ERDC
Engineer Research and Development Center

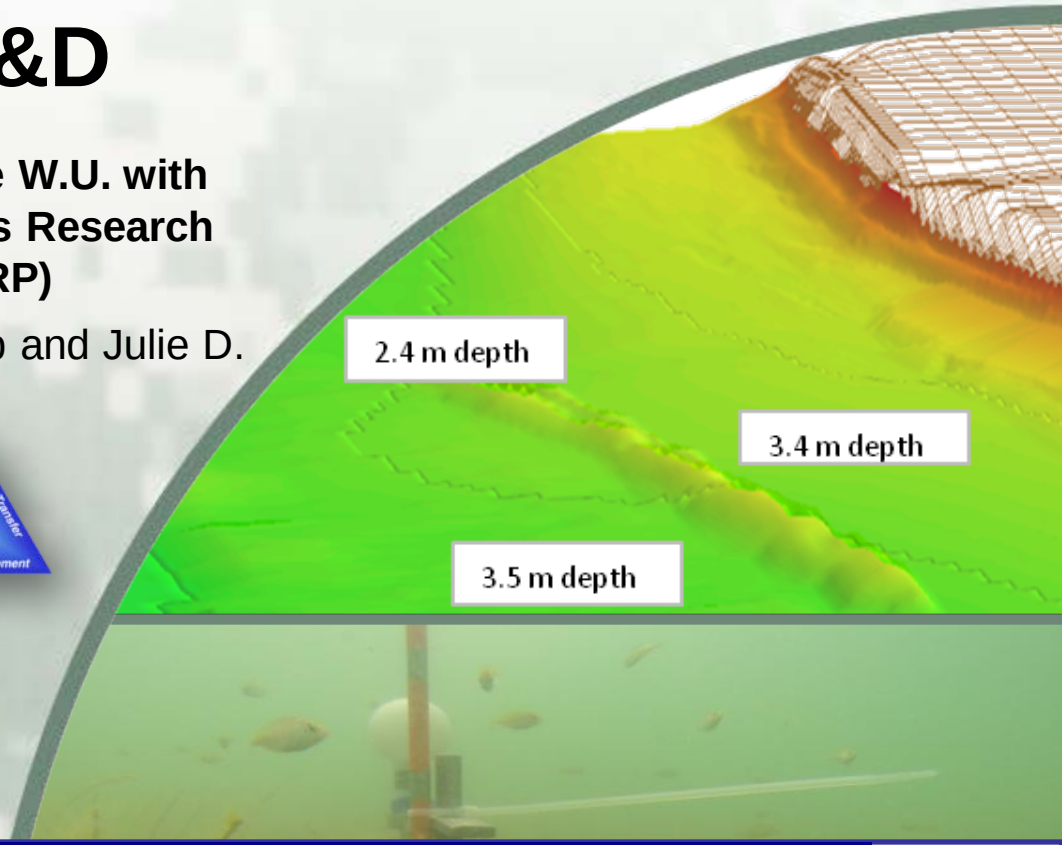
Nearshore Berms R&D

Tanya M. Beck

Kelly Legault (SAJ), Coraggio Maglio, Cheryl Pollock, and Katie Brutsche & Ping Wang (USF)

Collaborative W.U. with Coastal Inlets Research Program (CIRP)

Linda Lillycrop and Julie D. Rosati



Jeff McKee
HQ Navigation Business Line Manager

Jeff Lillycrop
Technical Director

Eddie Wiggins
Associate TD

Statements of Need

Design and Evaluation Tool for Nearshore Berm Placement of Non-Beach Compatible Material
Tracking Number 2011-N-15

Nearshore Placement of Dredged Sediment Assessment
Tracking Number 2011-N-19

Nearshore Berms in USACE

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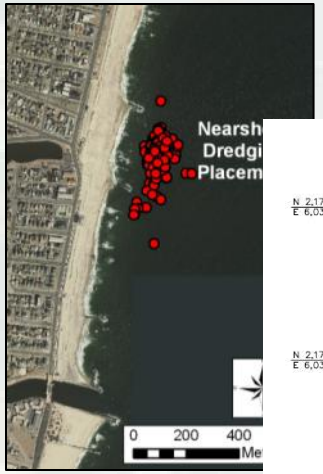
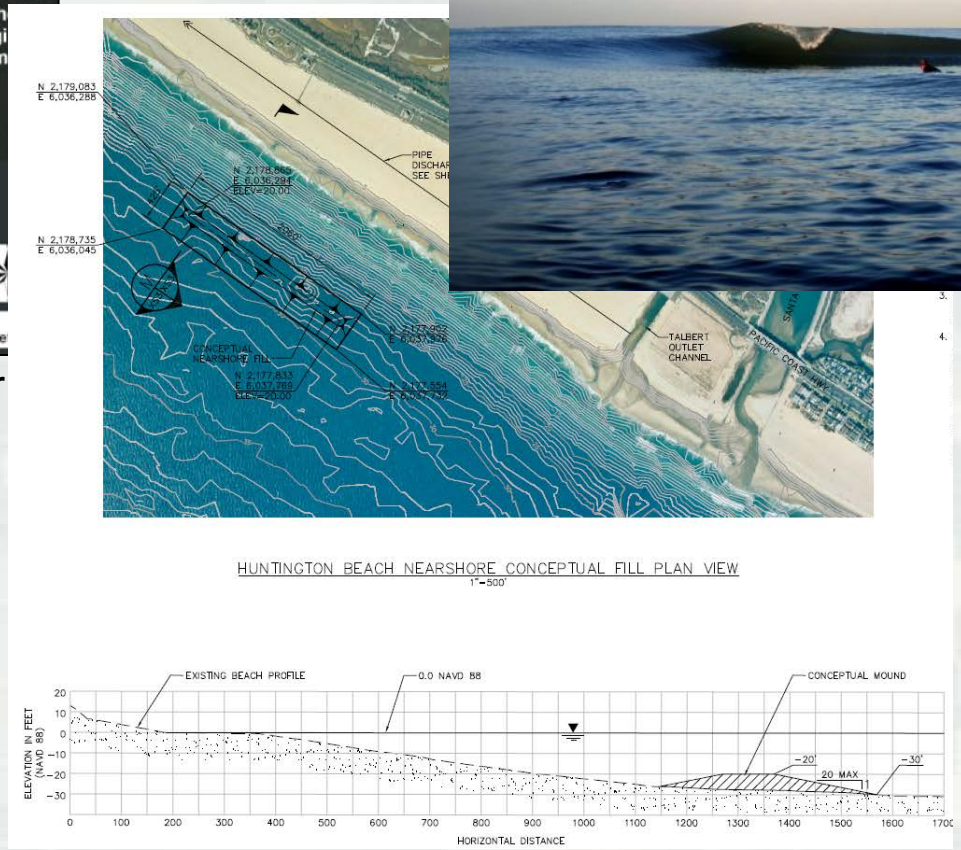
Small Dispersive Placements



Shark River Inlet (NAN)



Huntington Beach (SANDAG)

Assateague Island, MD (NAB)

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Nearshore Berms in USACE

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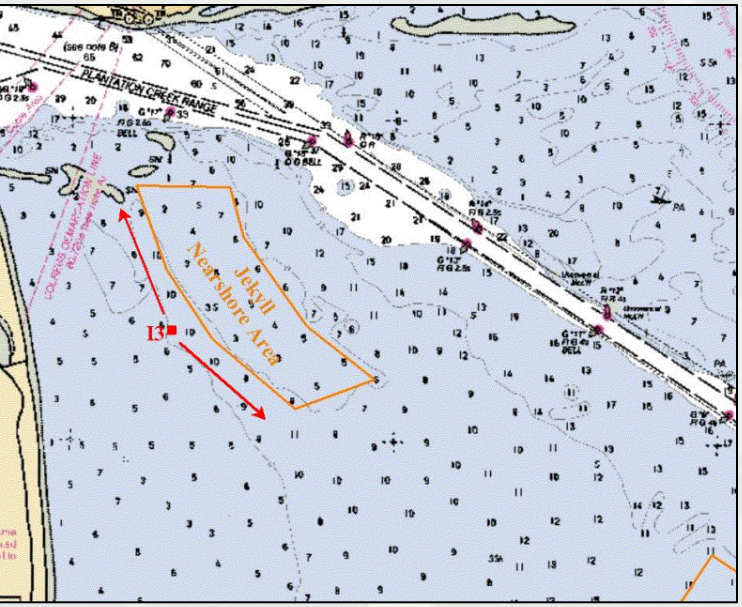
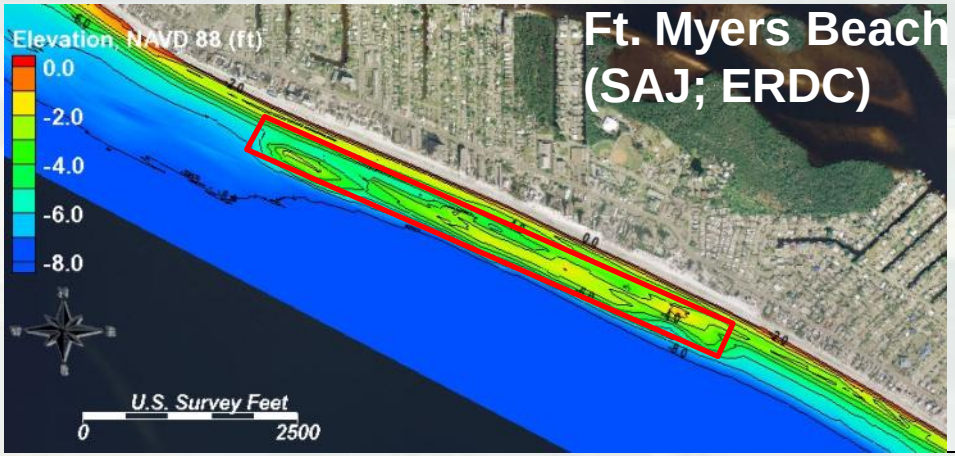
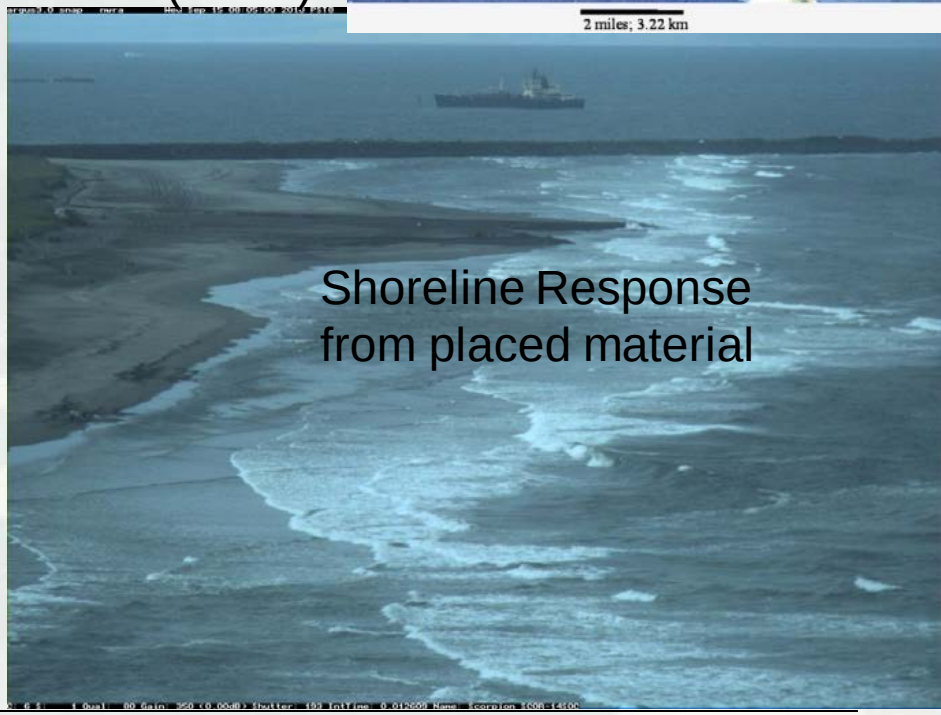


Brunswick (SAS; DOER)

Benson Beach Beneficial Use Placement (NWP)



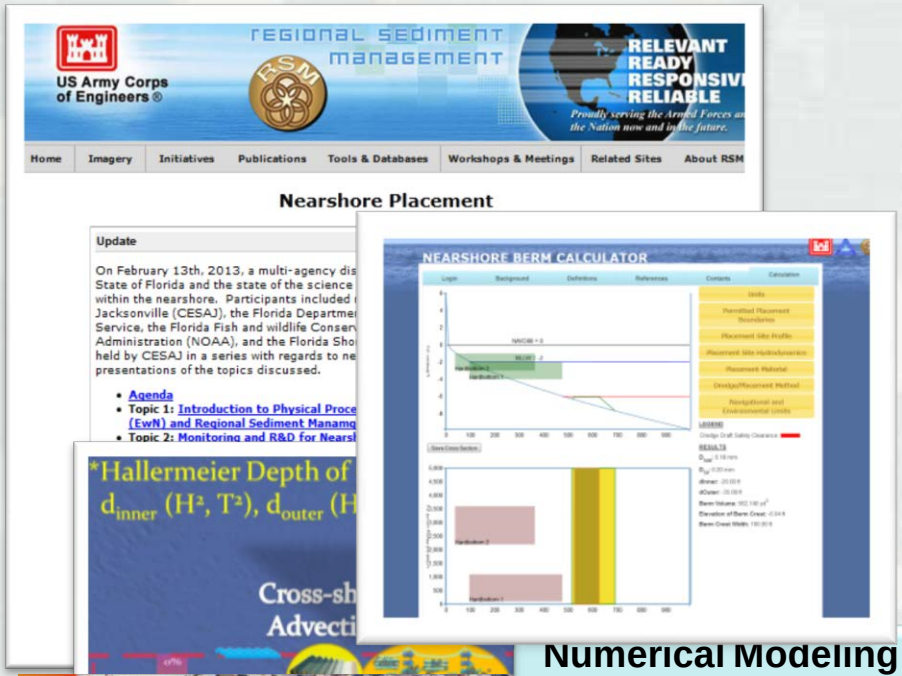
Ft. Myers Beach (SAJ; ERDC)

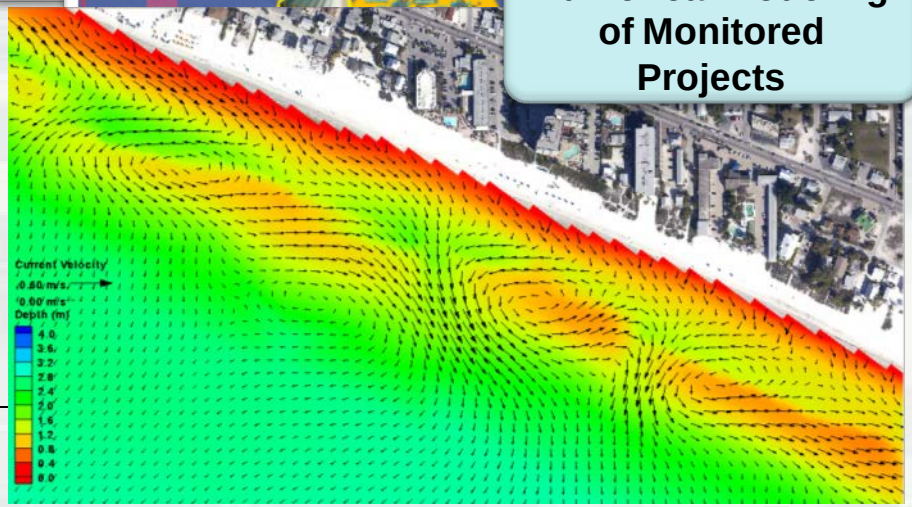


Shoreline Response from placed material

Approach

- Participation In Workshops (SAJ); Nearshore Berm Webinar
- Compilation & assessment of literature and monitoring data (Website & NBC)
- Developing flexible tools (rapid desk-top to detailed models) for design
- Numerical Modeling of Berms Using CMS
- Guidance documentation





Numerical Modeling of Monitored Projects

Modeling Methodology for Nearshore Berms

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Development of Test Matrices for Cross-shore Sediment Transport

Methodology to Develop Parameter Matrix for Sites

BERM INSHORE — LOCAL URSELL

Hs \ Tp				
0.1	6.6			
	101			
0.5	4.2	6.6	3.3	2.8
	205	505	126	91
0.9	3.3	4.2	6.6	2.8
	227	368	909	164
1.7	2.8	3.3	4.2	6.6
	309	429	696	1718
2.1	2.8	3.3	4.2	6.6
	382	530	859	2122

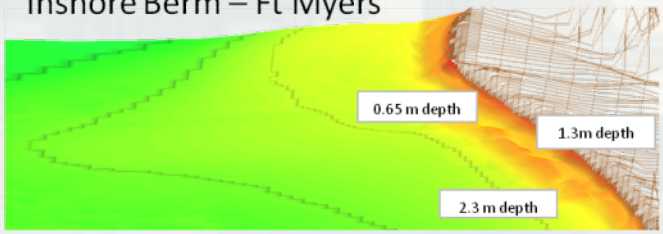
LOCAL DEPTH 0.65

BERM OFFSHORE — LOCAL URSELL

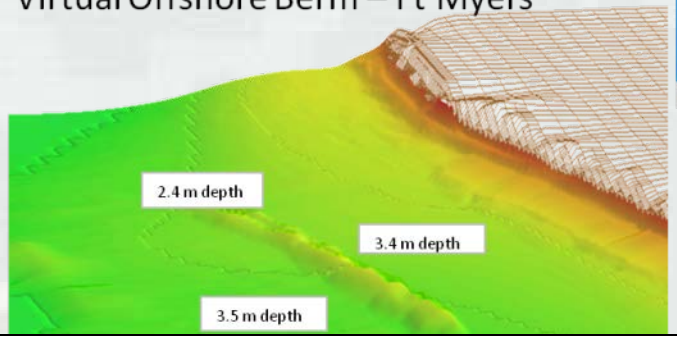
Hs \ Tp				
0.1	6.6			
	7			
0.5	4.2	6.6	3.3	2.8
	15	37	9	7
0.9	3.3	4.2	6.6	2.8
	17	27	67	12
1.7	2.8	3.3	4.2	6.6
	23	31	51	126
2.1	2.8	3.3	4.2	6.6
	28	39	63	156

LOCAL DEPTH 2.4

Inshore Berm – Ft Myers

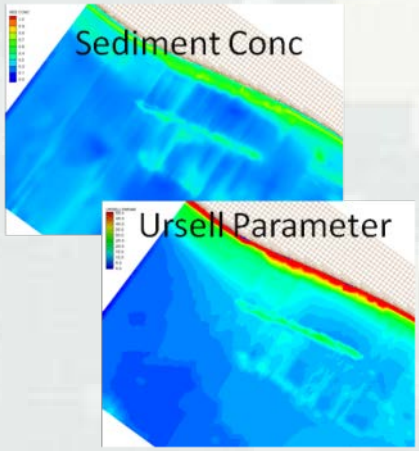


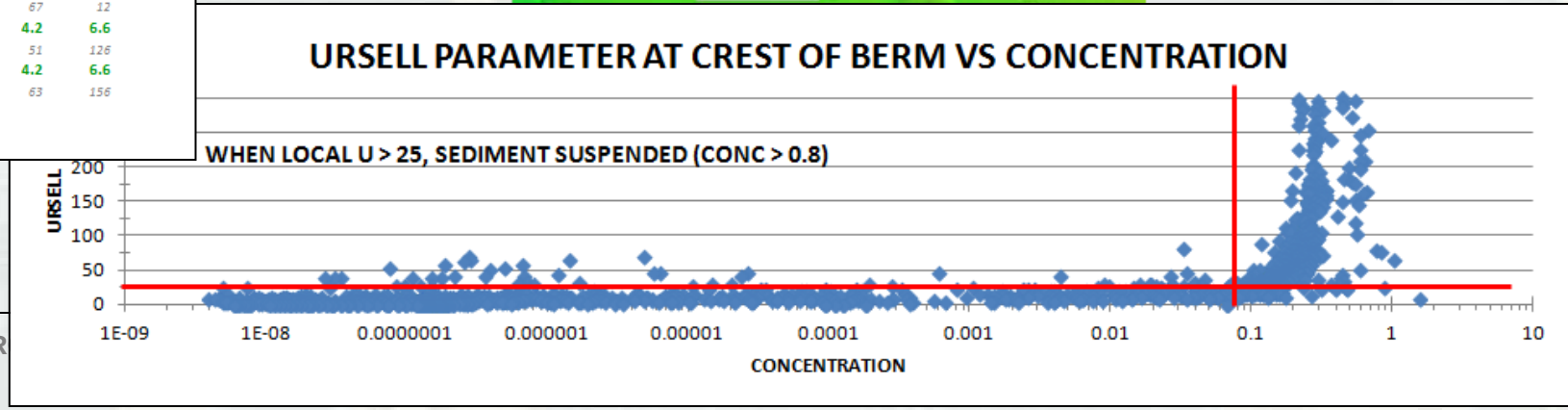
Virtual Offshore Berm – Ft Myers



$$Urs = HL^2/h^3$$

H = Local Wave Height
L = Local Wave Length
h = mean water depth at crest of berm





BUILDING STR

Web-App: Nearshore Berm Calculator

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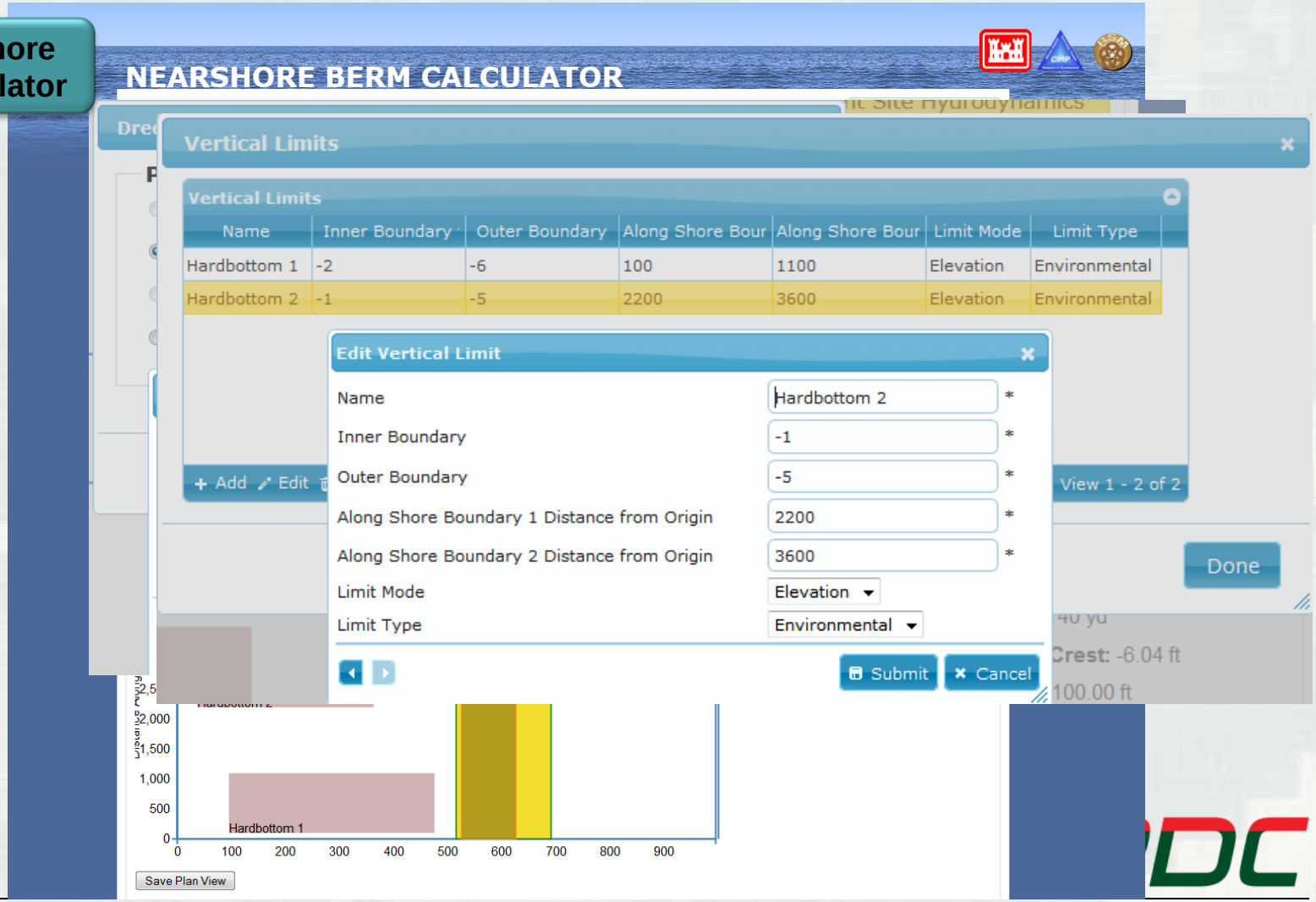
The Nearshore Berm Calculator



http://bermcalc.azurewebsites.net

Innovative solutions for a safer, better world

Leveraging/Collaborative Opportunities:

CIRP/RSM/DOER Collaboration on the Egmont Key Dredging and Placement Project

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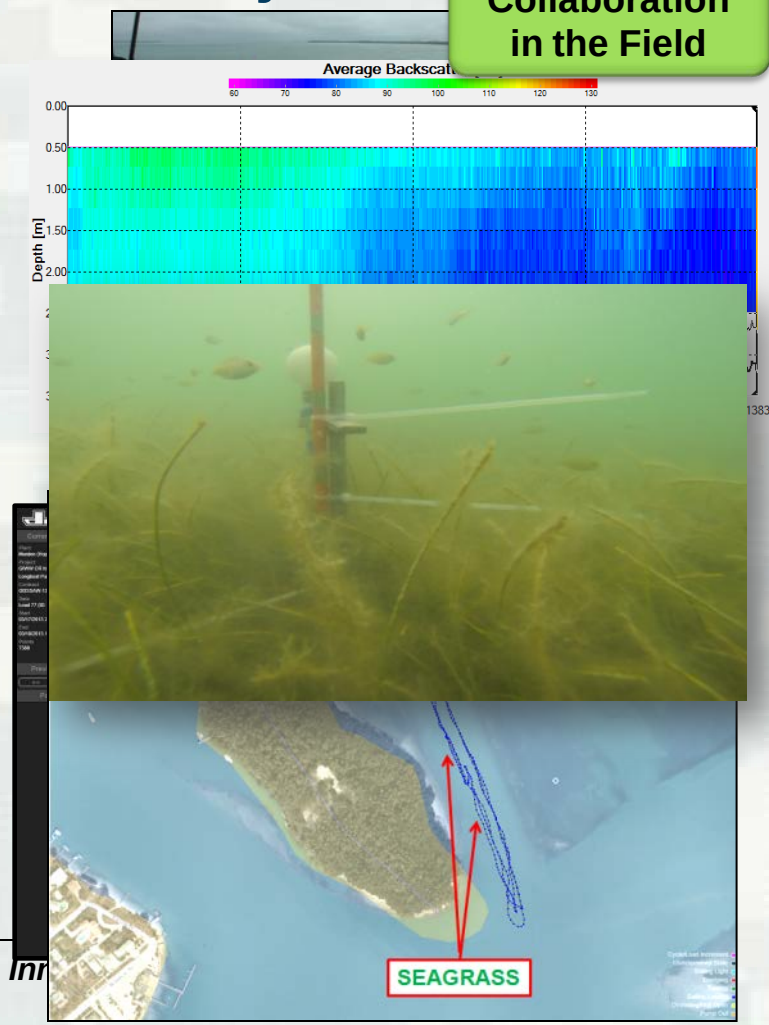
- Monitor Dredging and Disposal Operations for a Nearshore Placement
- DOER Added:
  - Increased Data Collection for Mass Balance
  - Monitoring of Plume Near-field and Far-field Fates
  - Determine Impacts to Resources
- Find Correlations between TSM, NTU and Light Attenuation
  - Looking for a way to accurately measure thresholds of Turbidity

Collaboration in the Field



Deliverables:

	Date
o Nearshore Berm Webinar	11/30/2012
o Nearshore Berm Calculator Release Version	9/31/2013
o Nearshore Berm Calculator Technical Note	10/31/2013
o Pensacola Swash Berm RSM-Technical Note	5/31/2013
o Ft. Myers Berm Progress Report	7/31/2013
o Egmont Key Berm Progress Report	8/31/2013
o Nearshore Berm RSM IPR Presentations	8/31/2013
o Analysis and Numerical Modeling of Monitored Nearshore Berms JP (USF)	9/31/2013
o Egmont Key Technical Report	9/31/2013
o Bonus: Technical Note and Journal Paper on Sensitive resources near dredging of Navigation Channels	9/31/2013

Accomplishments/Benefits/ Lessons Learned :

- Participation in two SAJ Stakeholders Meetings
  - Tech/knowledge transfer to Florida Stakeholders
  - Gain understanding of major regulatory questions surrounding nearshore placement operations (beach and nearshore)
  - Stakeholder needs drive District's Statements of Need (we are getting first hand knowledge of the needs)
  - Gain interest in stakeholder participation in future research endeavors
- California/Oregon: Participation in meetings brought on perspective of temporal benefits based on depth
- Leveraging with other R&D Programs enhances the research objectives and provides more researchers
  - Multiple objectives in CIRP/RSM/DOER collaboration

FY14 Plans

- Publish Nearshore Placement Tech Report (#2)
- Publish CHETN on the NBC
- Continued development of the NBC
- Idealized modeling to develop empirically-derived design parameters
- Use Idealized Modeling for planning the FRF Experiment
- JP publication on the morphodynamics of the Ft. Myers Nearshore Berm (USF)
- Collaborate with SAJ Stakeholders
- Collaborate with other potential FY14 RSM Studies (NWD/SPD; NAE)

FRF Experiment FY15

Nearshore Placement Design Plan

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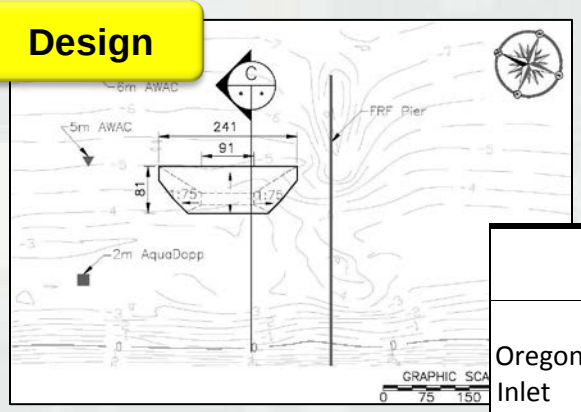
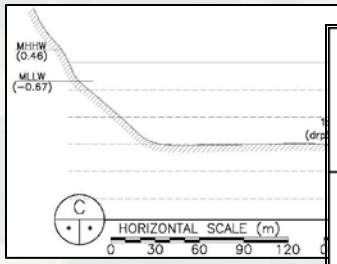
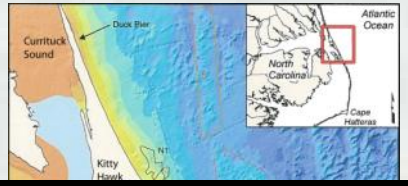
Design





Sources



Source	Approx. Sand Diameter (mm)	Distance to FRF km (Miles)	Concerns or Obstructions
Oregon	0.22	50 (31)	Distance from the FRF
			could be 25-
			unt of fines, nance in the g Hwy 12

	Material Source			Dredge and Placement Method			Answer Stakeholder Questions				
	Oregon Inlet	Offshore sand deposits	Currituck Sound	Pumped into Place	Currituck or Murden Bottom Discharge	Sidecasting Placement	1	2	3	4	5
Design 1 – Swash zone placement	✓	✓	✓	✓				✓	✓	✓	
Design 2 – Nearshore berm	✓	✓	✓	✓	✓ (in calm conditions)		✓	✓	✓	✓	✓
Design 3 – Deeper nearshore berm	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓

						Discharge Diameter mm (in)
						Not listed
						NA
						NA
						254 (10) Submersible pump
USACE	Merritt	Sidecasting	NA	-	1.47 (4.83)	254 (10)
GLD&D	Dodge Island	Hopper	2,752 (3,600)	5.9 (19.5)	2.9 (9.5)	Not listed
GLD&D	Padre Island	Hopper	2,752 (3,600)	6.0 (19.6)	2.9 (9.5)	610 (24)
GLD&D	Liberty Island	Hopper	5,000 (6,540)	8.6 (28.3)	Not listed	762 (30)
GLD&D	Terrapin Island	Hopper	4,893 (6,400)	6.8 (22.3)	Not listed	851 (33.5)

*** Design and Documentation by Brian McFall**

FRF Experiment FY15

Nearshore Placement Design Plan

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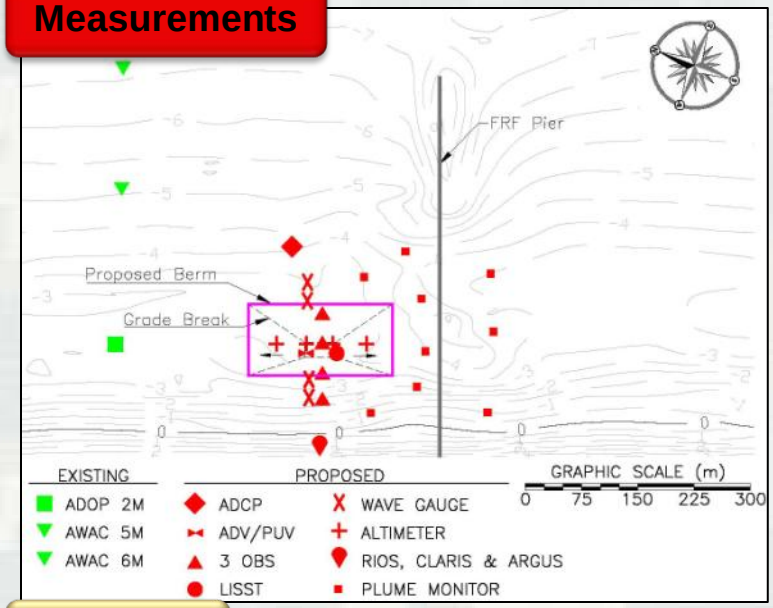
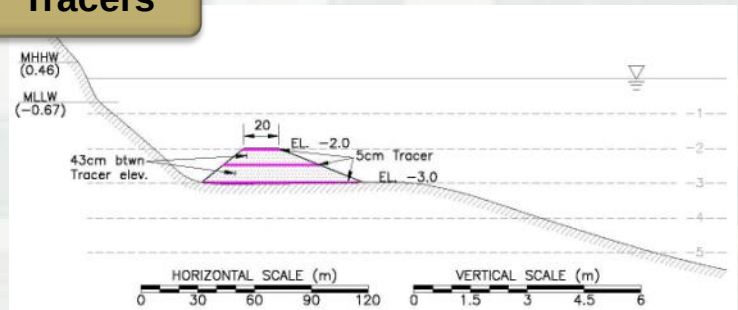
Measurements



Tracers



Recommendations

- Choose a design option
- Coordinate with the Town, State, and Wilmington District (Washington Office) on borrow site
- Coordinate with USACE-Wilmington and with Great Lakes D&DC and be prepared for more than one option (two berms are better than one)
- Test different placement techniques (works best if more than one type of dredge)
- Prepare for measurements: Procure instrumentation and coordinate with the field

*** Design and Documentation by Brian McFall**

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