

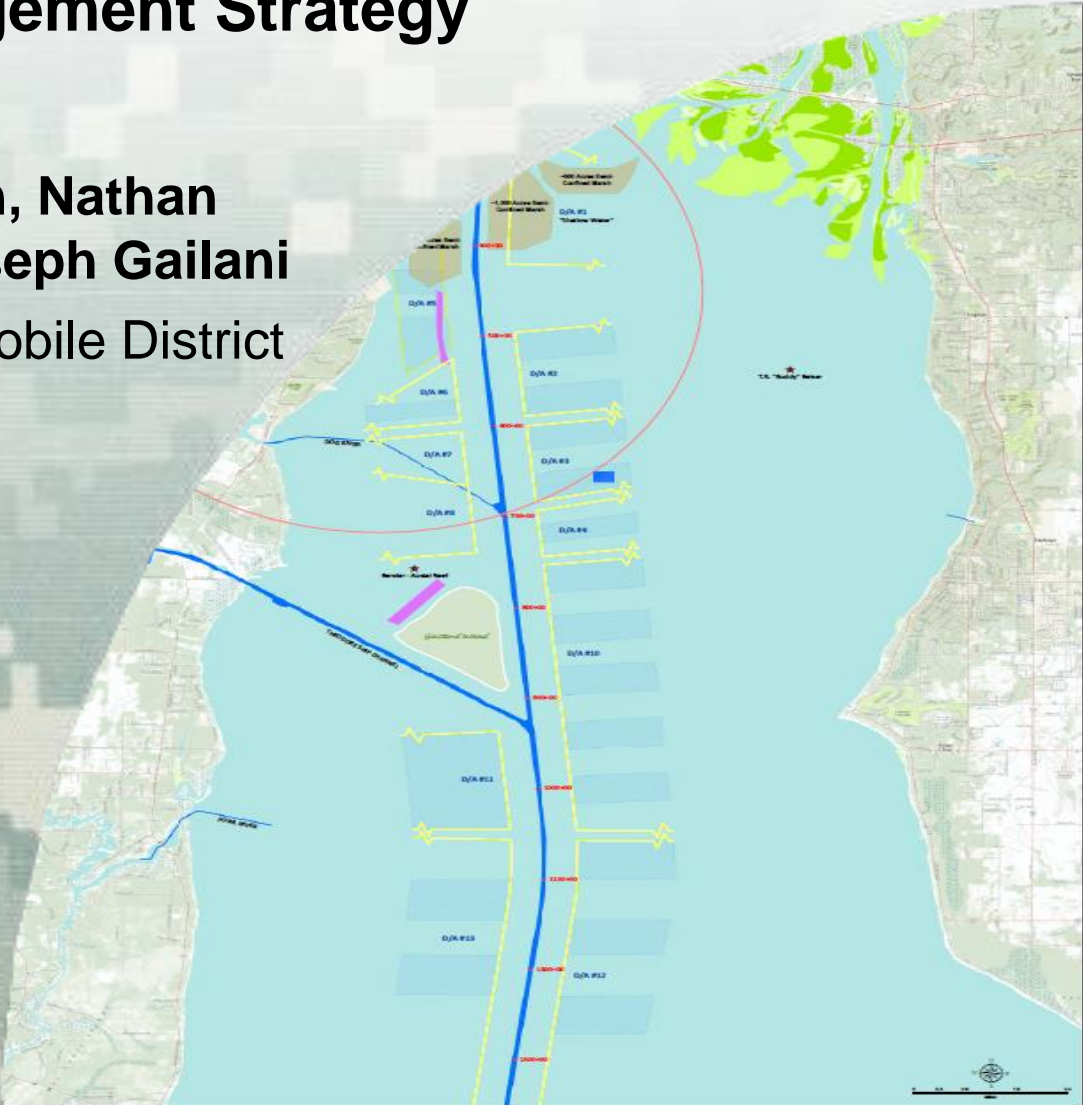
31st Annual National Conference on Beach Preservation Technology

Regional Sediment Management Strategy for Mobile Bay, Alabama

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U.S. Army Corps of Engineers, Mobile District

February 8, 2018



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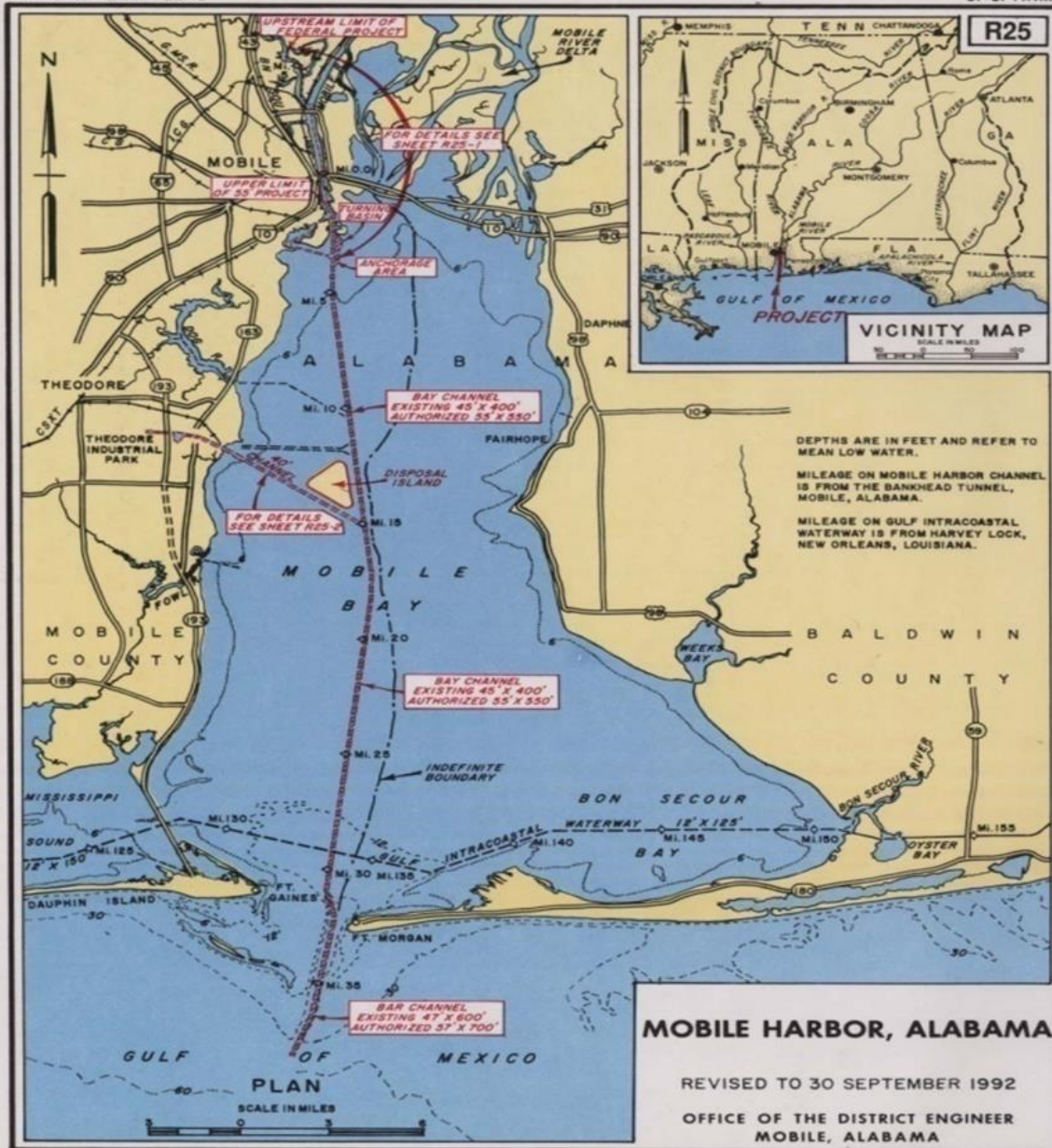
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Challenge



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- WRDA 1986
 - ▶ Authorization for widening and deepening
 - ▶ Dredged material from Mobile Channel shall be disposed of in open water in the Gulf of Mexico
- WRDA 1996
 - ▶ May consider alternatives to disposal of dredged material in the Gulf of Mexico, including environmental acceptable alternatives for beneficial uses of dredged material and environmental restoration
- Is removing all the dredged sediment from the Bay the smart thing to do?
 - ▶ 4 mcy/yr



Interagency Team Goals



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- Development of in-bay disposal strategies both short and long term
- Utilizing environmentally accepted alternatives for beneficial uses of dredged material
- Identify, evaluate, and utilize new and existing engineering techniques and management models/tools to evaluate alternative management options
- Utilizing alternative dredging equipment

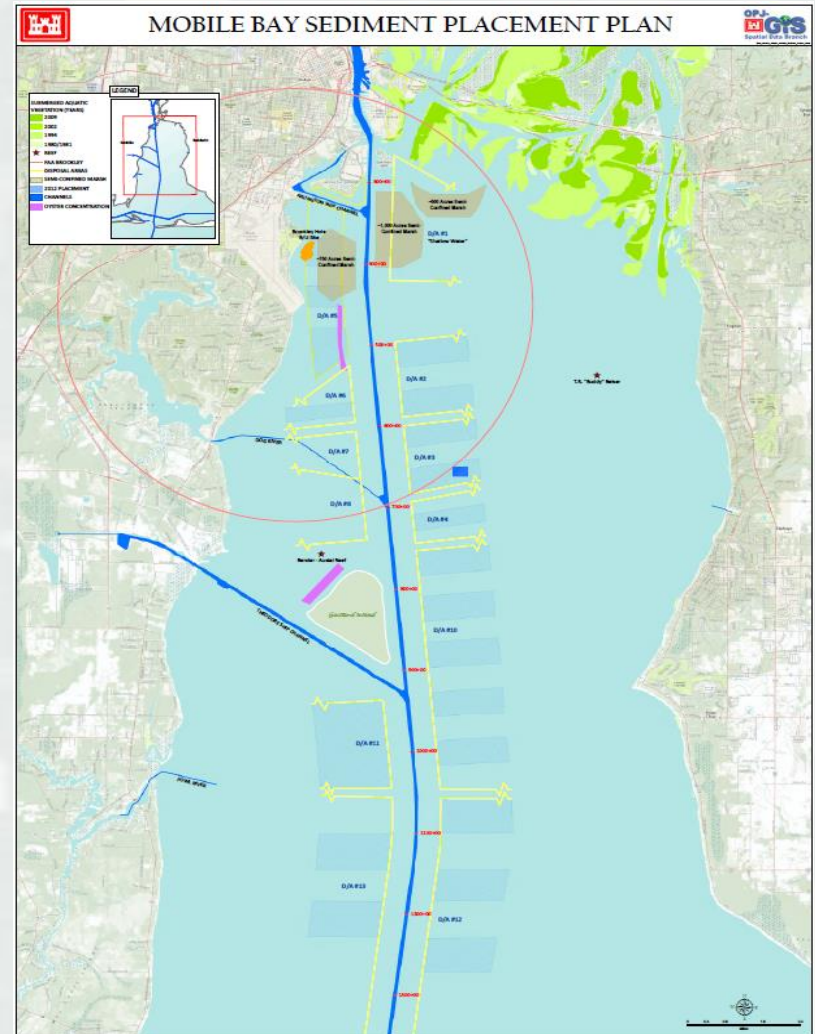


Accomplishments



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- Brookley Hole
 - Short term
- In-bay disposal
 - Long term
- Tidal marsh creation in upper Mobile Bay
 - Long term - planning phase
- Beneficial Use from Channel Improvements



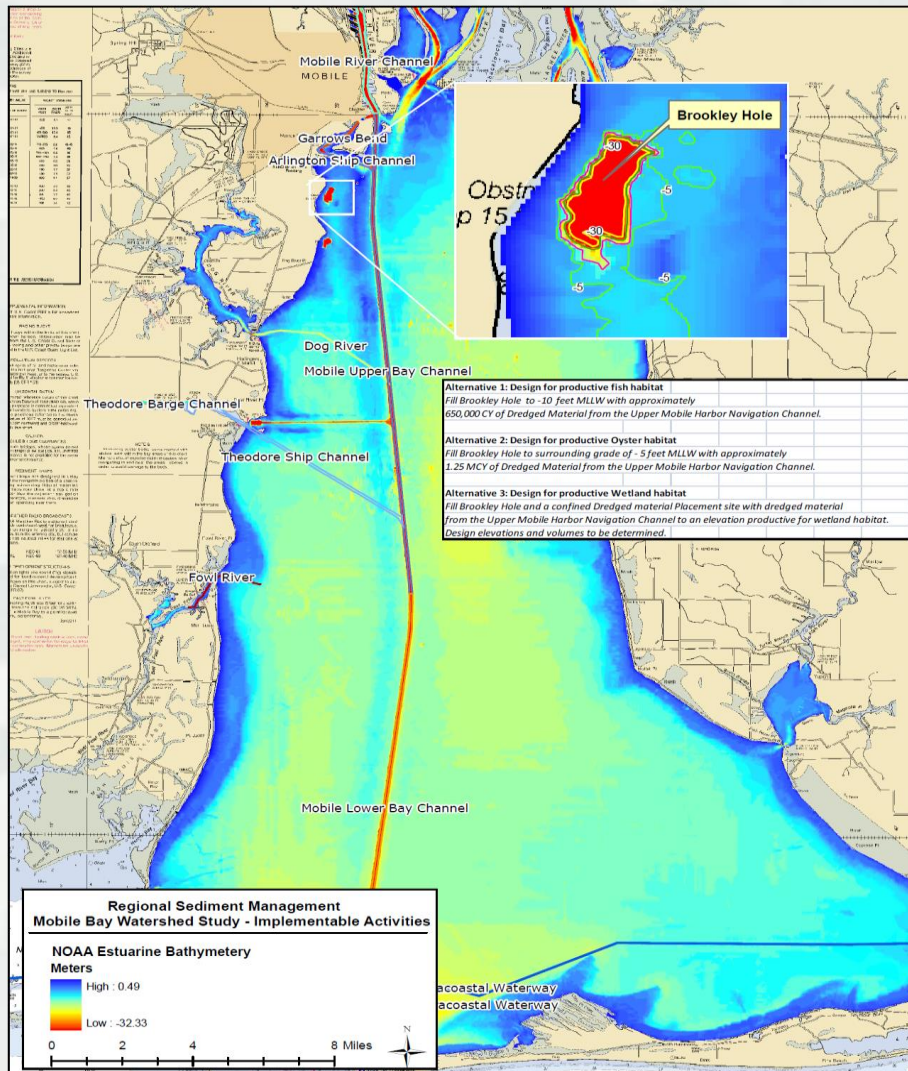


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BU of Dredged Material to Fill Brookley Hole



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- Borrow source for creation of Brookley Air Field
 - 65 acres in size with a maximum depth 22 feet
 - Hypoxic/anoxic conditions resulting in degraded ecological productivity.
- Fill Options
 - Fill to some level of productivity
 - Fill to surrounding grade through successive dredging cycles
- Fill placement activities
 - 2012 - 1.2 MCY initial fill from Mobile Bay Channel
 - 2014 – 750,000 cy
- Monitoring results used to determine desired level of restoration

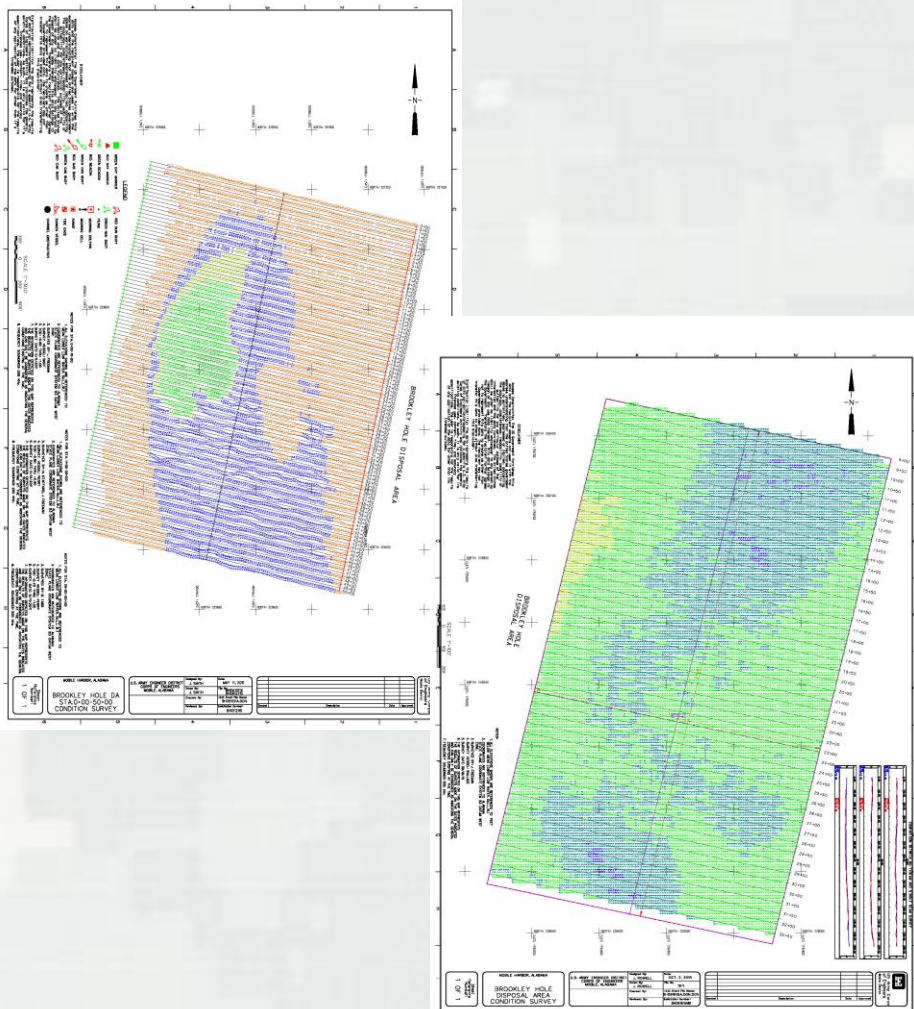
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BU of Dredged Material to Brookley Hole



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- Brookley Hole Monitoring Results
 - No evidence of post-restoration hypoxia/anoxia
 - Fish density increased during spring and fall
 - Significant increase in benthic diversity and abundance but still recovering
 - Beneficial use objective has been achieved
- Future placement may be warranted if significant consolidation occurs
- Area unproductive restored to 50 acres of productive bay bottom
- Significant savings to maintenance costs for Mobile Harbor



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Open Bay Disposal in Mobile Bay



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- 4 mcy of material removed from Mobile Bay Channel annually
- WRDA Requirements – off shore disposal
 - ▶ Is removing all dredged sediment from the Bay the smart thing to do?
- Emergency open water disposal conducted
 - ▶ 1998 – Hurricane Georges
 - ▶ 2005 – Hurricane Katrina
- Use demonstration to evaluate what happens to the material after placement



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Mobile Bay Channel Open Water Thin-Layer Disposal



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- Summer of 2012
 - ▶ Exercised emergency action in permit
- Placed 9 MCY in pre-established historic open water disposal areas
- Utilized hydraulic cutterhead dredge
- Thin-layer disposal techniques
 - ▶ Not to exceed 12" in thickness
- Significant savings in dredging costs
- Used as demonstration to monitor and model behavior
 - ▶ Sediment consolidation
 - ▶ Benthic recovery
 - ▶ LTFATE modeling

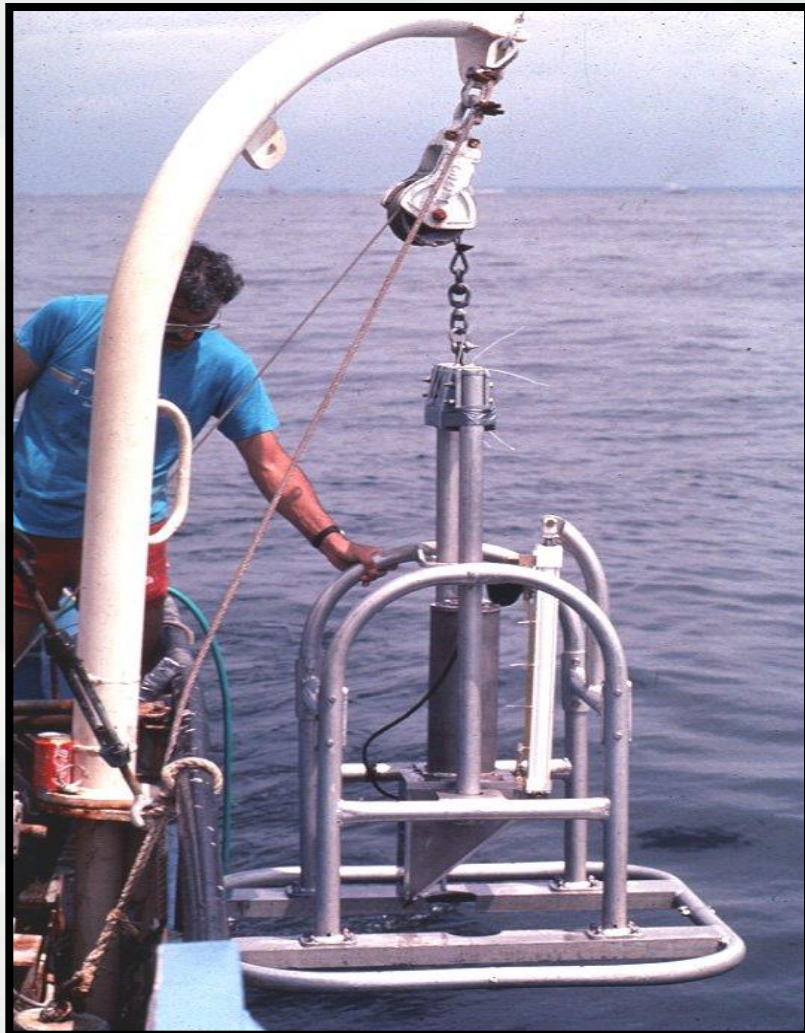


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Sediment Profiling Imagery



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Oxygenated
Surface Layer
Reworked by
Currents or
Wave action

02-09

Sediment-water
Interface

Dredged
Material
Layer

Buried
Native Bed

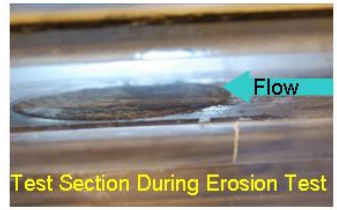
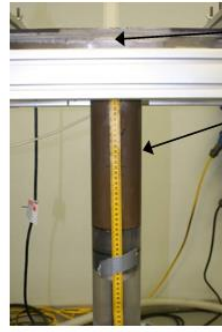
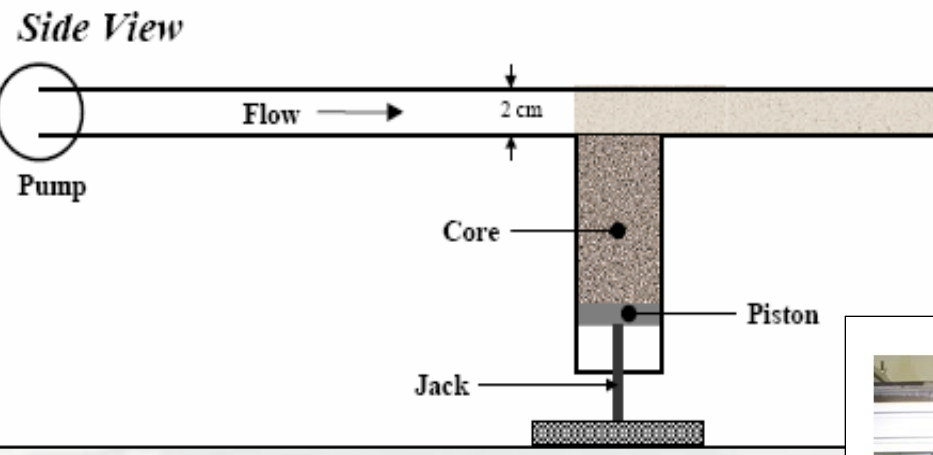
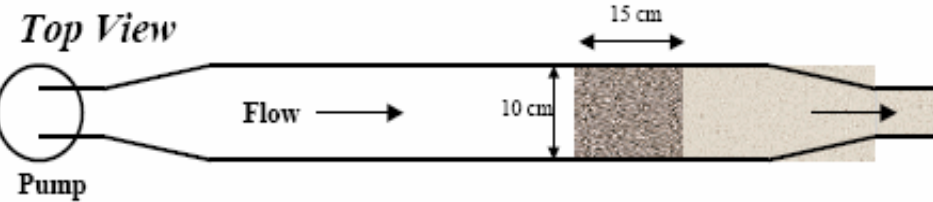
Scale in cm

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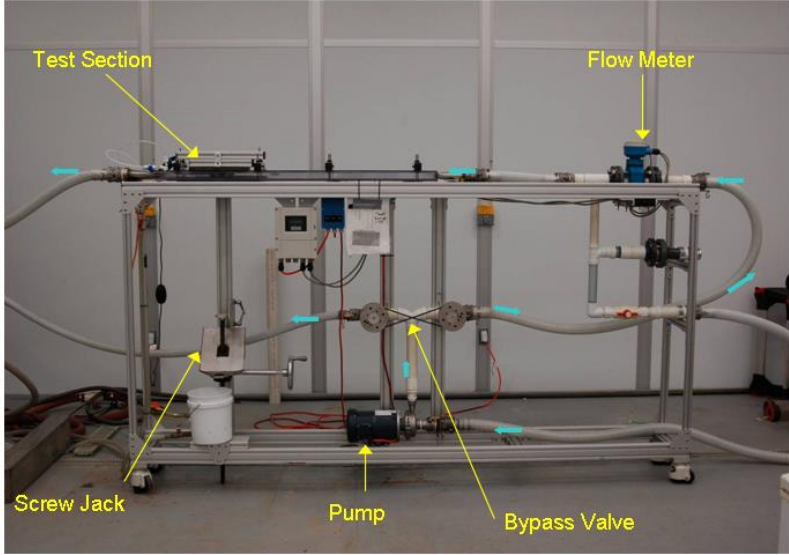


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SEDFLUME



Shear stress t (Pa)	Flow Rate t (GPM)
0.1	6.1
0.2	9.1
0.4	13.5
0.6	17.0
0.8	20.1
1.2	25.3
1.6	29.8
2.4	37.4
3.2	44.0
4	49.9
5	56.6
6.4	65.0
8	73.7
10	83.5
12	92.5
13	96.7
14	100.8



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Monitoring & Modeling Conclusions



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- Significant consolidation of placed material
- Rapid benthic recovery
- Approximately 35% of the sediment that erodes from the designated disposal areas is transported and deposits in the navigation channel.
- The remaining 65% is widely dispersed throughout the bay by wind-, river-, and tide-driven currents.
- The dredge material placed in thin-layers is less erodible (~ 45%) than native sediment.
- Sediment becomes remobilized into Bay's natural sediment system (Not transported along the bottom)



Implementation



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- Based on monitoring & modeling results
 - ▶ WQC modified in June 2014
850,000 cy placed - Summer 2014
1.2 million cy placed - Fall 2015
Continuing placement activities
 - ▶ Surveys show material is barely detectable
 - ▶ Placement sites used every 4 to 6 years





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Establishment of Long Term BU Site in Upper Mobile Bay Future



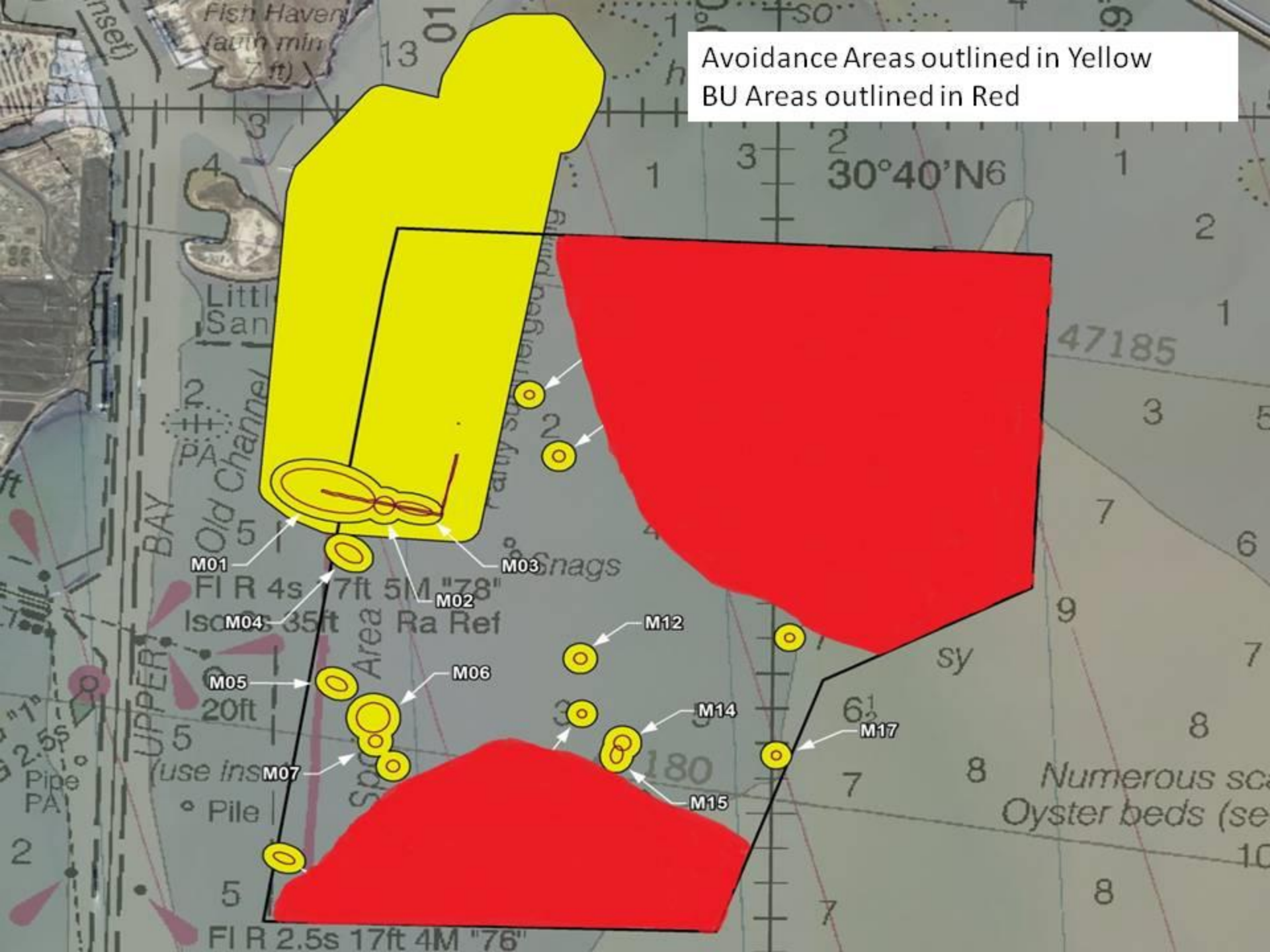
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Potential Long Term Beneficial Use Sites in Upper Mobile Bay



- Semi-contained, large scale open water disposal area (tidal marsh) in upper Bay
- More effective sediment management associated with maintaining Mobile Harbor
- Develop feasibility level BU design
- Planning process to include NEPA coordination, design, and permitting actions.
- Identify and prioritized potential sites
- Activities completed
 - Hydrographic survey of the upper Bay
 - SAV survey
 - Cultural resources survey
- Submitted proposal for Federal RESTORE Funding

Avoidance Areas outlined in Yellow
BU Areas outlined in Red





RESTORE Proposal Goals and Objectives



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- Restore and conserve habitat
- Enhance utilization of navigation maintenance sediment and maximize use of dredge material for sustainable coastal restoration
 - ▶ Federal navigation channel
 - ▶ ASPA terminals
 - ▶ Local and private dredging activities
- Construction of semi-submerged containment area and placement of dredge material
- Secondary Objectives
 - ▶ Improve water quality and provide habitat for living coastal and marine resources
 - ▶ Enhance community resiliency
 - ▶ Enhancing the regional economy by providing cost effective disposal options for navigation related industries located along the inland waterways



Project Implementation



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- Phase 1 - Planning
 - ▶ Geotechnical investigations of prioritized area
 - ▶ Determine final footprint
 - ▶ Preliminary design
 - ▶ Environmental compliance and NEPA documentation
 - ▶ Regulatory permitting
- Phase 2 – Construction (not part of initial funding)
 - ▶ Final Design
 - ▶ Construction of containment feature
 - Using material from onsite or dredged stockpiles along the BWT
 - ▶ Initial 100 acres of marsh
 - Using material from upper Bay maintenance



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Mobile Harbor Channel Improvements

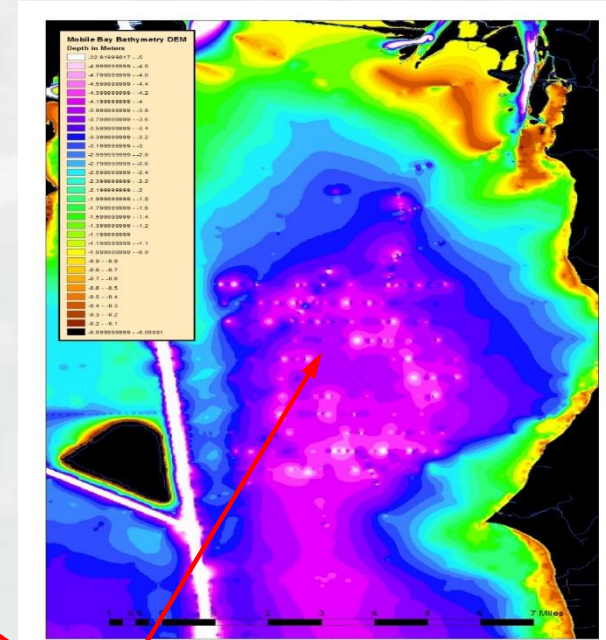
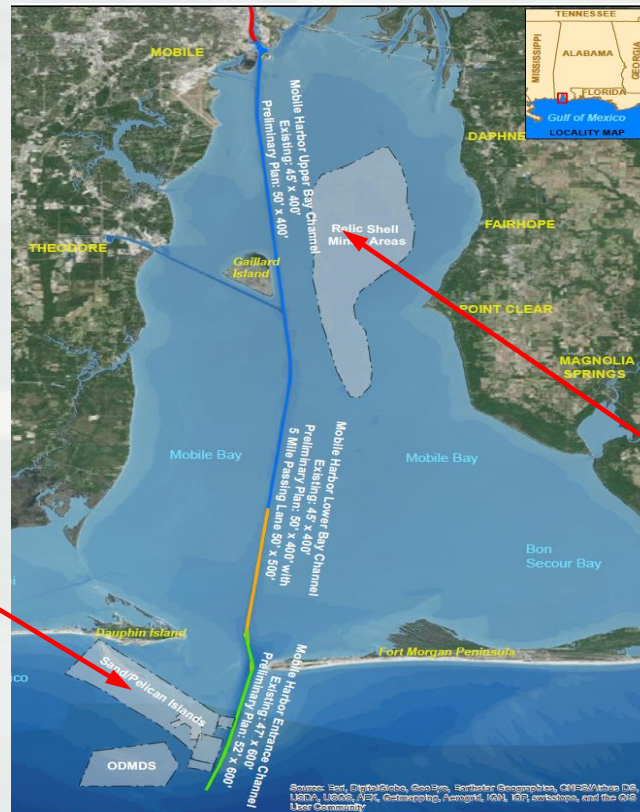


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- Conducting feasibility study to deepen and widen portions of the navigation channel
- Considering beneficial use of new work material

Placement of sandy material in Sand Island-Pelican Island complex

Keeps sand in littoral system



Placement of material in relict oyster dredging holes

Increases environmental productivity Improves water quality



Realized Benefits



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- Emphasize connection between maintenance dredging requirements, beneficial uses, and sediment management methods that reduce dredging costs
- Reducing amount of ocean sediment disposal
- Return sediment into natural system
- Establish long-term beneficial use opportunities
- Implementation of environmental restoration alternatives



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Thanks!