, 16.40 ft

CERC (K=0.1) (yd <sup>3</sup> /month)	5,015
Mil-Homens (2013) (yd <sup>3</sup> /month)	3,166
Shaeri et al. (2020) (yd <sup>3</sup> /month)	3,126

Close

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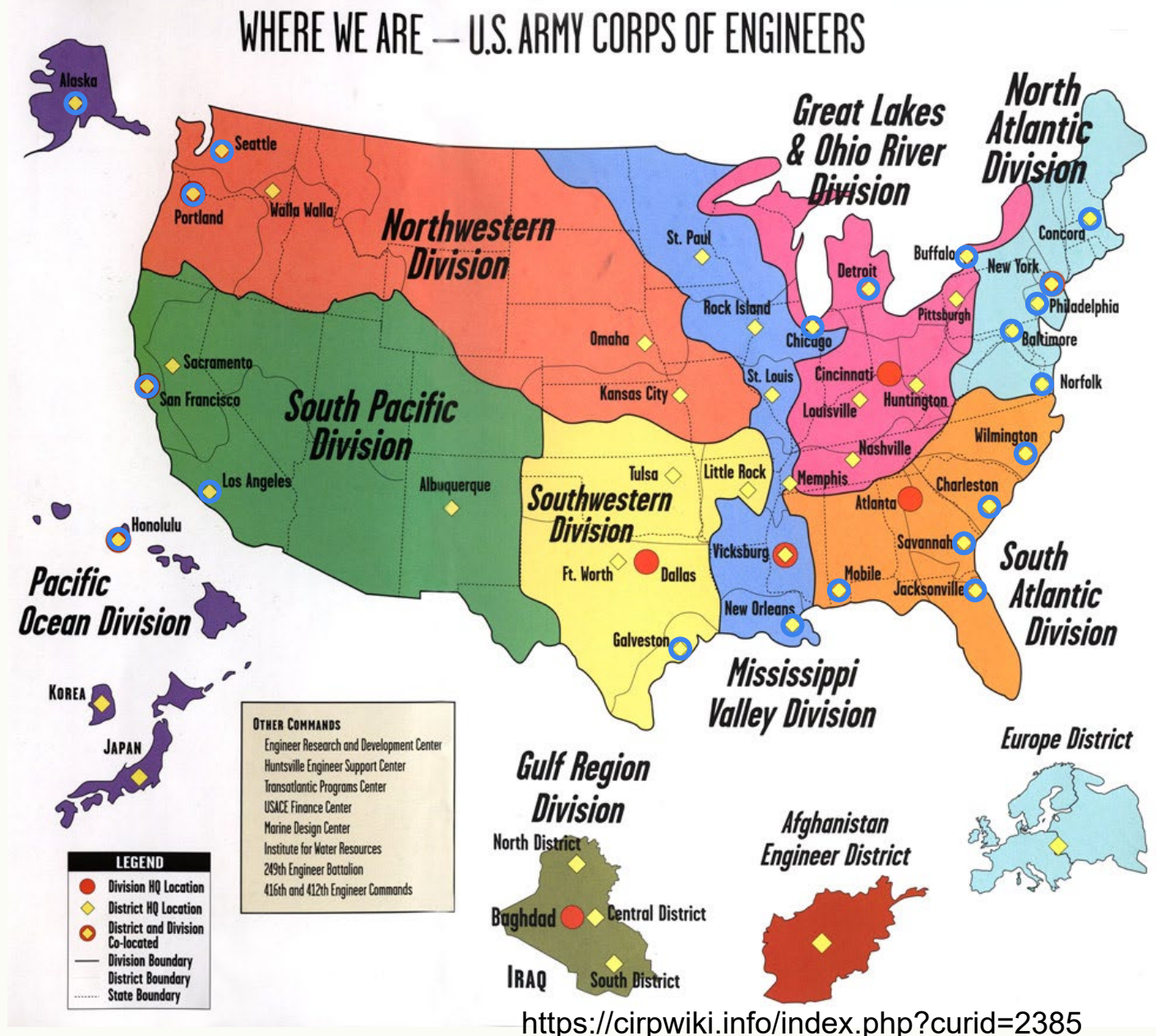
# Nearshore Placement Practices Teleconferences

## District Teleconferences

- LRC, LRE, LRB, NAE, NAP, NAB, NAO, SAW, SAC, SAS, SAJ, SAM, MVN, SWG, SPL, SPN, NWP, NWS, POA, POH

## Discussion Topics

- Nearshore nourishment construction techniques
- Regulations
- Placements outside the surf zone
- Monitoring
- Placements near coastal structures
- Performance metric ideas
- Research suggestions





# Nearshore Placements Near Coastal Structures

## Placements immediately adjacent to coastal structures

- Several examples from NAO, NWP, and NWS of placements in erosive areas around coastal structures (e.g. jetty tip, jetty toe)
- An example from MVN about nearshore placements contributing to the connection between the jetty and beach
- NAP is moving away from placing sediment immediately adjacent to coastal structures over possible infilling concerns

## Placements in the vicinity of coastal structures

- Several examples from LRC, LRE, NAB, NAO, NWP, and NWS of placements often within several thousand feet downdrift of jetties, generally to align with erosive areas
- NWP point about placing sediment to nourish the overall sediment system around coastal structures

**Balance between sediment needs near coastal structures, optimizing transport distances, operational considerations, and potential channel infilling**

# Summary

## FY20 Major Advances in Capability

- Permit users to select specific months for SMT estimates
- Updated Hands and Allison (1991) Chart comparison
- Apply alongshore transport equations to estimate nearshore berm deflation rate following Bain et al. (in prep)

## FY20 Major Products & Collaborations

- SMT code update
- Collaboration with OPJ on bringing new features and updates to the SMT
- Teleconferences on nearshore placement practices with each of the 21 Coastal and Lake USACE Districts
- LR on nearshore placements near coastal structures

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## FY21 Products/Advances

- Continued work with OPJ to convert code updates to python and implement in the NAV Portal setting
- SMT Journal Paper
- Profile modeling of nearshore placements adjacent to beach nourishments and estimates of lifespan increases