

# Regional Sediment Management Program



Engineer Research and  
Development Center

**Linda Lillycrop**  
Program Manager

**Jeff McKee**  
HQ, Proponent  
Navigation Business Line Manager

**Jeff Lillycrop**  
Technical Director, Navigation

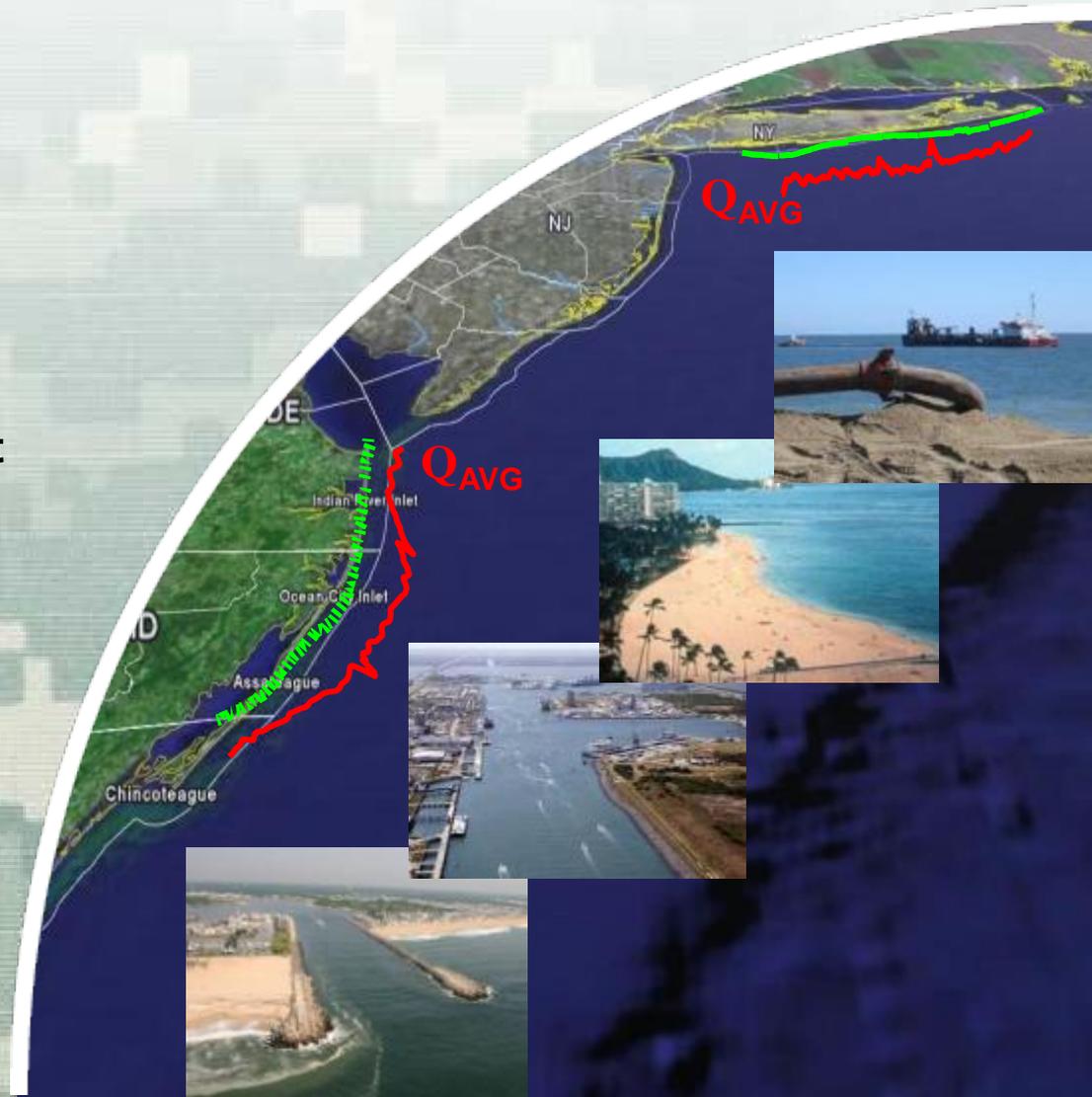
**Eddie Wiggins**  
Associate Technical Director, Navigation

**Regional Sediment Management  
and  
Engineering With Nature  
Inland Meeting  
Omaha, NE  
29 April – 1 May**



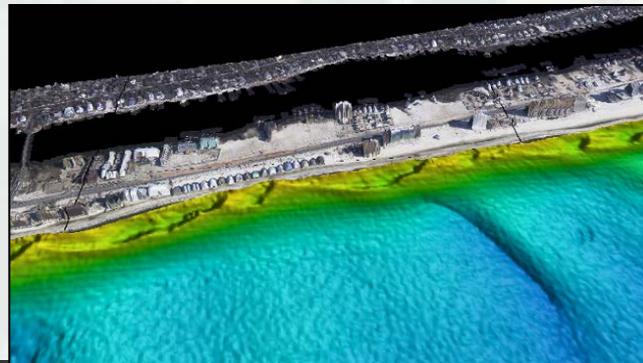
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US Army Corps of Engineers  
**BUILDING STRONG**®

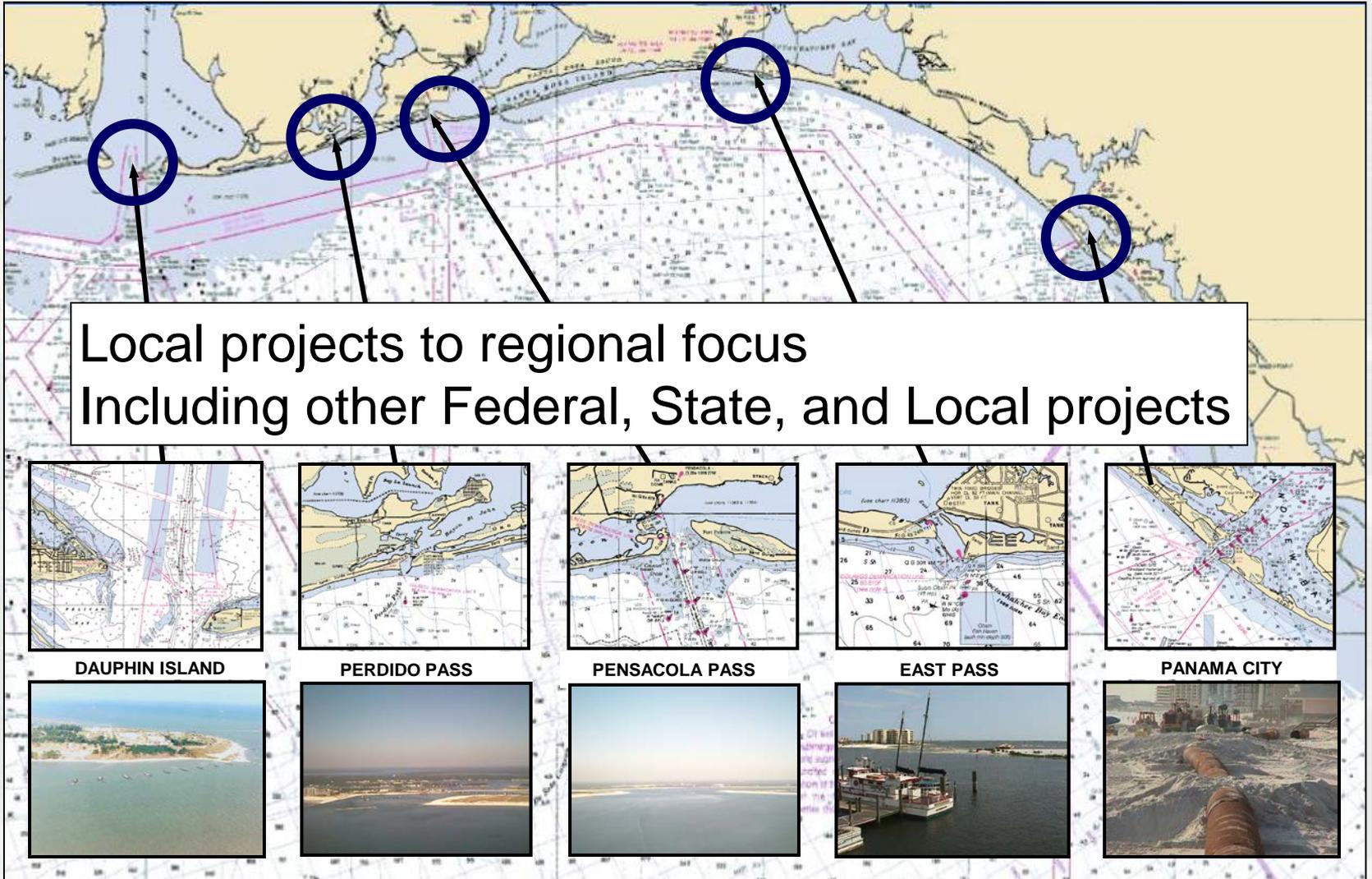


# Outline

- **Regional Sediment Management**
  - What it is
  - How it works
- **District Participation**
- **RSM Examples R&D/District**

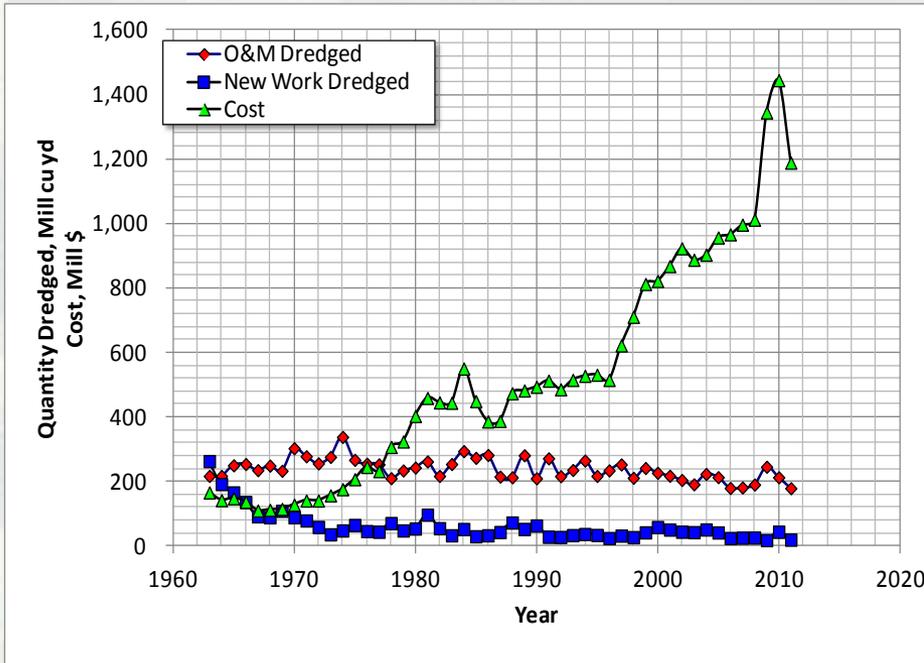


# Why RSM?

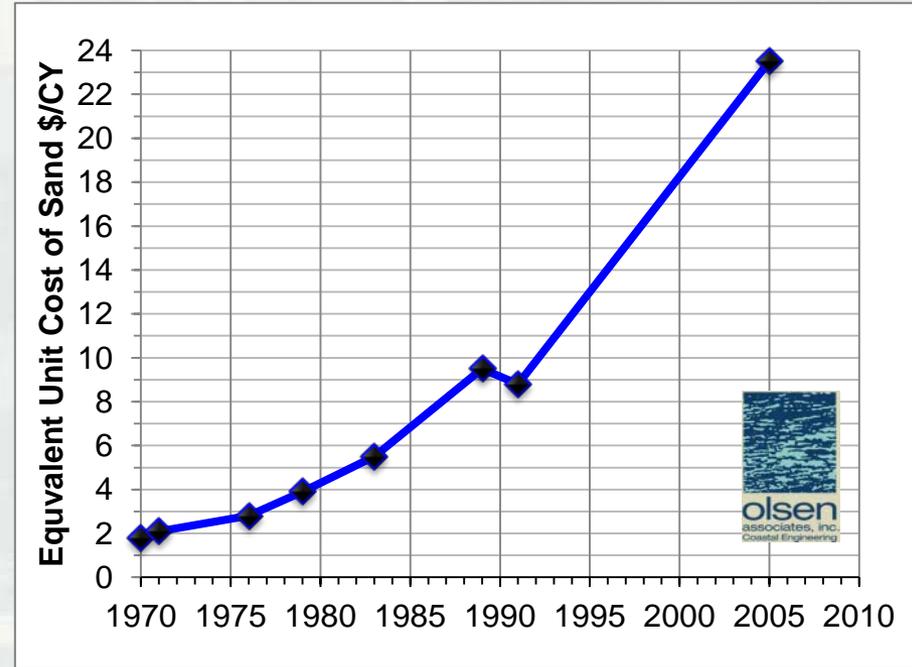


# Increasing Maintenance Costs

**US Navigation Channels**  
O&M & New Work Volumes and Cost



**Broward Co Shore Protection Project**  
Cost of Sand



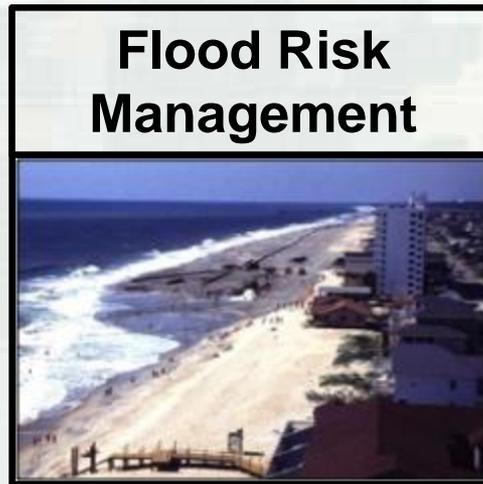
# Regional Sediment Management



A systems approach  
for efficient and effective use  
of sediments  
and management of projects  
in our Coastal, Estuarine,  
Riverine, and Watershed  
environments



# RSM = Sustainable Solutions for.....



## RSM Operating Principles:

- Recognize sediments as a regional resource; prioritize use
- Link and leverage across multiple projects, business lines, authorities
- Improve operational efficiencies & natural exchange of sediments
- Economically viable, environmentally sustainable solutions
- Local sediment actions which benefit the region, consider regional impacts
- Enhance technical knowledge/tools for regional approaches
- Share information and data
- Communicate and collaborate – USACE, Stakeholders, Partners



# RSM Team

**USACE  
Stakeholders and Partners**

**Share Successes  
and  
Lessons Learned**

**Identify Opportunities  
and  
Solutions**



**Take  
Action**

**Decision  
Making**

**Leveraging  
Resources,  
Data, Tools,  
etc**

**Overcome  
Obstacles**



# RSM Strategies



Reduce Offshore Placement



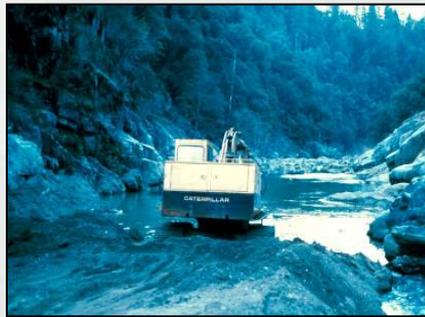
Nearshore/Beach Placement



Bypass Optimize Placement



Reduce CDF Placement Utilize to improve system



Reduce Sediments at the Source

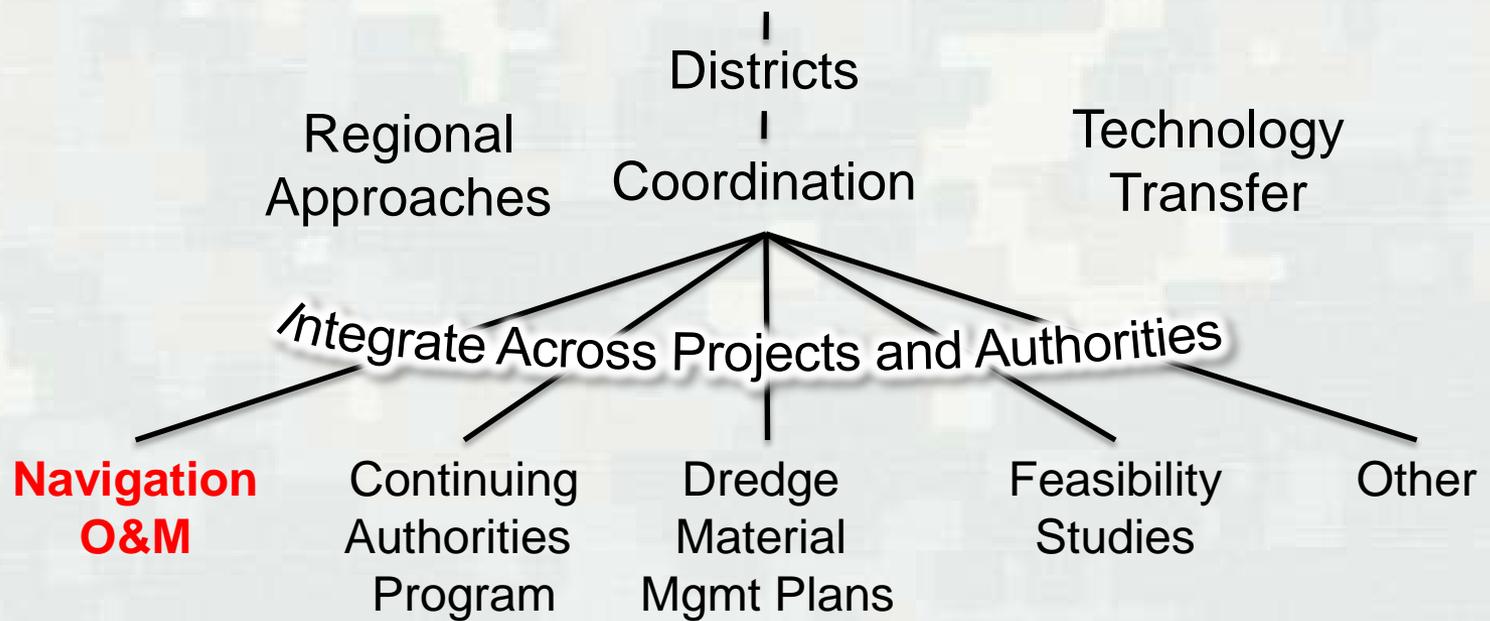


Ecosystem Restoration w/partners

- **Keep sediment in the littoral system**
- **Enhance natural sediment processes**
- **Reduce sedimentation**



# RSM Program



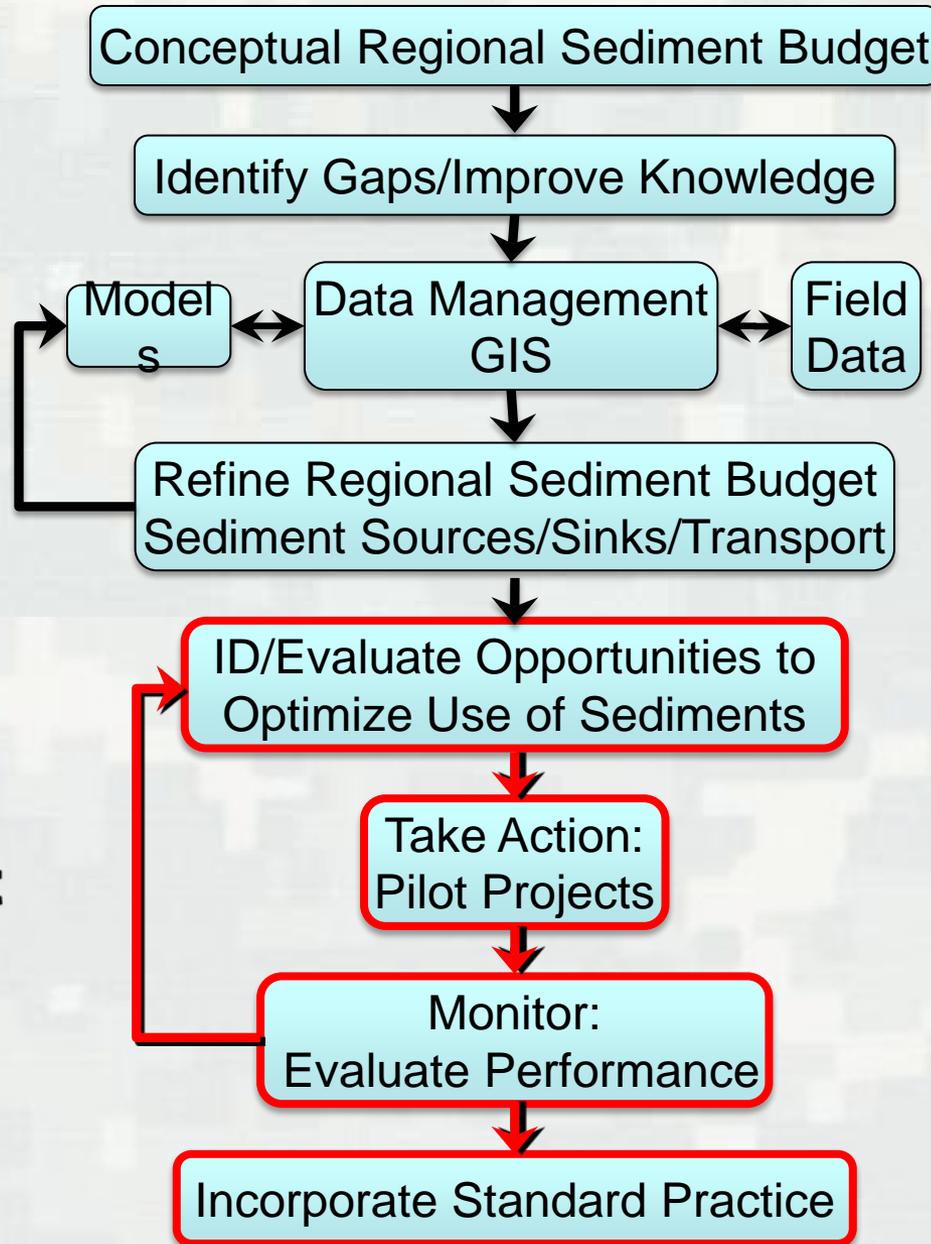
## *Construction*



# RSM Process

**Understand  
Region**

**Adaptive  
Management**



Communicate  
Coordinate  
Collaborate

USACE  
District PDT  
Divisions  
R&D

Partners

Stakeholders

Environmental  
Interests



## RSM Plans – Shelf Art

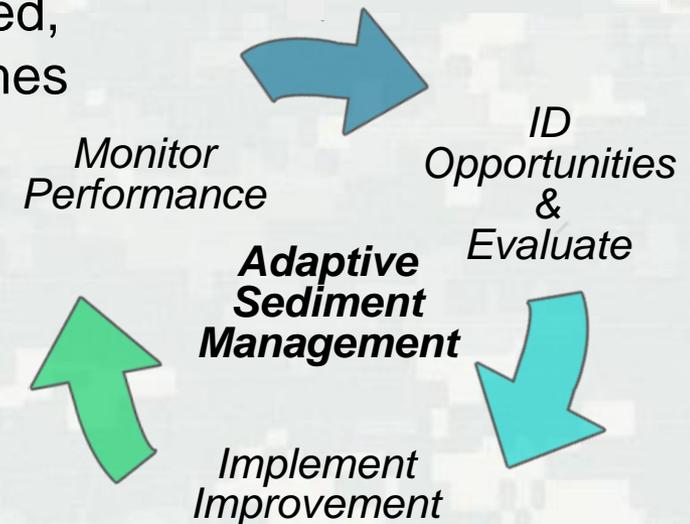
- 3-5 (or greater) year studies
- Expensive \$\$\$\$
- Lack coordination (authorities, cost share, permits, overcome hurdles)
- Do not result in construction -  
*Not moving sediment or no sand on the beach*



## RSM Strategies\*

Practical actions that can be planned, evaluated, coordinated, and constructed in short timeframes (1-3 years), adaptively managed

\*Win-Win for everyone



# *District Participation*



# Historical RSM Participation (2000-2013)



- ◆ 25 Districts
- ◆ ERDC, IWR-HEC



CODS/CFDC

NCDB

MCNP

WOTS



# RSM FY14 Participation



MCNP  
CODS  
NCDB



RSM FY14: 21 Districts, ERDC, IWR/HEC



# FY14 RSM

## Districts

LRC IL North Shore Sediment Budget, RSM Strategy  
NAB Atlantic Coast of MD Sediment Budget, RSM Strategy  
POH West Maui Sediment Budget, RSM Strategy  
SAJ N Coast Puerto Rico Sediment Budget, RSM Strategy  
SAW Masonboro Inlet Sediment Budget, RSM Strategy  
NAE Saco Bay-Scarborough Inlet RSM Strategy  
NAN Sandy Hook Channel Sediment Management  
SWG Galveston Entrance Channel RSM  
MVR Sangamon/Illinois River System Analysis  
MVS Kaskaskia River Sedimentation Reduction  
SAC Charleston Harbor Modeling, RSM Strategy  
NAO James River Navigation Channel, RSM Strategy  
SAJ Nassau & Duval Co RSM Strategies  
NWP Yaquina Jetty Sediment Stabilization-Sand Fencing  
SAJ Fate of Fines/Ship to Shore  
SPD/Corpswide Nearshore Placement  
LRE/LRB RSM PDT, Nearshore Placement, CE-Dredge Data  
NAP Document Post Sandy/Irene RSM-EWN Strategies/Actions  
NWO Inland RSM-EWN Workshop, RSM PDT/Coordination  
NWK Inland RSM-EWN Workshop, Reservoir Sustainability  
Engineering With Nature

## R&D/Tech Transfer

Nearshore Placement Guidance/Tools  
Sediment Budget Analysis System  
Defining Coastal Regions – Lidar  
Data Management and Access  
Nav Data Integration Framework  
CE-Dredge Dredging Histories DB  
Sediment Database & Web Tools  
RSM Projects Database  
RSM & CE-Dredge Viewer  
CMS/PTM Applications



MCNP

CFDC



# RSM Program Funding Process

- Request for Proposals
- Submittals THRU:
  - District RSM POC
  - District Chief, Operations
  - MSC RSM POC and MSC Chief, Operations
- Submittals TO:
  - HQ, Navigation Business Line Manager, Jeff McKee
  - ERDC RSM Program Manager, Linda Lillycrop
- Review Team: 4 Districts; CWG Lead; Inland POC, R&D PMs
- RSM PM formulates program
- Recommend Program/Budget ERDC TD Navigation
- Recommend/Approval to HQ Navigation Business Line manager
- Notify Districts of selections

Required from all initiatives:

Quarterly Progress Reports, Fact Sheets, Present RSM IPR/Workshop  
Lessons Learned: RSM Technical Notes



# RSM FY11-15 Proposal Criteria

- **Supports RSM and EWN Principles and Practices**
- **Takes action to optimize and move sediment**
- **Reduces lifecycle costs/Increases benefits**
- **Innovative solutions:**
  - Links multiple projects
  - Leverages across business lines, programs, projects
  - Develops new capabilities or techniques.
- **Utilizes existing/enhances Corps tools and builds Corps technical expertise.**
- **National significance & product transferability**
- **Technical Transfer:**
  - Communicate lessons learned / Publish results
  - Demonstrates benefits
  - Participation in Annual RSM IPR and Workshop
- **Past Performance: Completed Products, Milestones, Participation**

FY14: 38 proposals submitted, 21 selected

FY15 Proposals due 8 Aug 2014



## RSM Technical Notes, Reports, Manuals, Conference Papers



## Bi-Monthly RSM Conference Calls Webinars

*Technical Webinars with Districts*  
 CE-Dredge Dredging Manager  
 Sediment Sampling Database  
 Sediment Analysis and GeoApp  
 Sediment Budget Analysis System

DOTS: Training, technical assistance, case studies



**14<sup>th</sup> Annual  
RSM and EWN  
In-Progress-Review and Workshop**

22-24 July 2014  
Vicksburg, MS

***Please Join Us!!***



2013 RSM and EWN IPR and Workshop  
Coastal and Hydraulics Laboratory, Vicksburg



\*PDH available



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# RSM R&D Examples



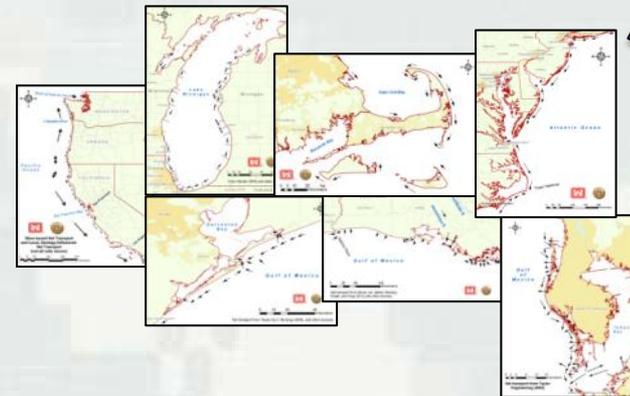
# Sediment Budget Analysis System (SBAS)

## Sediment Budget Viewer

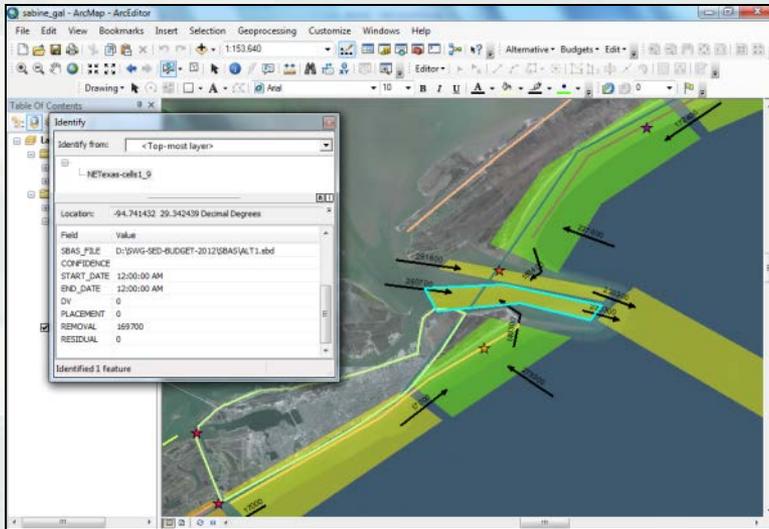
## Sediment Budget Repository



SBAS Web-Viewer



Sediment Budget Repository



SBAS Arc10  
NCMP 3D Lidar

\*SoN 2012-N-15

Automated Feature Extraction for Sediment Budgets

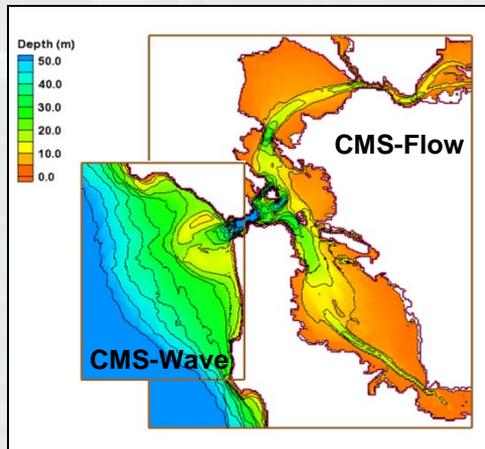
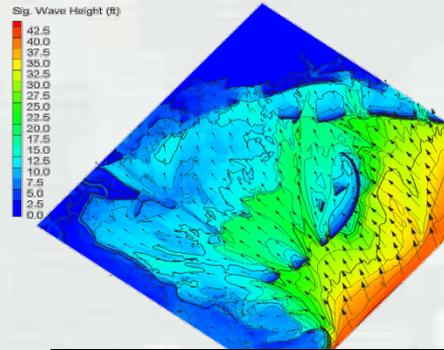
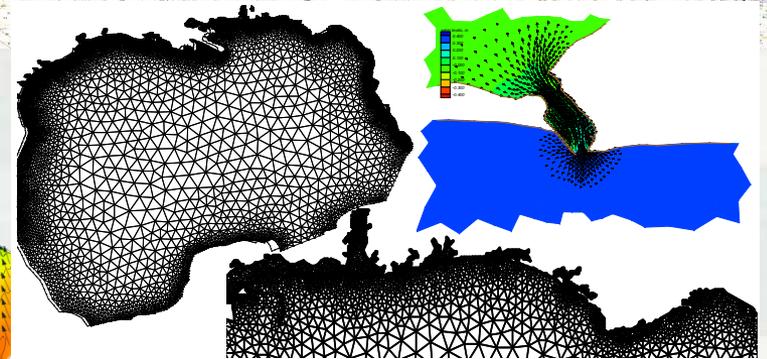
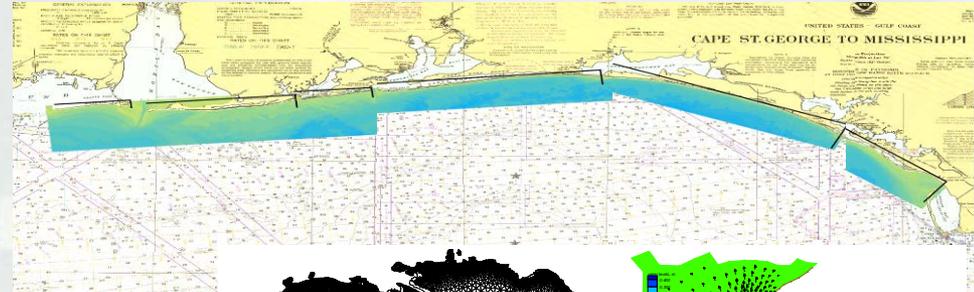


# Model Enhancements

Waves, Circulation, Water levels, Sediment Transport, Shoreline Change

Complex to Adaptive Management

- Regional processes and trends
- Sediment sources & sinks
- Multiple interacting projects
- Connect beaches & inlets
- Navigation channel maintenance
- Evaluate local/regional Strategies





# Supplemental Data Collection for Comprehensive Regional Analysis

## SAJ Southwest FL RSM



# JALBTCX – National Coastal Mapping Program

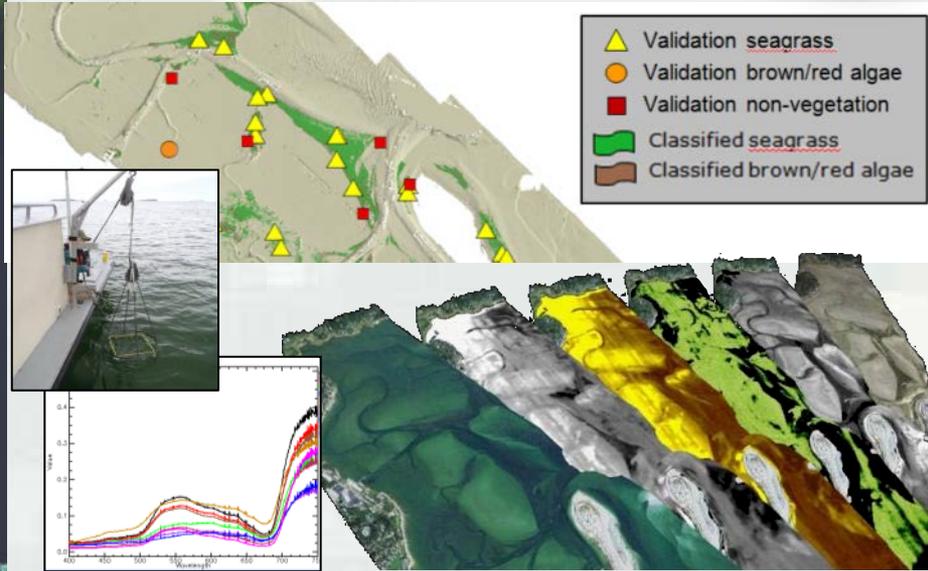
## National Coastal Mapping Program

### Products

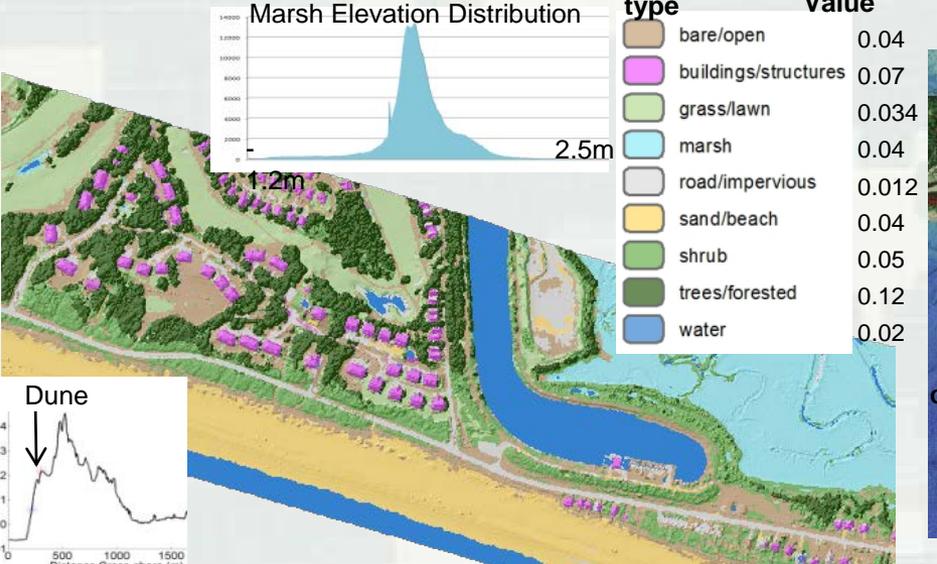
- ASCII XYZ
- Aerial photos
- Zero contour
- Aerial photo mosaics
- 1-meter bathy/topo DEM
- LAS format topo
- 1-meter bathy/topo bare earth DEM
- Hyperspectral image mosaics
- Laser reflectance images
- Basic landcover classification
- Volume change



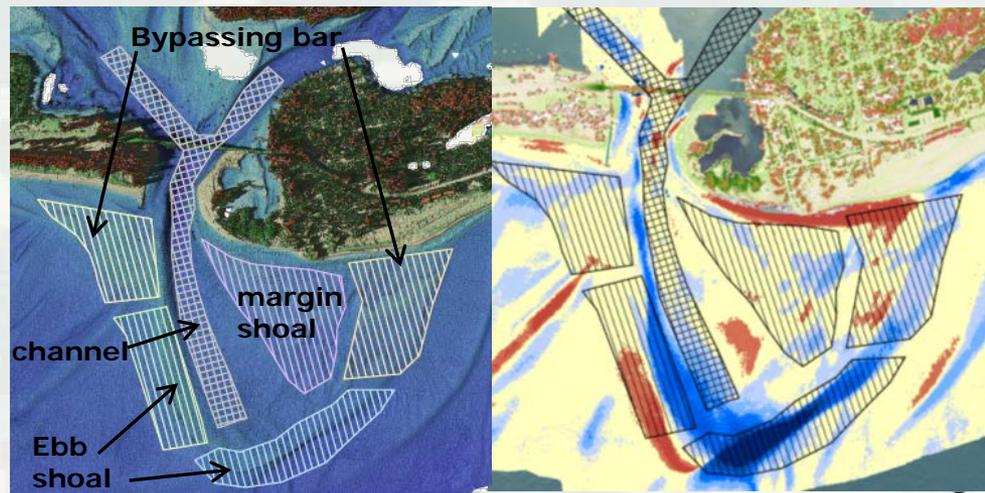
## Submerged Aquatic Vegetation



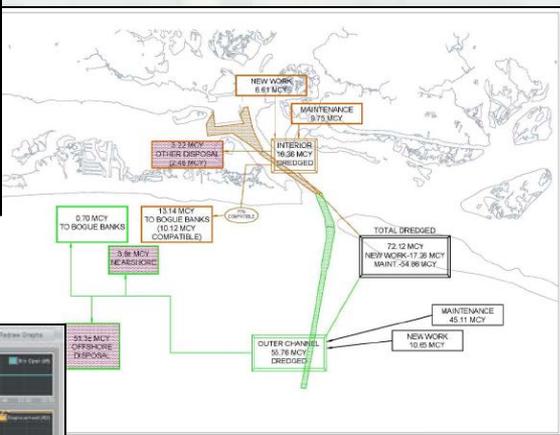
## Coastal Land Cover



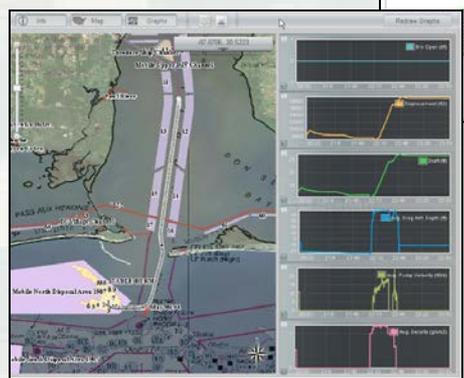
## Sediment Budgets



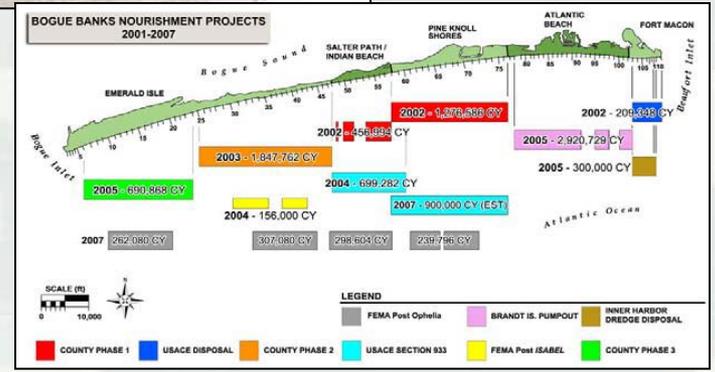
# Dredging information:



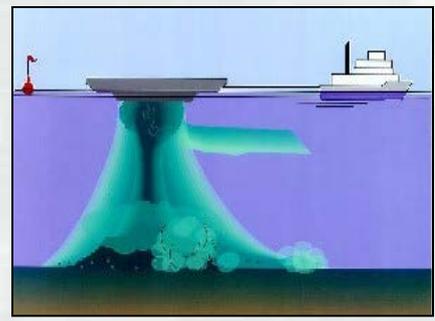
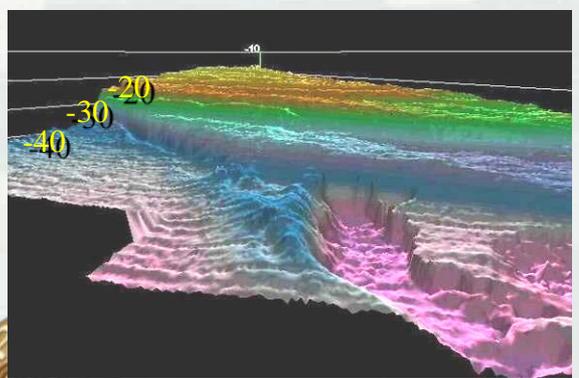
## Beach Nourishment



## Navigation Channels Borrow Areas



## FATE Models



## Shoaling Patterns/Dispersion



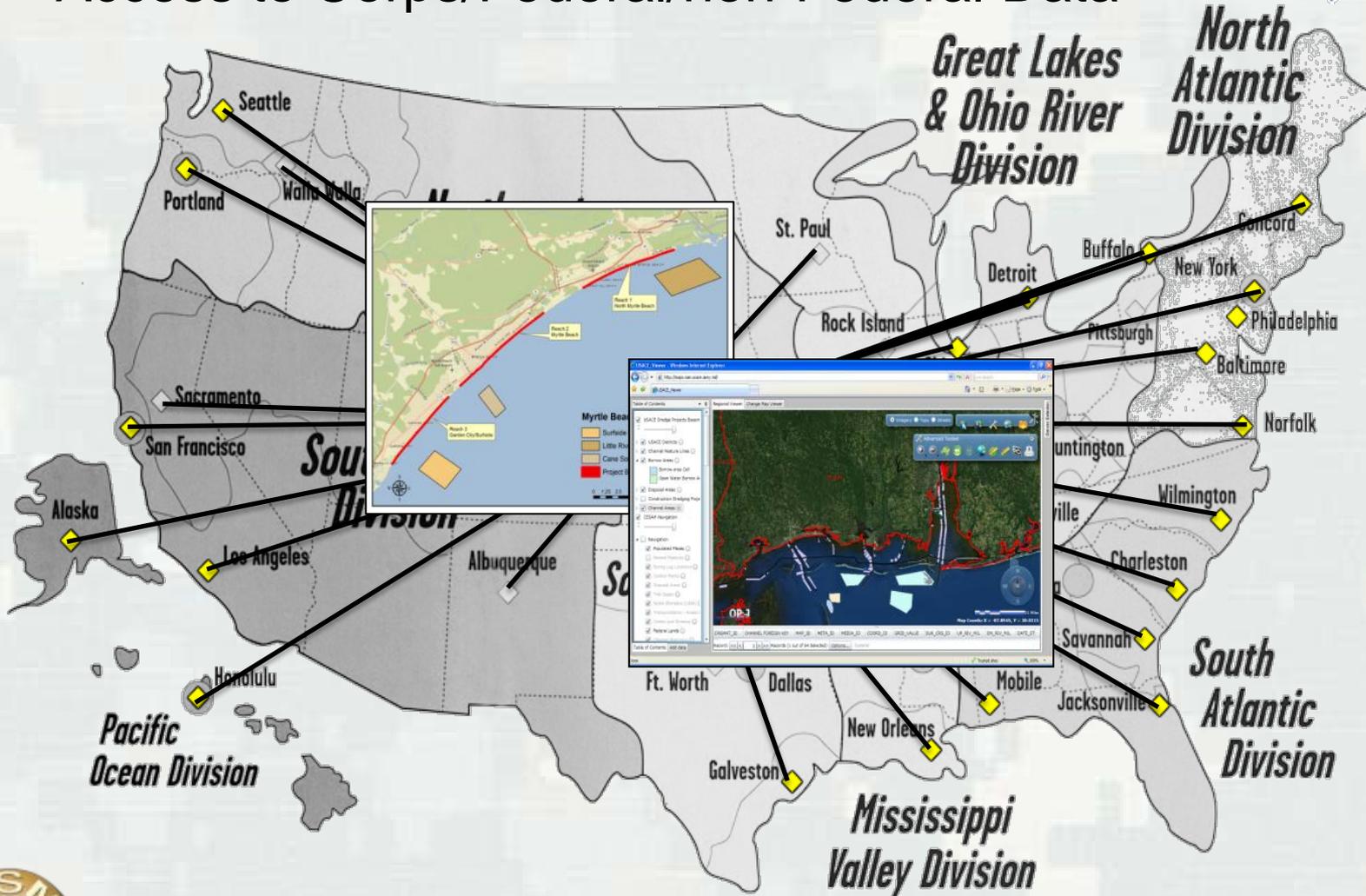
## Sediment Characteristics







# Web/GIS-Based CE-Dredge/RSM Viewer Dredging Manager Access to Corps/Federal/non-Federal Data



SoN 2013-N-31 Data Integration Framework-Navigation Portal

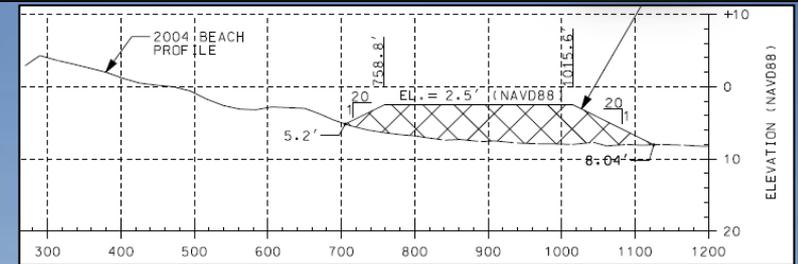


# Advancing Nearshore Berm Research, Guidance, and Tool Developments



## Guidance and Tools needed for:

- Design
- Operations & Placement
- Evolution
- Benefits



Nearshore  
Berm

SoN 2011-N-15 Design & Evaluation Tool for Nearshore Berm placement of Non-Beach Compatible Material  
SoN 2011-N-19 Nearshore placement of Dredged Sediment Assessment

# RSM Long-Term Goal.....

## Link with Engineering With Nature



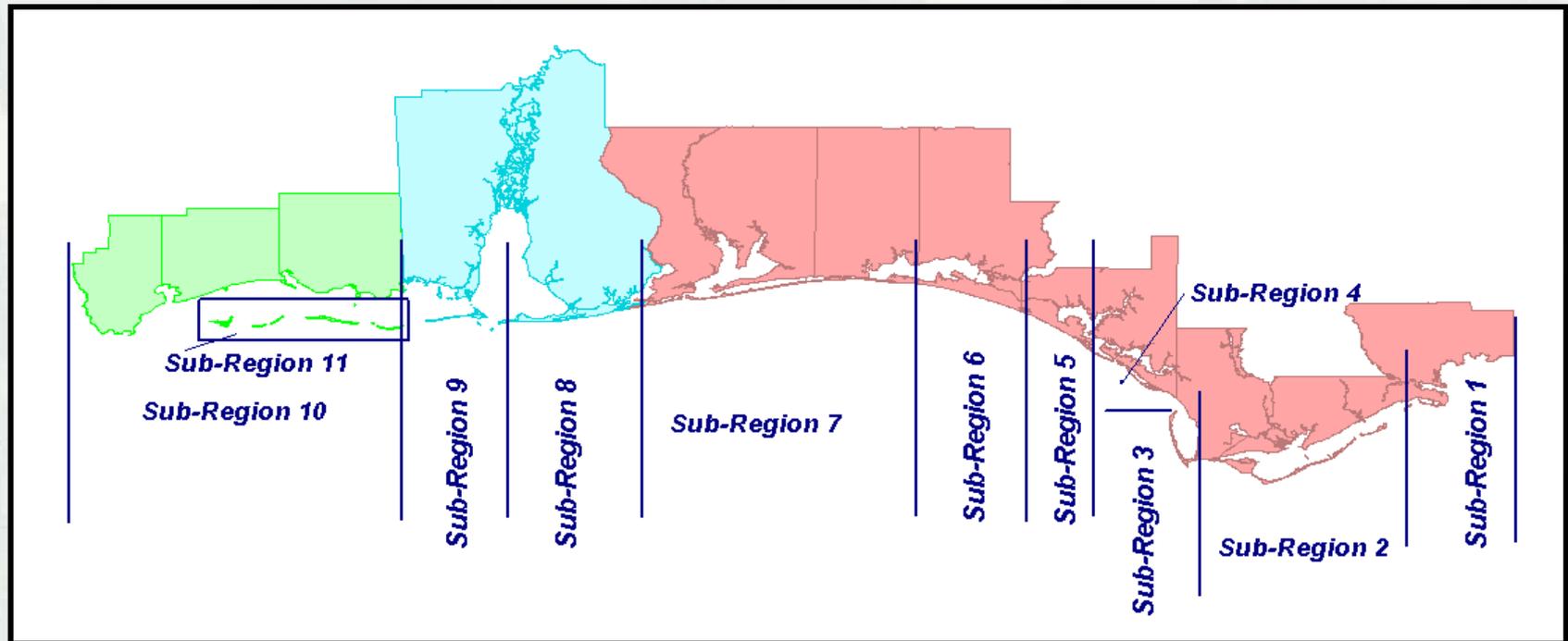
- Working with Nature (PIANC)
- Regional Sediment Management
- Beneficial Uses of Dredged Material



# District RSM Examples



# Mobile District RSM Domain



**375-miles of Shoreline**  
**21 Federal Projects**  
**8 State Parks**  
**7 Military Installations**

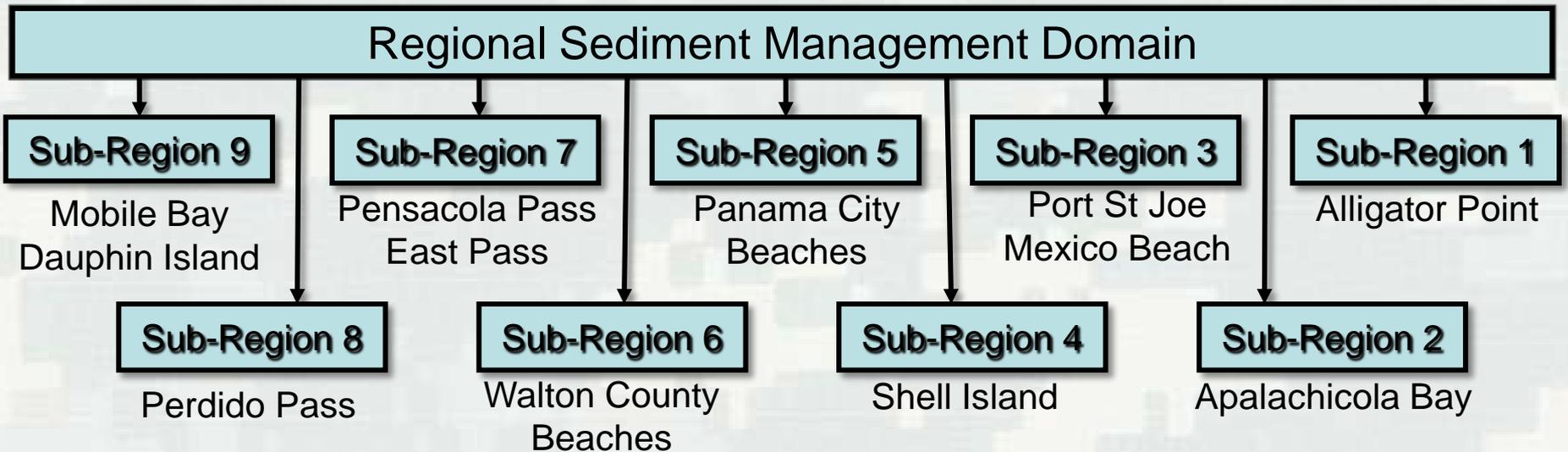
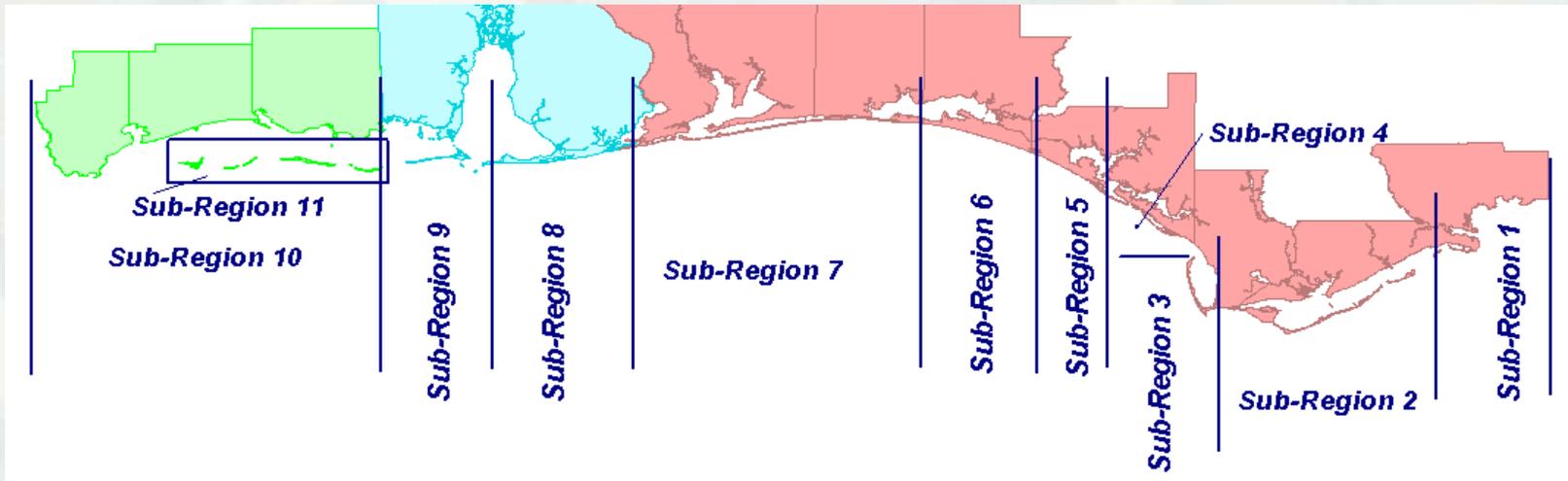
**Gulf Islands National Seashore**  
**Harrison County Beach Fill**  
**Panama City Beach Fill**  
**Local Projects**



# Mobile District RSM Demonstration 2000-2003

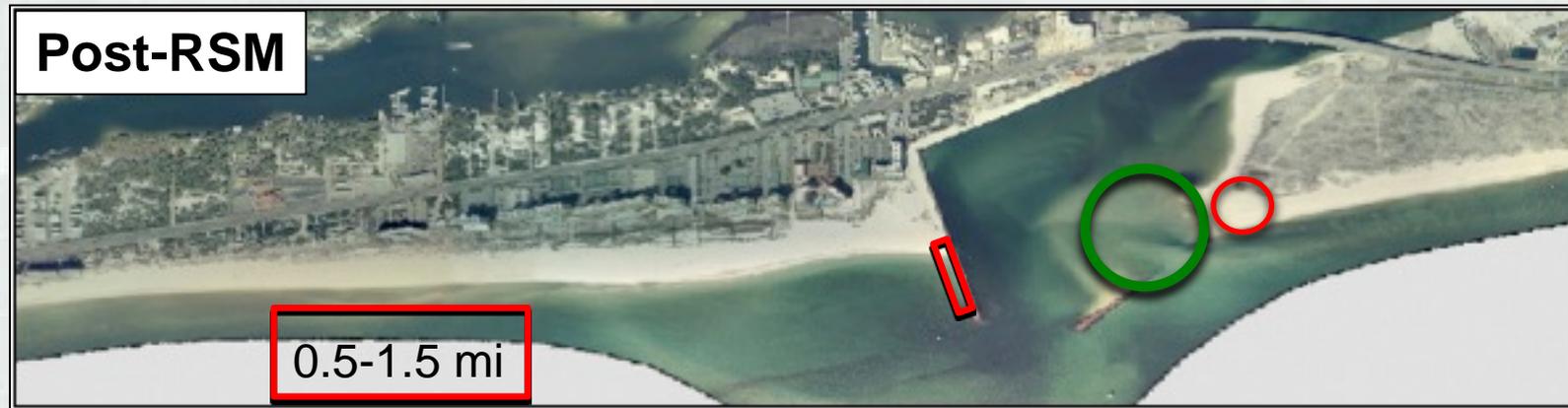


# Regional to Local Strategies



# Perdido Pass, AL

Shoreline Erosion, Littoral System Resource, Sand Bypassing, Nearshore Placement, Reduce Rehandling





# St Johns County

- St. Augustine Inlet O&M
- Intracoastal Waterway O&M
- St. Augustine Beach CG
- Vilano Beach Feasibility GI



# SAJ RSM Value to the Nation 2013

FY13 NAVIGATION RSM (Supplemental/Navy )	TotalCost (NAV)	Placement	Beach volume dredged	Rough Value to FRM**
Port Everglades* (partial)	\$ 1,898,489	Broward SPP	96,126	\$ 3,104,870
Palm Beach Harbor	\$ 4,870,074	Palm Beach Co NF	420,000	\$ 8,568,000
Ft Pierce Inlet	\$ 3,299,090	Fort Pierce SPP	191,000	\$ 3,247,000
St Lucie Inlet	\$ 6,465,600	Martin Co. SPP	200,000	\$ 3,400,000
St Augustine Inlet	\$ 1,932,600	St Johns SPP	116,000	\$ 1,774,800
Ponce Inlet (SAW)	\$ 1,000,000	St Lucie SPP (NS)	141,000	\$ 2,397,000
AIWW-Jupiter Inlet	\$ 2,601,207	Palm Beach Co	55,000	\$ 1,122,000
AIWW-Haulover Inlet		Dade Co. SPP	120,000	\$ 4,080,000
	\$ 22,067,060			\$ 27,693,670

\*Includes \$1.2M NF (MOA)

\*\*Includes 15% placement losses



# Mobile District: Mobile Bay Basin

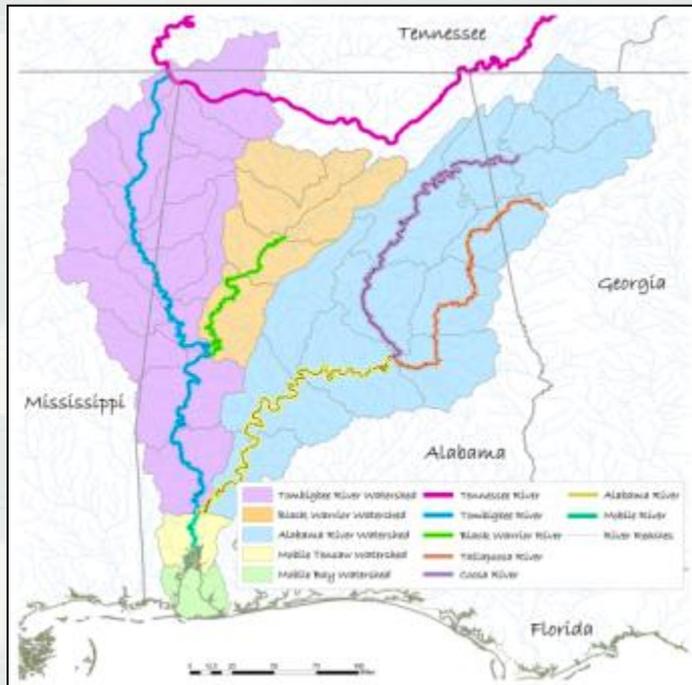


## Sediment Budget, Tools, Analysis

– reduce sedimentation/optimize disposal

## Interagency RSM Team

- Alabama Department of Conservation and Natural (ADCNR), State Lands Division
- ADCNR, Marine Resources Division
- Alabama Department of Environmental Management (ADEM)
- Alabama State Port Authority
- U.S. Fish and Wildlife Service
- NOAA, National Marine Fisheries Service
- Alabama/Mississippi Sea Grant
- Mobile Bay National Estuarine Program



# Mobile District: Mobile Bay In-Bay Disposal Strategy RSM and Engineering With Nature



## WRDA 96

Upper-Bay

In-Bay Disposal

Thin-Layer Disposal

Lower Bay:

ODMDS

1000-acre habitat in upper bay

Restore wetlands that have been lost in bay

Place 2M/every 2- yrs = 9-10 Mcy

Gaillard Island

An aerial photograph of Gaillard Island, a triangular island in the lower bay of Mobile Bay. A dashed white line connects the ODMDS location on the inset map to this island.

# FY13 SAM: Short-Term Biodegradable Containment Structures for BU Applications



**Pilot:** SW Galliard Island non-permanent bio-degradable geotubes (jute burlap)

- 4.5 Acres, 1,500 ft shoreline
- Interior sand spur dikes for retention
- 100% biodegradable turbidity curtain
- Jan/Feb 2013: Place Theodore Ship Channel material (70,000 CY, +2.5 MLLW)
- Transplant Existing adjacent vegetation
- Monitoring for project performance

## Products:

- Interagency RSM Working Group Meetings
- Action: Demo BU project short-term containment
- TN: Use of Temporary Biodegradable Containment Structures
- Shore & Beach Journal Article

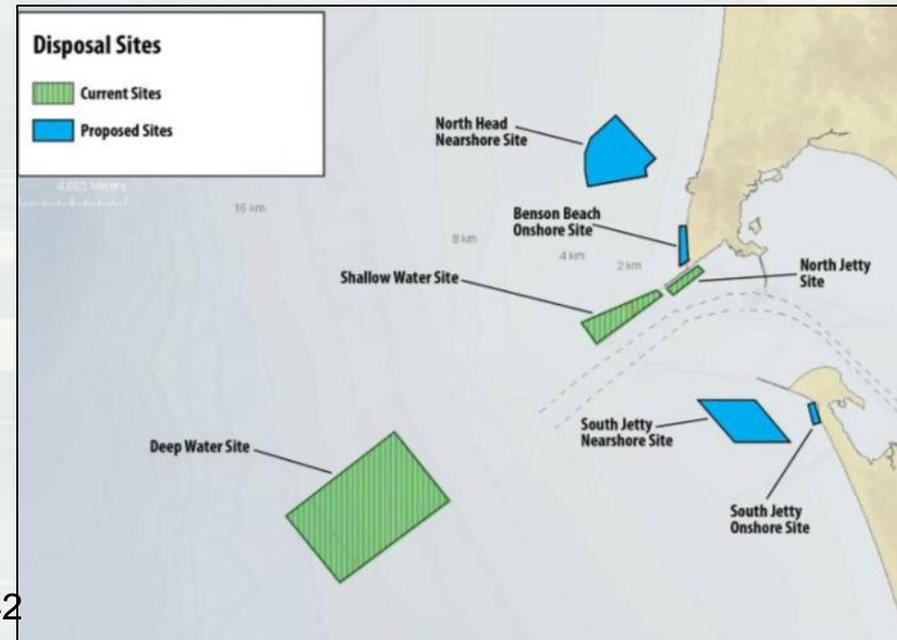
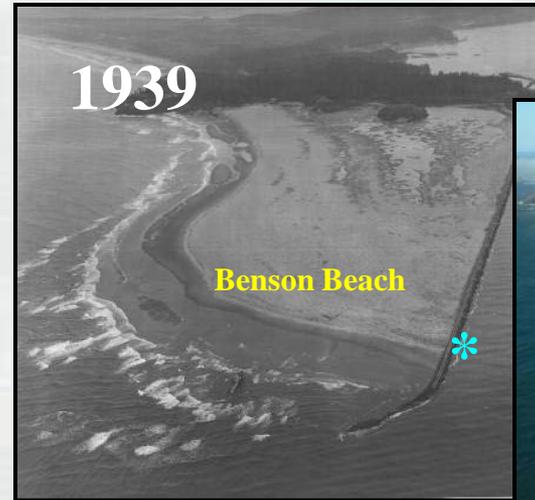


# Portland District - Mouth of the Columbia River, OR

- Collaboration 2002:
  - District & Stakeholders
- Leverage:
  - Projects, Resources, Models, Tools, Data Collection...
- Long-term strategy
- Taking action FY12

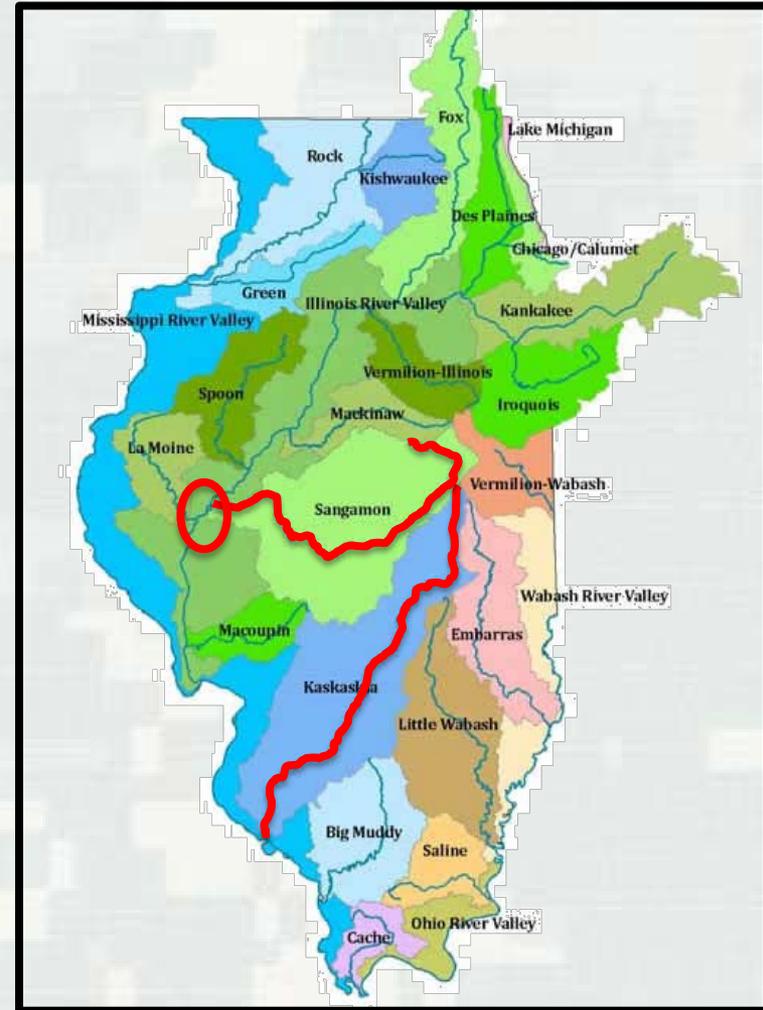
## Benefits

- 4 New nearshore BU sites
- Reduced dredging costs
- Protect navigation structures channel system
- Stabilize Inlet morphology
- Extend capital investments
- Reduce shoreline erosion
- Environmental habitat



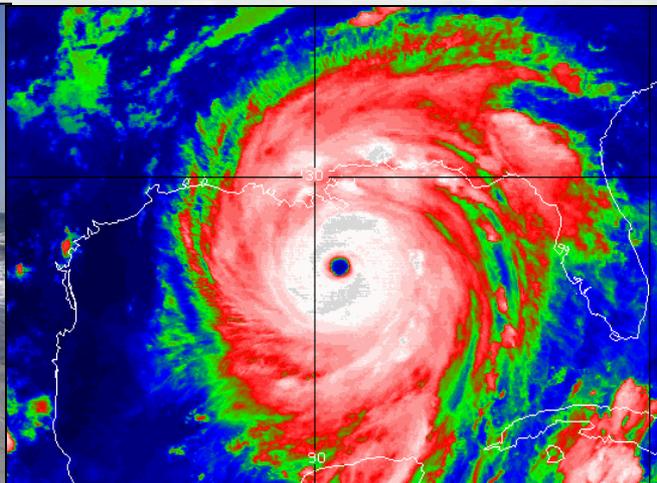
# MVR: Sedimentation Impacts Confluence Sangamon & Illinois River

# MVS: Kaskaskia River Sedimentation



# Why RSM is Important

- Improve utilization of sediments - local & regional
- Link multiple projects, authorities, funding, reduce timelines
- Improve channel availability, shoreline erosion, environmental habitat
- Increase benefits while reducing/maintaining costs
- Improve partnerships and collaboration



# Framework to Expand RSM-EWN Inland RSM-EWN Workshop, 29 April – 1 May, Omaha



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***Please Join Us!!***



2013 RSM and EWN IPR and Workshop  
Coastal and Hydraulics Laboratory, Vicksburg



\*PDH available



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