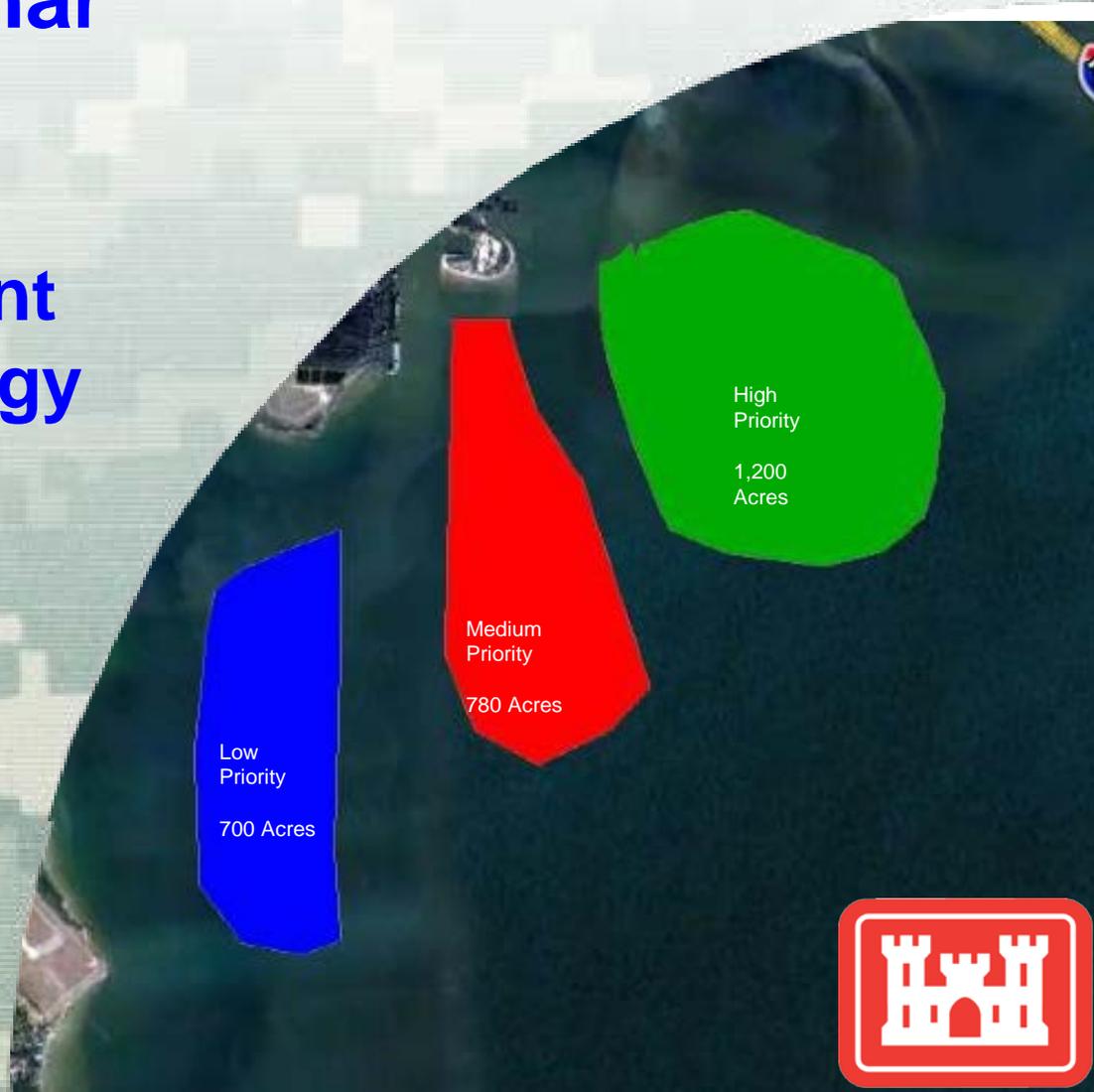


Regional Sediment Management Bi-Monthly Webinar

Mobile Bay Sediment Management Strategy

February 19, 2015



Mobile Bay RSM Program Recommendations

- Identify, evaluate, and utilize new and existing engineering techniques and management models/tools to evaluate alternative management options
- Development of in-bay disposal strategies both short and long term
- Considerations for an in-bay disposal demonstration project
- Utilizing environmentally accepted alternatives for beneficial uses of dredged material
- Demonstrate open water disposal with monitoring and predicting movement of sediment associated with in-bay disposal areas
- Utilization of cutterhead dredges providing flexibilities to employ a greater percentage of the available dredging fleet
- Establish interagency working group to develop a sediment management strategy



Mobile Bay Interagency Working Group (IWG)

- Alabama State Port Authority (ASPA)
- USACE, Mobile District
- ERDC
- Alabama Dept. of Environmental Management (ADEM)
- Alabama Dept. of Conservation and Natural Resources (ADCNR), State Lands Division
- ADCNR, Marine Resources Division (MRD)
- Geological Survey of Alabama (GSA)
- U.S. Fish and Wildlife Service (FWS)
- National Marine Fisheries Service (NMFS), Habitat Conservation Division
- Mobile Bay National Estuarine Preserve (NEP)
- Dauphin Island Sea Lab (DISL)
- The Nature Conservancy (TNC)
- Mobile County Environmental Department



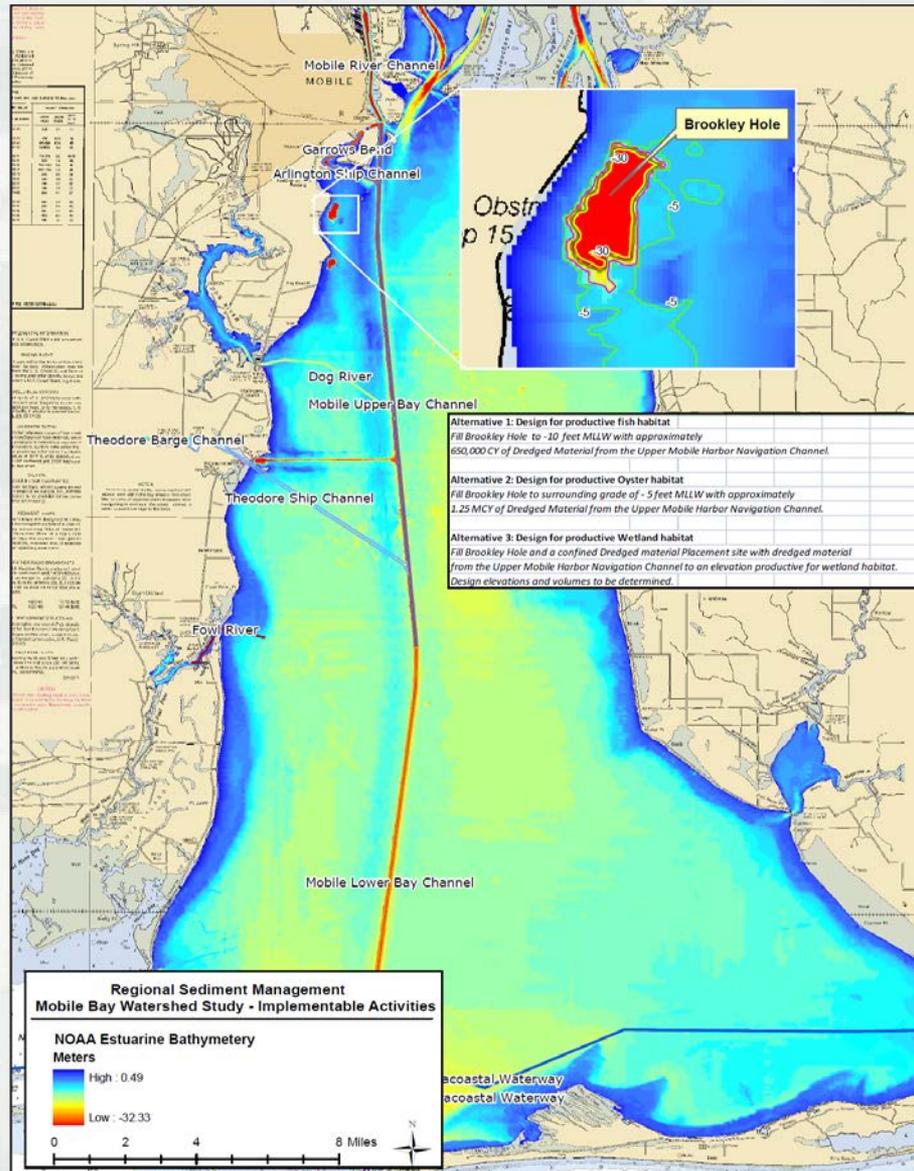
Mobile Bay Channel Disposal

- 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



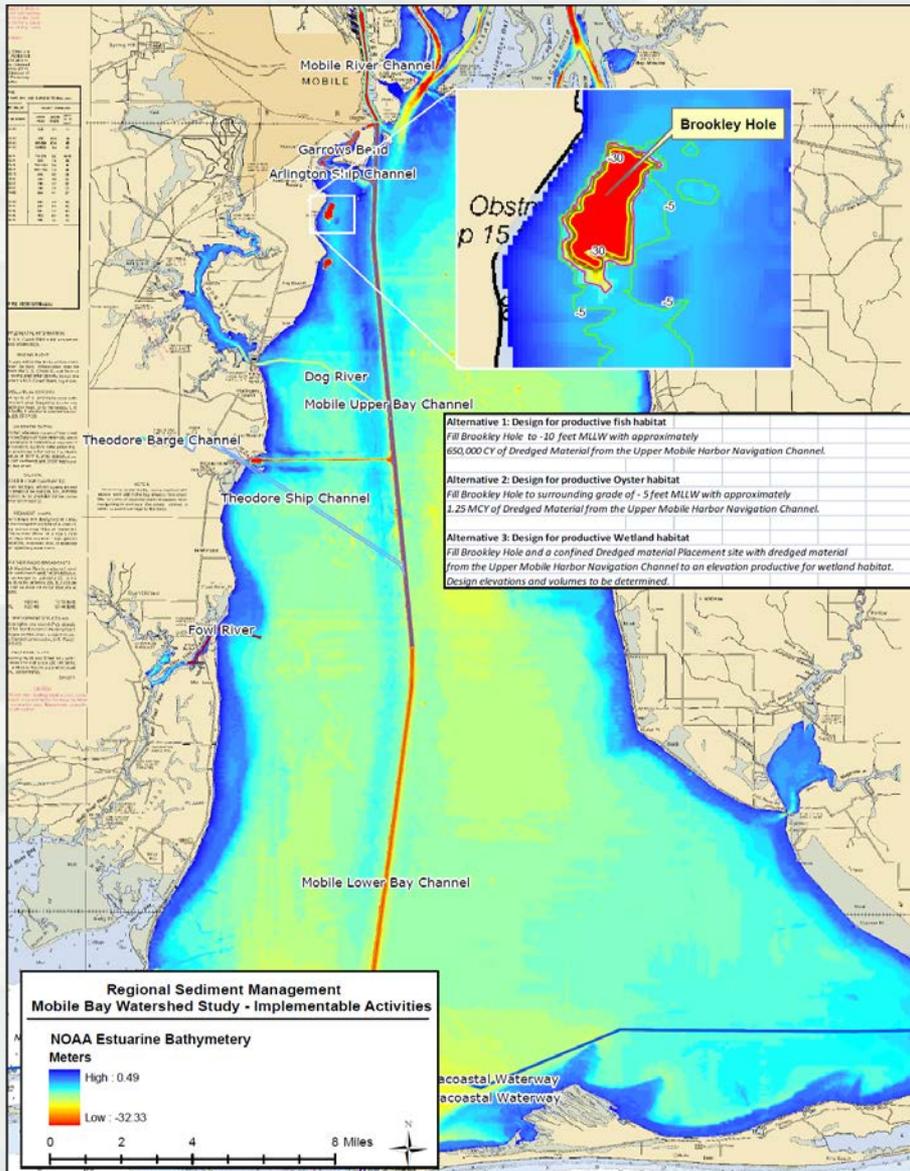
BU of Dredged Material to Fill Borrow Pit (Brookley Hole) – In progress



- Old borrow source for creation of Brookley Air Field
- Baseline surveys reveal hypoxic conditions resulting in degraded ecological productivity
- 1.2 MCY of initial fill from upper Mobile Bay Channel
- Fill Options
 - Fill to some level of productivity
 - Fill to surrounding grade through successive dredging cycles
 - Combination of emergent feature w/ marsh vegetation grading into shallow submerged environment
- Leveraging other research programs (DOER)
 - Conducted baseline characterizations
 - Continued post-fill monitoring
- Monitoring results used to determine desired level of restoration
- Initial fill completed September 2012
- Monitoring conducted under DOER



BU of Dredged Material to Fill Borrow Pit (Brookley Hole) – In progress



• 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

• IWG recommended continued placement

- Summer 2014 dredging cycle
- Additional 750,000 cy placed
- Hydrographic surveys and DO monitoring after consolidation
- Further recommendations using results of monitoring



Establishment of Long Term BU Site in Upper Mobile Bay

Potential Long Term Beneficial Use Sites in Upper Mobile Bay



- Interagency Working Group to help plan and implement semi-contained, large scale open water disposal area (tidal marsh) in upper Mobile Bay
- Builds on requests of Alabama State Port Authority (ASPA) to partner in implementation of more effective sediment management associated with maintaining Mobile Harbor
- Develop feasibility level BU design
- ASPA will take lead on the design, NEPA coordination, and permitting actions.
- Activities completed
 - Hydrographic survey of the upper Bay
 - SAV survey
 - Cultural resources survey
- Geotechnical surveys next step

BU sites as refined and prioritized from the April 12 Meeting



In-Bay Disposal Considerations

- WRDA Requirements
 - ▶ Is removing all the dredged sediment from the Bay the smart thing to do?
- Open water disposal has been recently conducted
 - ▶ 1998 – Hurricane Georges
 - ▶ 2005 – Hurricane Katrina
- 2012 recertification included emergency open-bay option
- IWG Concerns
 - ▶ What happens to the material after placement
- Use demonstration to evaluate opportunities to resolve issues



Mobile Bay Channel Open Water Thin-Layer Disposal

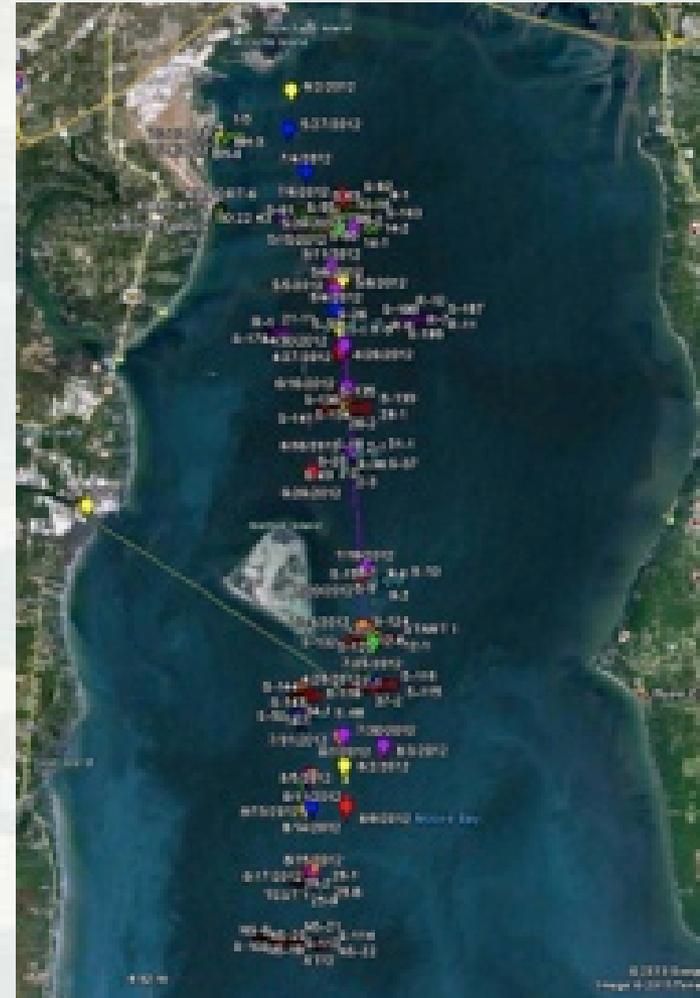


- Summer of 2012
 - ▶ Exercised emergency action in permit
- Placed 9 MCY in pre-established historic open water disposal areas
 - ▶ Disposal Areas 1-3, 10, 11 and 13
- Utilized hydraulic cutterhead dredge
- Thin-layer disposal techniques
- Significant savings in dredging costs
- Used as demonstration to monitor and model behavior



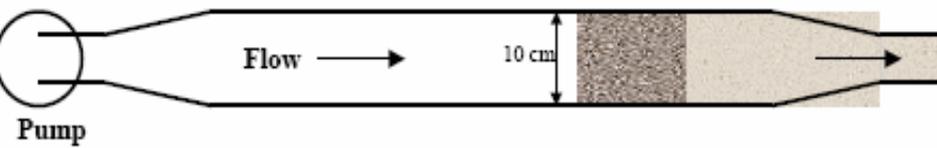
THIN-LAYER PLACEMENT MONITORING

- Sampling conducted September 2012
- Collected sediment profiling imagery at 219 stations
- Collected push cores for grain size analysis and geotechnical properties at about 185 stations
- TLP stations represented time series from 24 hours to 6 months post-placement

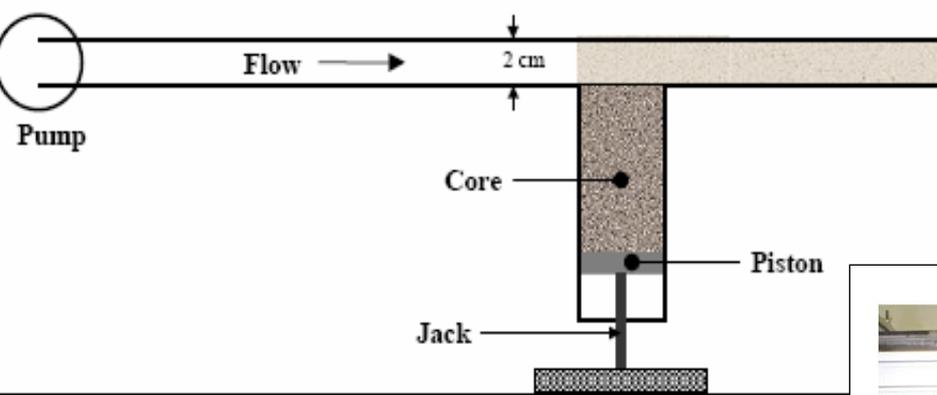


SEDFLUME

Top View

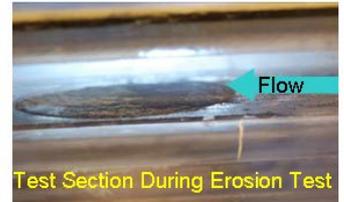


Side View



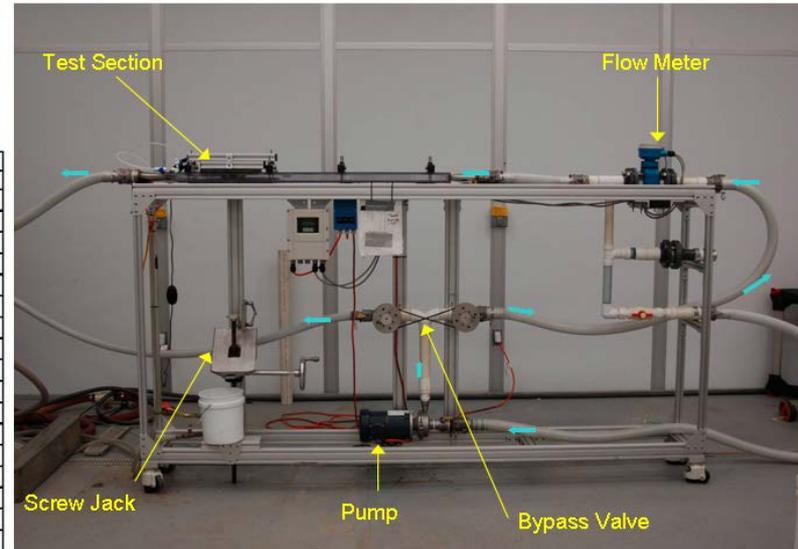
Test Section

Core



Test Section During Erosion Test

Shear stress t (Pa)	Flow Rate (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



LTFATE Modeling Approach

Current- and wave-induced sediment transport was simulated in Mobile Bay for the following conditions:

- Seasonal Event: Feb – May 2010
- Storm Events
 - Hurricane Gustav: Aug – Sep 2008
 - Hurricane Ida: Nov 2009

These three simulation periods were modeled ‘with’ project conditions and ‘without’ project conditions.

The ‘with’ project conditions assumes that 12 inch thick TLP deposits were placed evenly in the designated disposal areas.

The ‘without’ condition (base case) assumes that no TLP was placed and the sediments at the disposal sites are native (with corresponding erosion rates).



LTFATE Modeling Scenarios

Four specific model scenarios were simulated for each of the three simulation periods:

- 1) TLP has least erosive potential based on Sedflume slurry tests (12 inches TLP thickness).
- 2) Sensitivity Simulation 1 (most erosive): TLP has same erosive potential as native sediment (12 inches TLP thickness).
- 3) Sensitivity Simulation 2: TLP has least erosive potential based on Sedflume slurry tests but half the difference in critical shear stresses (12 inches TLP thickness).
- 4) No TLP exists (base case).



Modeling Conclusions

- 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)
- Based on these results
 - IWG recommended Corps pursue modification of Mobile Harbor WQC to include a long term open-bay thin-layer disposal option
 - WQC modified in June 2014
 - 850,000 cy placed in open-bay sites



Sediment Management Strategy

- Continue placing material in Brookley Hole and other artificially created holes.
- Continue pursuit of Upper Bay BU site:
- Open-bay placement using thin-layer disposal
- Use ocean disposal where necessary



RSM Funded Filling Dredged Oyster Pits

