

NATIONAL REGIONAL SEDIMENT MANAGEMENT PROGRAM

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Innovative solutions for a safer, better world



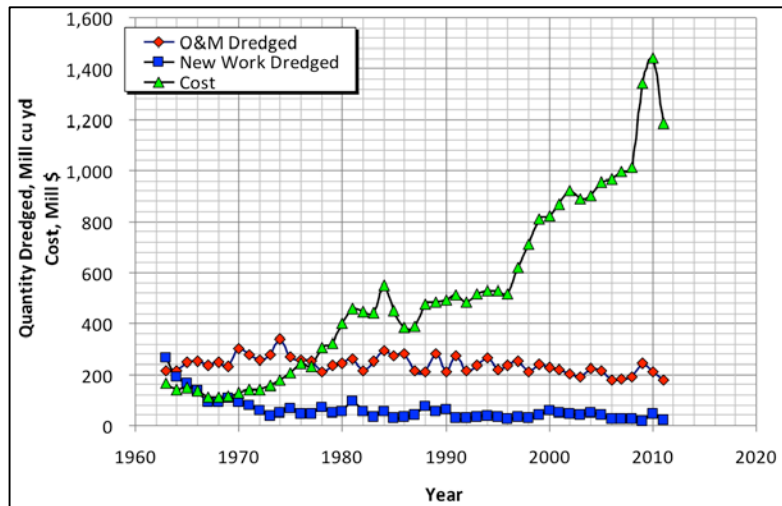
US Army Corps
of Engineers®



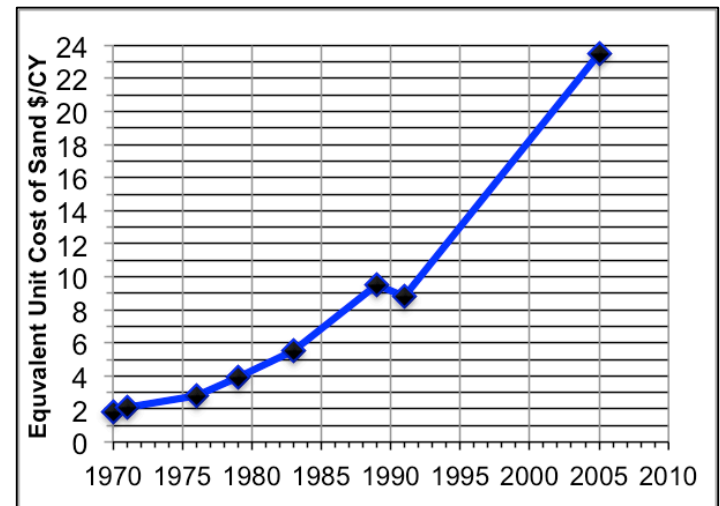
.....The Corps moves 200 Million cu yds of sediment annually



...At a cost of more than
\$1 Billion per year



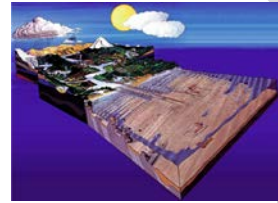
US Navigation Channels
O&M & New Work Volumes and Cost



Broward Co Shore Protection Project
Cost of Sand

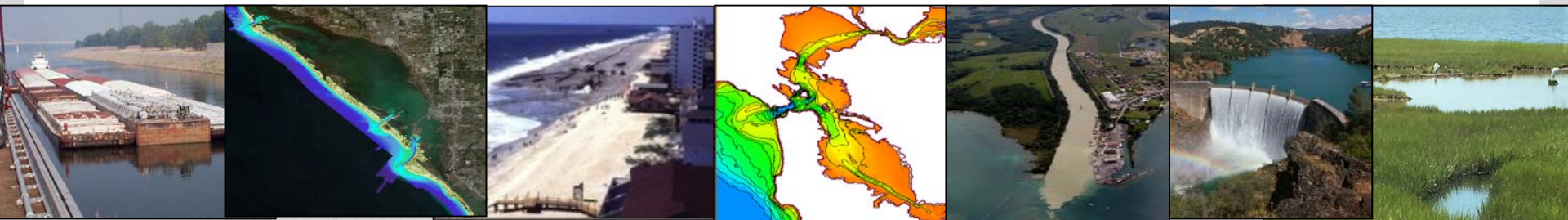
Regional Sediment Management

Established 1999, CERB Charge



“A systems approach using best management practices for more efficient and effective use of sediments in coastal, estuarine, and inland environments for healthier and more resilient systems.”

- Recognizes sediment as a valuable resource
- Work across business lines, projects, and authorities to create short and long-term economically viable and environmentally sustainable solutions
- Improve operational efficiencies and natural exchange of sediments
- Consider regional implications of project scale actions and benefits
- Apply/Enhance tools and technologies for regional approaches
- Share lessons learned, information, data, tools, and technologies
- Communicate and collaborate





RSM Goals and Strategies



Reduce
Upland/CDF
Disposal



Bypass
Backpass
Sediments



Reduce
Erosion



Save
Capacity



- **Keep sediments in the system**
- **Mimic natural sediment processes**
- **Reduce unwanted sedimentation**
- **Environmental enhancement**
- **Maintain & protect infrastructure**

Reduce
Channel
Shoaling



Reduce
Runoff



Ecosystem
Habitat
Restoration



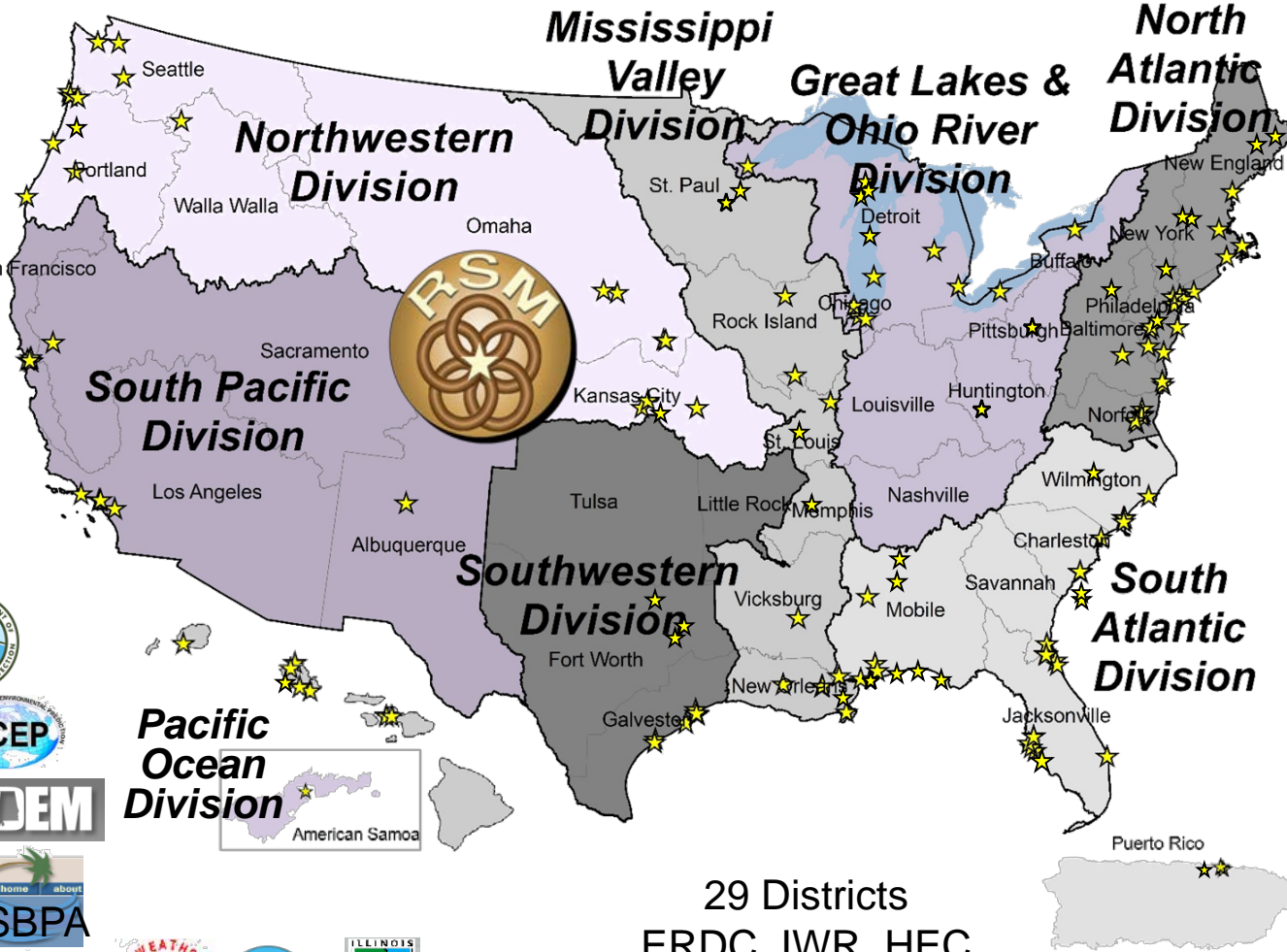
Stabilize
Structures



National RSM Program Participation (2000-2019)

>230 Projects

Collaboration



29 Districts
ERDC, IWR, HEC



Tools & Technologies

RSM Collaboration: National and Regional Teams



RSM Process



4. TAKE ACTION

- Change practices, construct, monitor & adaptively manage
- Capture benefits & lessons learned
- Incorporate into standard practice



1. UNDERSTAND REGION

- Sediment sources, project needs, processes, gaps, engineering actions, ecological considerations
- Resources, challenges & requirements



2. EVALUATE RSM STRATEGIES (PROJECT SCALE)

- Efficient & effective use of sediments
- Project-level analysis (tools, models, technologies)
- RSM pilot projects



3. REGIONAL RSM STRATEGY

- Integrate projects into Regional Strategy
- ID authorities, funding, permit requirements, leveraging opportunities
- Prioritize: need, benefits, timelines



Communication, Collaboration, Innovation, Decision Making
Interagency, Stakeholders, Partners, Resource Agencies

-

The figure consists of two maps. The top map is a regional map of the Houston area, showing the Gulf of Mexico coastline and the proposed Houston Ship Channel. Key locations labeled include Houston, Pasadena, The Woodlands, Spring Branch, Houston Ship Channel, Houston Ship Channel Entrance, San Luis Pass, and Sabine Pass. A scale bar indicates distances from 0 to 20 miles. A legend identifies erosion and accretion areas with various shades of red, orange, yellow, and green, and symbols for sediment accretion and erosion.

The bottom map is a detailed view of the Houston Ship Channel entrance area. It shows the channel's path and the surrounding land. Labels indicate 'Sediment accretion' and 'Erosion here' at various points along the channel. A callout box points to a specific area, stating 'Opportunity to reduce dredging'. A scale bar at the bottom indicates distances from 0 to 20 miles. A legend identifies erosion and accretion areas with various shades of red, orange, yellow, and green, and symbols for sediment accretion and erosion.



The diagram illustrates the data structure for a river network. On the left, a river network is shown with arrows indicating flow direction. On the right, four data tables are listed, each with a header and a list of rows (indicated by dots). Arrows point from specific reaches in the river network to these tables:

- Bed Material**: Linked to the top reach of the main river.
- Hydrology**: Linked to the second reach of the main river.
- Hydraulics**: Linked to the third reach of the main river.
- Local Sources**: Linked to the bottom reach of the main river.

A separate table, **Loading Templates**, is also shown, which is linked to the Local Sources table via three arrows.



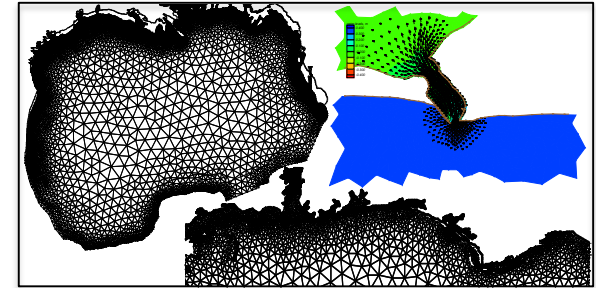
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Models for RSM

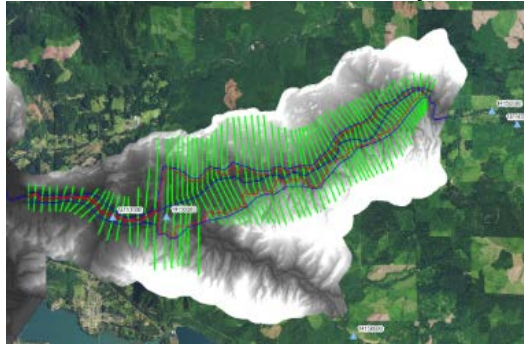


- Sediment sources and sinks
- Regional processes and trends
- Multiple interacting projects
- Connect beaches & inlets
- Connect rivers & reservoirs
- Navigation channel maintenance
- Evaluate local/regional RSM strategies

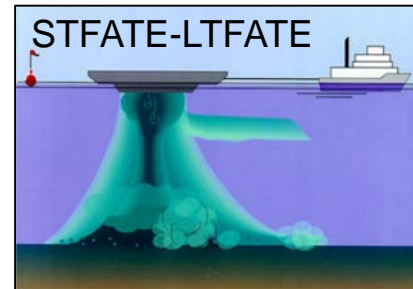
ADCIRC: Storm Surge & Circulation



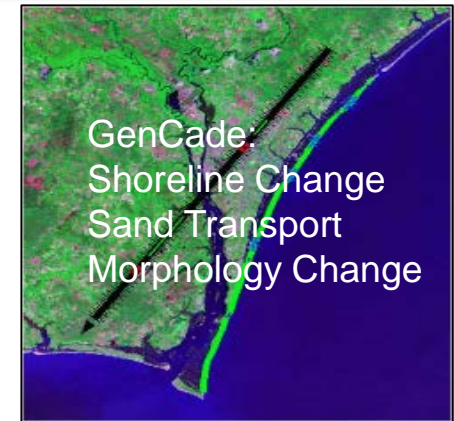
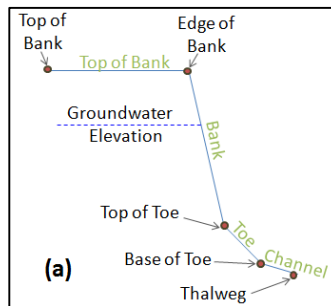
HEC-RAS: River Analysis



Dredge Material Placement

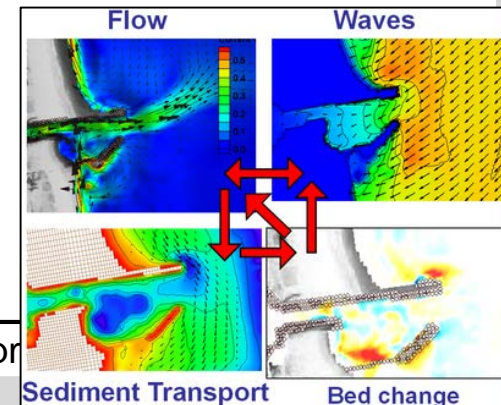
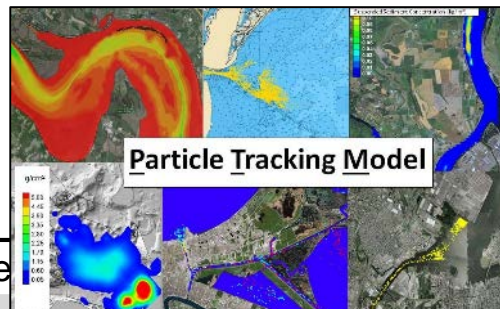
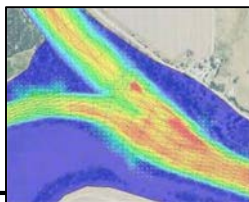
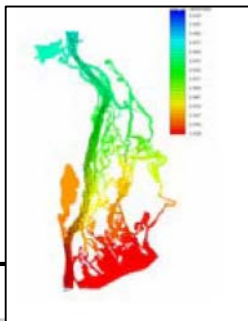


Bank Stabilization



CMS

ADH: Watershed Analysis



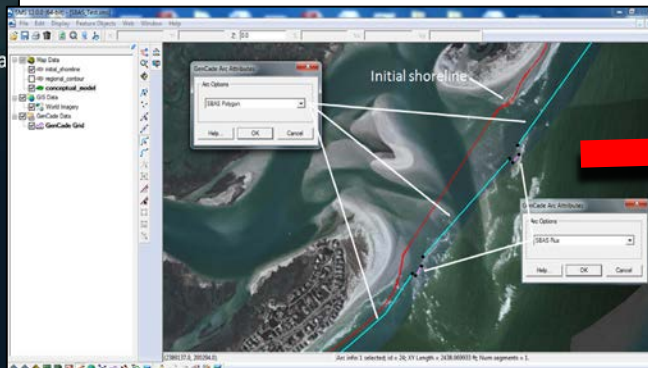
GenCade & SBAS Integration



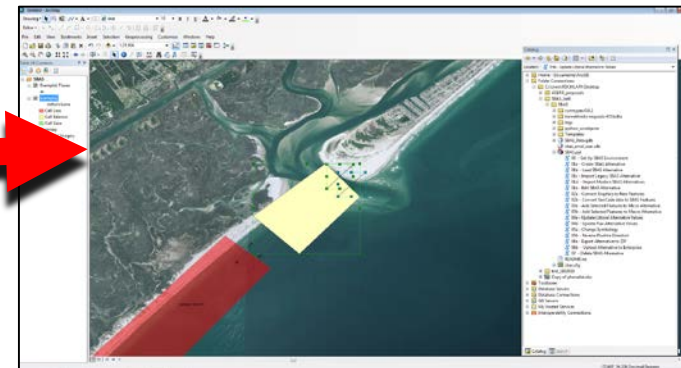
GenCade

- Regional shoreline change, sand transport, inlet-sand sharing model
- Connects multiple beaches & inlets
- Multiple sources & sinks
- Regional trends
- Evaluate regional strategies

GenCade



SBAS



Automate Output to SBAS

- Volume change
- Transport rates
- Dredging and beach fill volumes
- Cells and fluxes



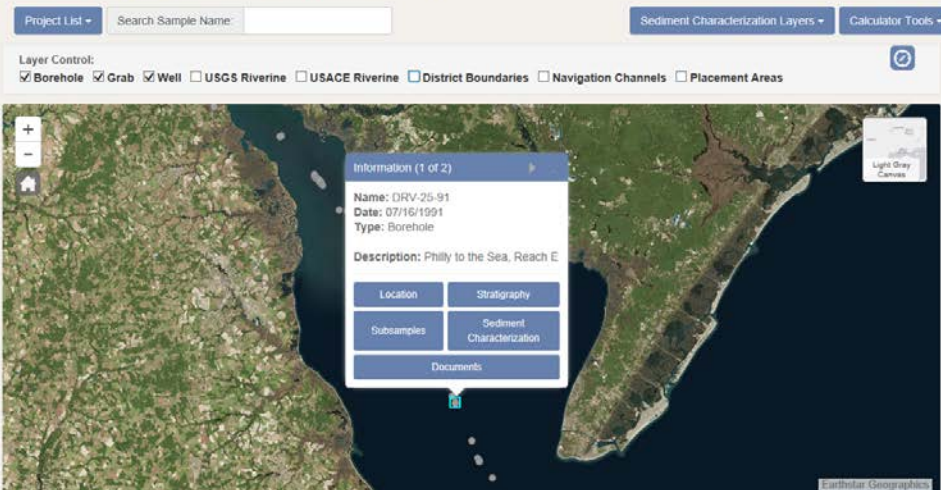
Sediment Analysis and GeoApp (SAGA)



<http://navigation.usace.army.mil/SEM/Analysis>

Sediment Analysis (SAGA)

To view sediment data, from the Project List drop-down select a project or in the Search Sample Name text box type a sample name. The map zooms to the appropriate location, displaying sediment sampling events for all items selected in the Sediment Characterization Layers drop-down and the Layer Control section. To display the ID of an event, hover over its icon, to display a popup with additional data about the event, click the icon. Many popups also include links to additional data and/or reports. Sediment data is provided by the Sediment Analysis & Geo-App (SAGA) database, which is populated by USACE Districts through [Excel data templates](#) available on the USACE Geospatial Platform. To analyze a sediment sample not available in SAGA, select a tool from the Calculator Tools drop-down.



Mapped Sites

- Show distribution of sampling sites
- Filter sites based on sediment characterization testing
- View navigation channels or placements areas

Tools

- Compute Grain Size statistics with data not yet stored in SAGA (Sieve size distribution testing)

Site Details

- Retrieve testing results
- View documents
- Access stratigraphy

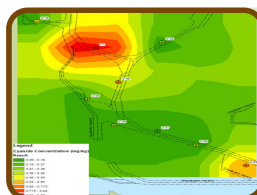


FRF

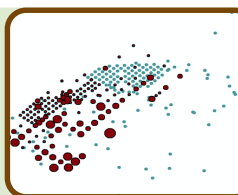


SAC, SPN
MVD

US Army Co



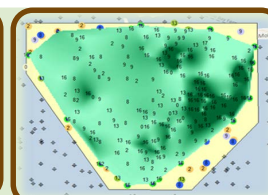
Visualize distribution of detected chemicals



Symbolize sites based on average grain size



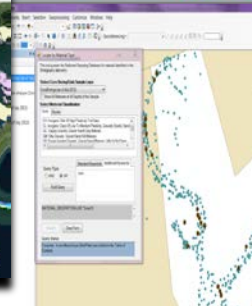
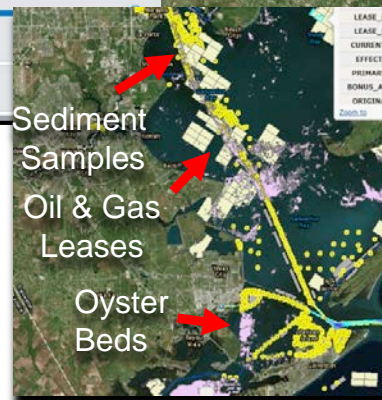
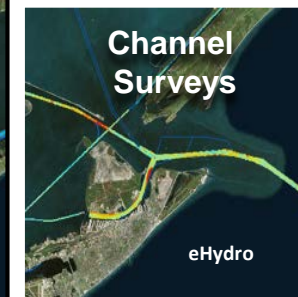
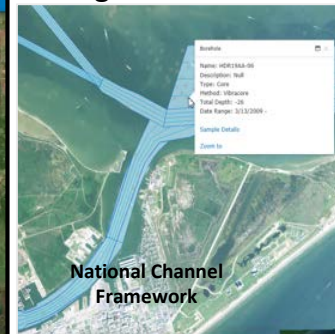
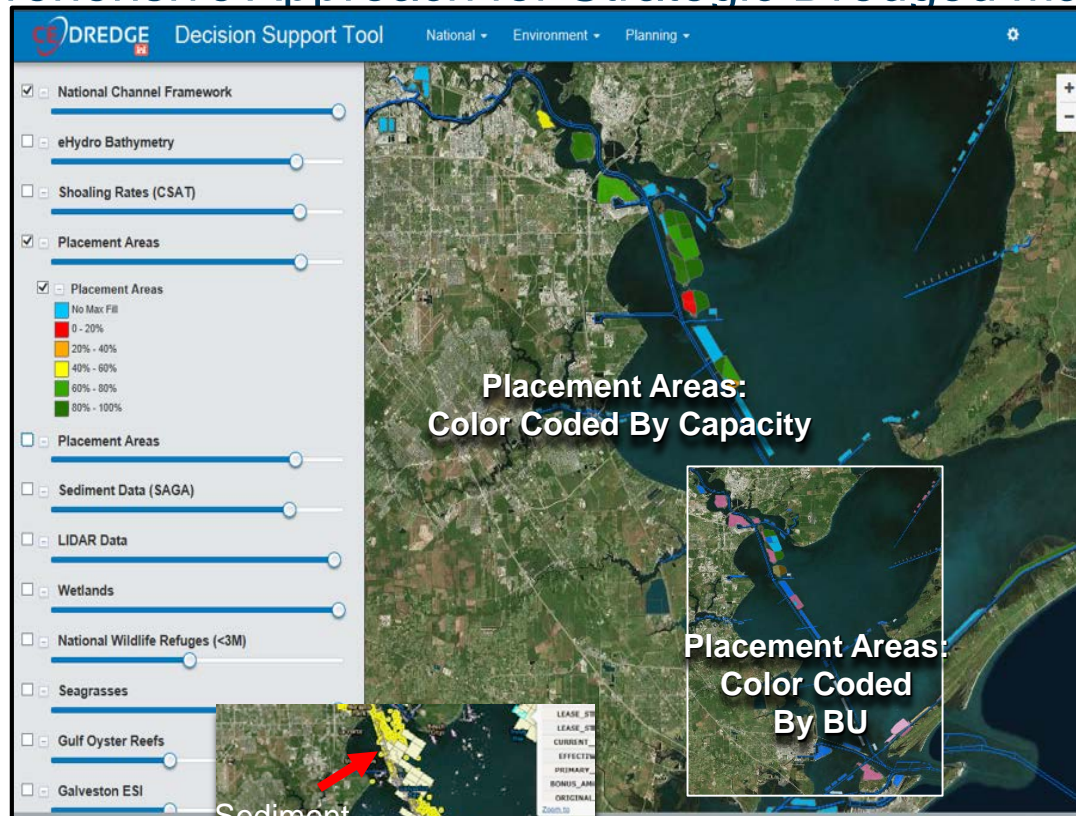
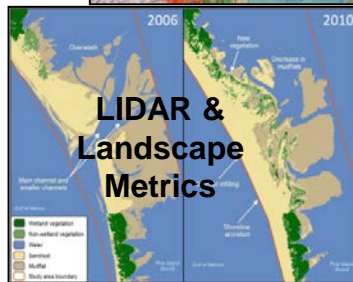
Isolate sites based on attributes



Determine volume of material at specified depths

er

Navigation Channels



Sediment Data & Tools

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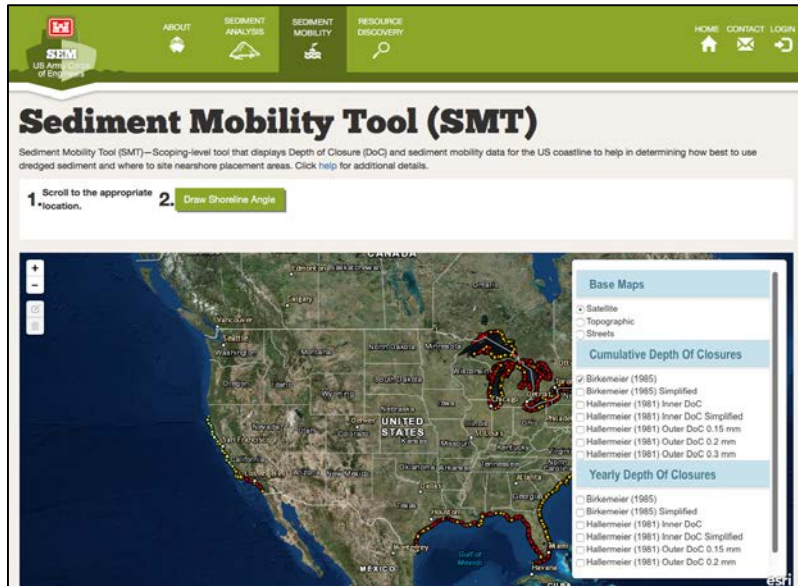
Nearshore Berm Research, Guidance, and Tools

<http://navigation.usace.army.mil/SEM/SedimentMobility>

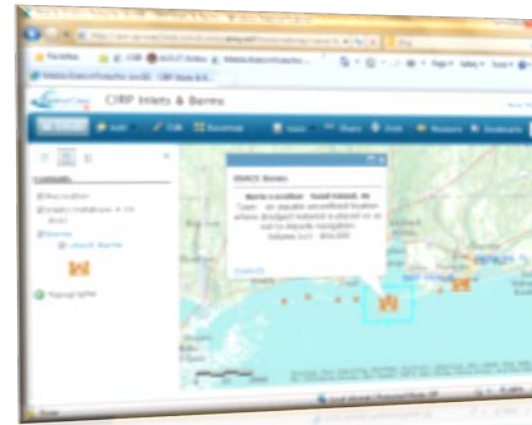
SMT

Preliminary tool: educated decisions w/limited data
Estimates

- Frequency of sediment mobility
- On/Offshore migration direction
- Dominant axis of wave direction to estimate alongshore migration



d_{50} (mm)	Frequency of Mobilization	Predicted Sediment Migration
0.1	16 – 38%	83% Offshore
0.2	14 – 30%	60% Onshore
0.3	12 – 26%	84% Onshore



Berm Database

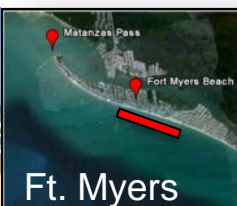


Assateague
Island, MD



Pensacola

South Padre
Island



Ft. Myers



Egmont



Vilano

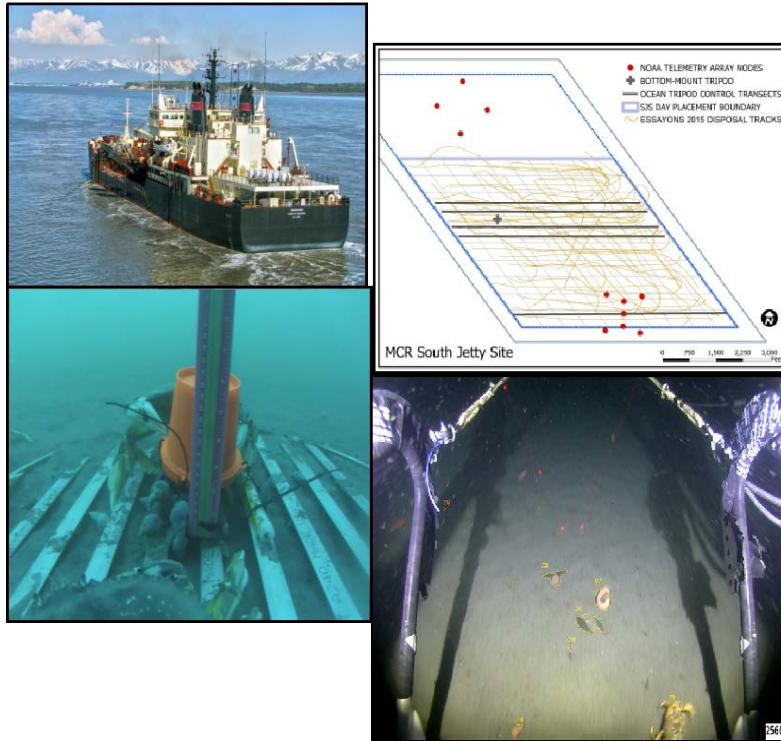


Pensacola



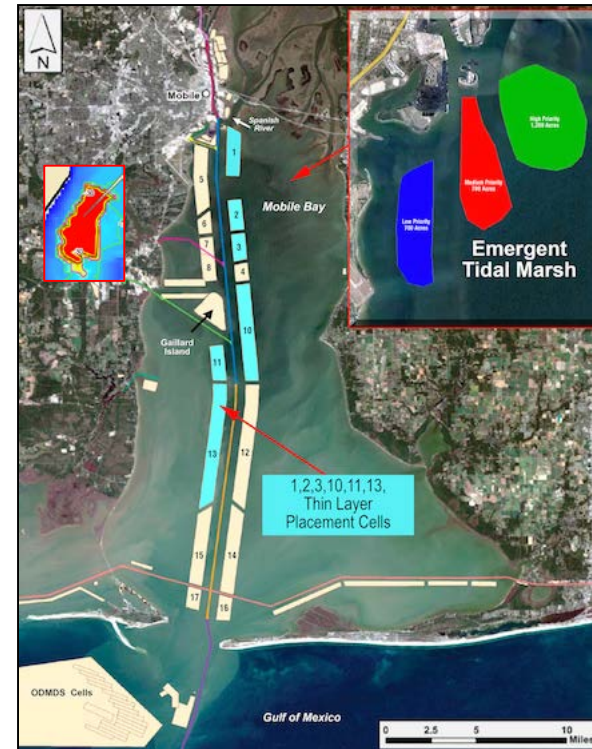
Thin Layer Placement of Dredged Sediments

Open Water Placement



Mouth of the Columbia River
(Lower Columbia River Solutions Group)

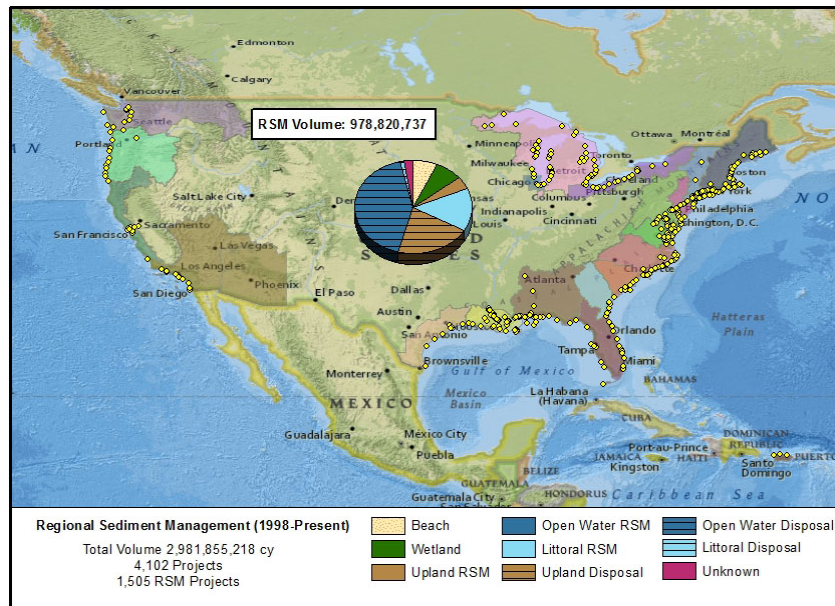
Mobile Bay
(Interagency Working Group)



Understand Behavior - Mobilization, Transport, Consolidation
Benthic Habitat - Reduce Impacts & Enhance
Shallow Emergent Tidal Marsh Habitat
Dredge Hole filling - Recover Hypoxic & Anoxic Zones

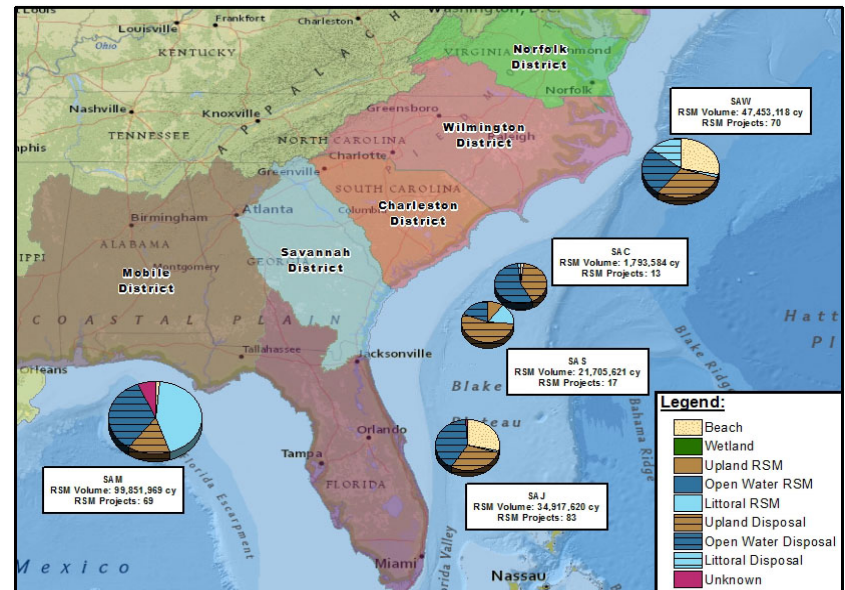
Historical Navigation Sediment Utilization:

Where, when, volume of sediments placed beneficially? Where can we improve?



District Data 1998-2017 Coastal Navigation Projects

- 3 Bcy
- 36% placed beneficially
- 9 Mcy/yr placed on beaches
- 5 Mcy/yr Unknown



Regional Sediment Management (RSM) Studies

SWG selected for RSM studies FY12-19 (green = implementing)

- **FY12: Matagorda Bay RSM Study**
- **FY13: GIWW RSM (West Galveston Bay)**
- **FY14: Galveston Entrance Channel RSM**
- **FY15: Lower Matagorda Bay RSM**
- **FY16: GIWW-CCSC Intersection Shoaling**
- **FY17: GIWW-Bolivar Flare Shoaling**
- **FY18: Utilization and Design Considerations for Channel to Victoria (CTV) BU Sites**
- **FY19 (upcoming study): GIWW Caney Creek RSM**

*from Trisha Campbell, SWG



Galveston Entrance Channel RSM

Tricia Campbell, Ashley Frey, Andy Morang



Challenge

- Funding challenge to maintain Galveston Entrance Channel and upland PAs
- Dredge 1.5-2MCY every 18-24 months, \$6-8M

Objectives

- Solutions to reduce channel sedimentation & dredging requirements
- Allow more flexibility to manage overall project
- Coordinate w/PAS Galveston Park Board of Trustees Galveston Island study 50 yr mgmt plan

Maximum Sediment Saved by Implementing Each Alternative Individually

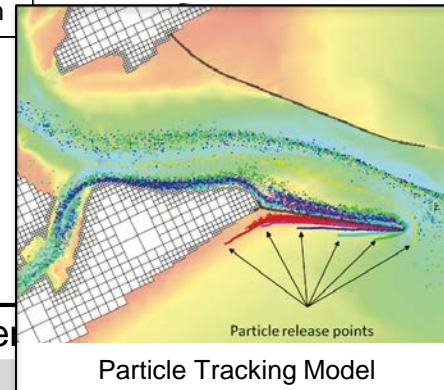
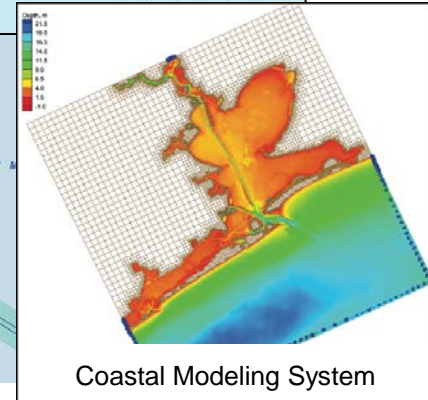
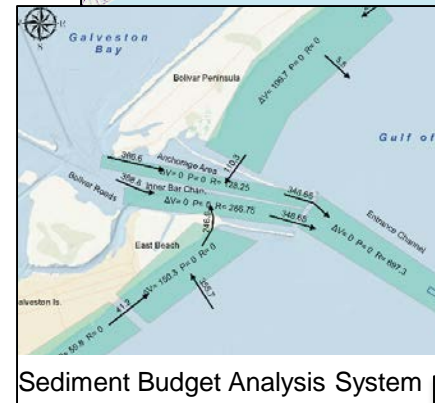
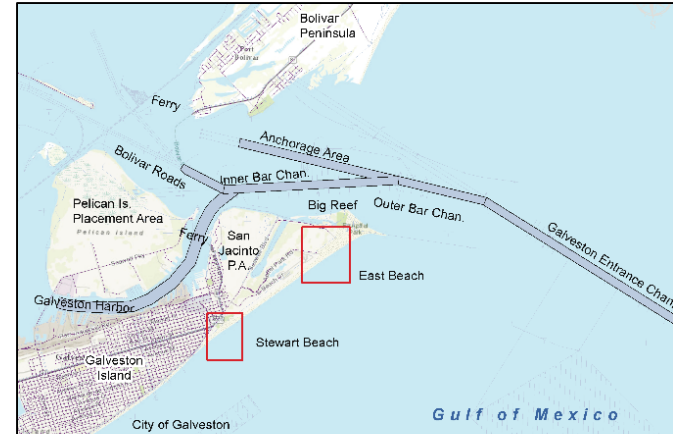
- Sand-tighten jetties: 113,000 CY/YR
- Prevention of wind-blown sand: 21,000 CY/YR
- Back-passing plant with spur dikes 150,000 CY/YR
- Close boat cut in North Jetty: 160,000 CY/YR
- Place PA A material on beach: 300,000 CY/YR

MAXIMUM POSSIBLE SAVINGS OF ALL ALTERNATIVES:

690,000 CY/YR* ~ \$2.8M/YR (based on \$4/CY)

Park Board Adopted Sand Management Plan 2015

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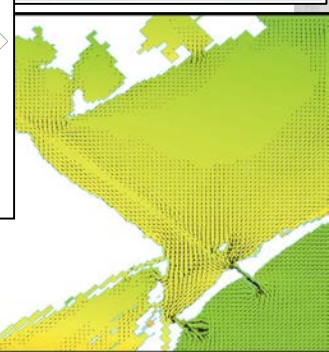


Challenge

- ## Approach

-
- Map of the Matagorda Ship Channel and Gulf Intracoastal Waterway area. The map shows the Matagorda Ship Channel and Gulf Intracoastal Waterway. A red dashed rectangle outlines the 'Expanded Study Area'. A blue rectangle within it outlines the 'Focused Study Area'. A callout points to 'Sundown Island'. A legend indicates 'Nav Channels' (black line) and 'Placement Areas' (blue rectangle). A scale bar shows 0 to 14 miles. Source: Esri, DigitalGlobe, GeoEye, AeroGRID, IGN, and the GIS User Community.

-



SWG – Channel to Victoria BU Utilization Investigation

POC: Steve Howard



BLUF: Development of an alternative approach to managing dredged material in the GIWW, Channel to Victoria (CTV) by assessing impacts of utilizing BU sites adjacent to the channel.

Challenges

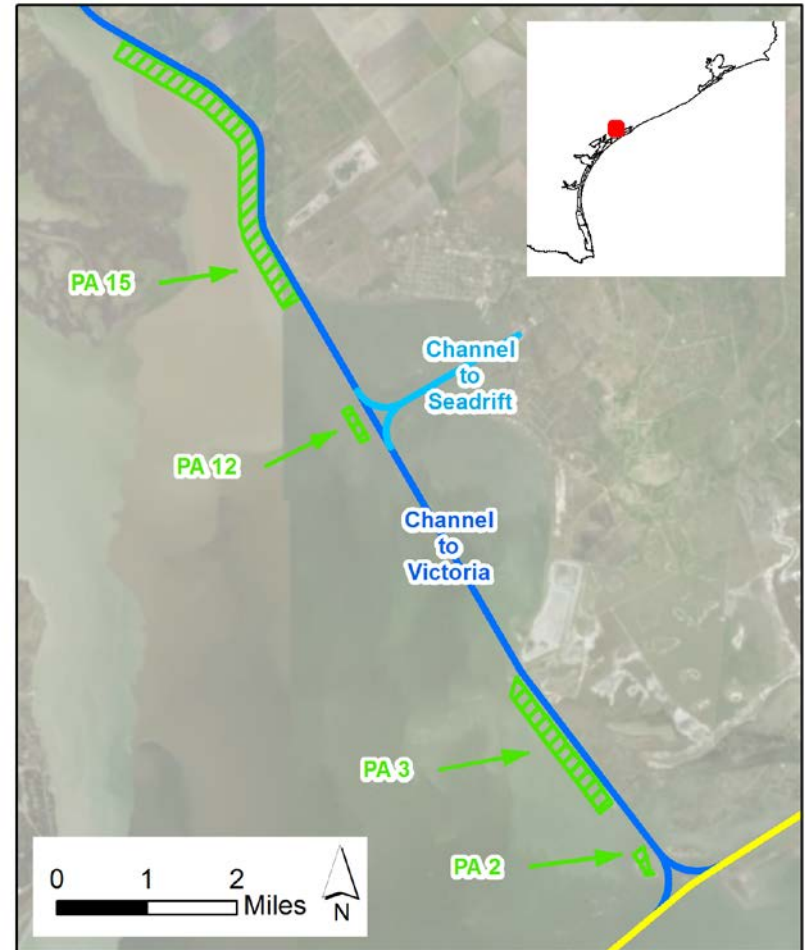
- Quantify benefits
- Balance missions of difference agencies

Objective

- Leverage historic or previously identified BU sites.
- Determine potential impact on channel shoaling rates and design components.
- Reducing the cost of dredging while creating/enhancing habitat

Approach

- Task 1: Gather data
- Task 2: Review coastal processes and develop potential living shorelines
- Task 3: Analyze impacts of BU sites/living shoreline to channel
- Task 4: Cost analysis



SWG, GIWW CCSC Intersection Shoaling Reduction

POC: Tricia Campbell



BLUF: Shoaling in the Gulf Intracoastal Waterway (GIWW) adjacent to the Corpus Christi Ship Channel (CCSC) has impacted navigation over past several years. Analysis of physical conditions and alternative dredging and/or placement practices could help to increase channel availability.

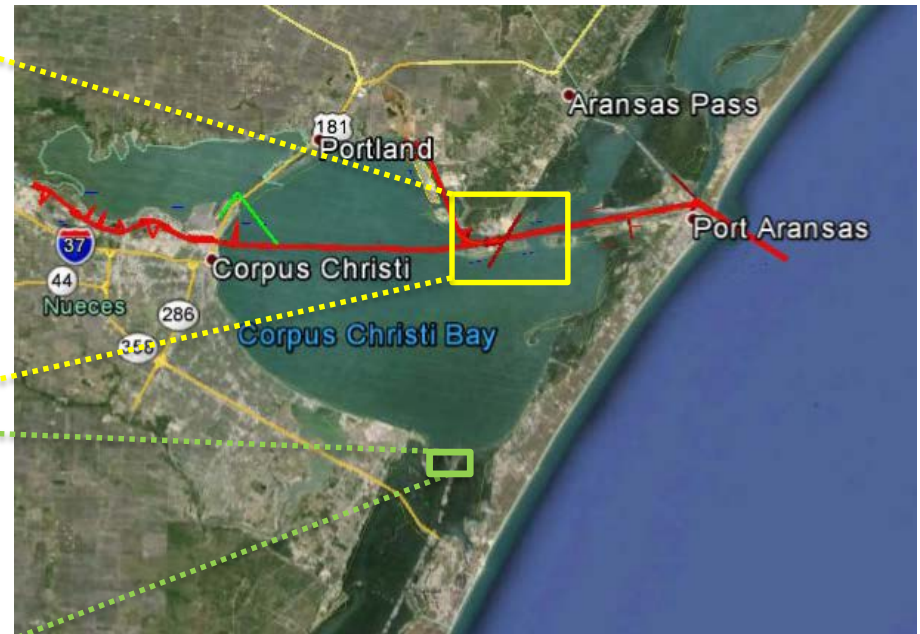
Description/Challenges

- Address two key shoaling areas and impacts to navigation
 - “Hole in the Wall” GIWW near intersection of CCSC
 - “The Spit” in South Corpus Christi Bay



Objectives

- Develop alternative approaches to managing sediment in the GIWW to better maintain navigation
- Provide general understanding of sediment movement along GIWW in Corpus Christi Bay



FY19 GIWW Caney Creek RSM



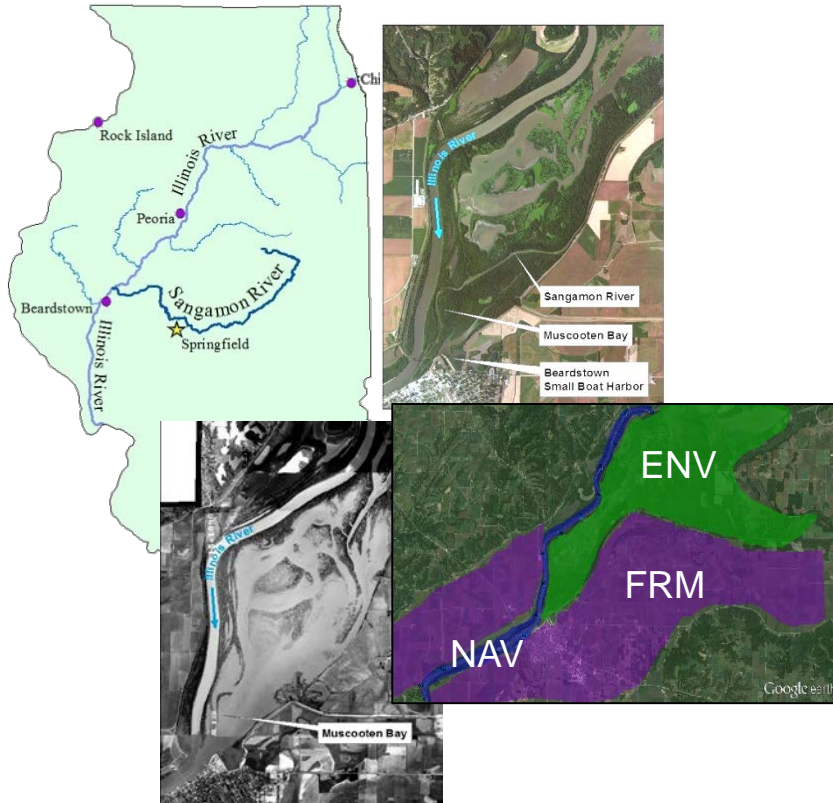
Recent increase in shoaling rate at GIWW intersection with Caney Creek has resulted in frequent navigation restrictions and bi-annual dredging



*from Trisha Campbell, SWG

Riverine and Reservoir RSM

Sedimentation Impacts at the Confluence of the Sangamon and Illinois Rivers



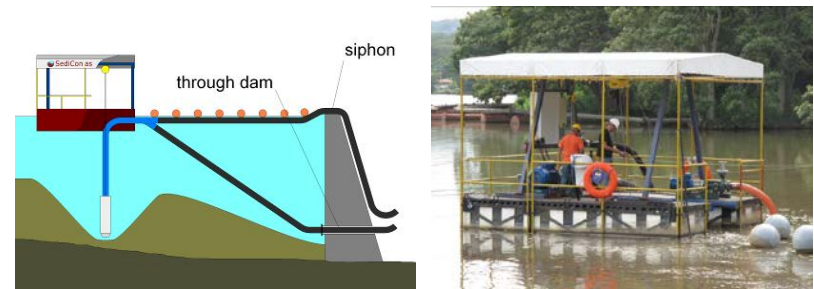
Reduce Sedimentation
Beneficial Use
Shoreline Restoration
Environmental Restoration
Consequences of Channelization
Land Use Impacts
Stakeholder Collaboration

Fall Creek, Cherry Creek, Spencer Dam Reservoir Flushing



- Monitoring and Model Enhancements
- Impacts & Benefits Increased Sediments Below Reservoirs

Innovative Reservoir Sediment Bypassing Techniques





What is the value of RSM?

- **Relationship building**
 - Across USACE
 - Stakeholder/Resource Agency Communication and Participation
- **More Efficient Systems**
 - Reduced lifecycle costs
 - More project execution (low use)
- **Utilizing Sediment Resources for Healthy Systems**
 - More sustainable and resilient coastal and riverine shorelines, ecosystem and aquatic habitats
- **Recovery operations**
 - Teams and relationships established
 - RSM strategies for managing sediments
 - Data, tools, models available

Regional Sediment Management (RSM)

A systems approach to deliberately manage sediments in a manner that maximizes natural and economic efficiencies to contribute to sustainable water resource projects, environments, and communities.

- Recognizes sediment as a valuable resource for Healthy Systems
- Regional implementation strategies across multiple projects and business lines to guide investments to achieve long-term economic, environmental, and social value and benefits
- Enhances relationships with stakeholders and partners to better manage sediments across a region (local actions with regional benefits)
- Share lessons learned, data, tools, and technology

What's New?

- 2016 RSM IPR and Successes/Challenges Meeting, 17-19 May 2016
- EY17 Request for Proposals
- GenCade Version 1 Quick-Start Guide
- "Sustainable Ports" - A Guide for Port Authorities
- USACE Navigation R&Q Strategic Vision Document
- RSM Successes
- CHETNs
- District Project Templates: Fact Sheets Quarterly Reports

Interactive Map

Click icons in the map below for additional information about RSM activities at specific offices. Note: Not all offices have additional info.

HISTORICAL RSM PARTICIPATION (2000-2015)

Map showing RSM participation across the United States, divided into divisions: Northwest, South Pacific, Southwestern, South Atlantic, Mississippi Valley, Great Lakes & Ohio River, and North Atlantic.

27 Districts (20 Coastal, 7 Inland) • ERDC, IWR-HEC • RSM Video



USACE Bi-Monthly Call/Webinars



District Stakeholder Workshops

Technical Webinars with Districts *R&D Programs DOTS WOTS

**Regional Sediment Management
Tools and Technologies
Volume I - Coastal - February 2018**

US Army Corps of Engineers
ERDC
Regional Sediment Management: Integrated Solutions for Sediment Related Challenges

**Regional Sediment Management
Tools and Technologies
Volume II - Inland - May 2018**

US Army Corps of Engineers
ERDC
Regional Sediment Management: Integrated Solutions for Sediment Related Challenges



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Brooklyn Hole

Middle River

12, 13, 10, 11, 13
Thin Layer
Placement Cells

Emergent Tidal Marsh

ODMDS

Gulf of Mexico

This photograph shows a river bend with a steep, eroded bank on the left and a concrete wall on the right. An inset image shows a close-up of the concrete wall.

The top left photograph shows a large group of people seated in a lecture hall, facing a screen. The top right photograph shows a group of people standing on a wooden bridge over a river, with a white bird in the water. The bottom photograph shows a group of people seated in a classroom or meeting room, facing a screen.

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