

Galveston District FY 12, FY 13 & FY 14 Regional Sediment Management (RSM)

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Galveston District Matagorda Ship Channel, FY 12 Regional Sediment Management (RSM)

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Galveston District, Matagorda Ship Channel RSM

Description/Challenge

- Area of Extensive Shoaling in Matagorda Ship Channel
- Annual Draft Restrictions = Annual Dredging Requirements
- Limited Funding for Dredging

Goals/Issues to Address

- Determine source of sediment
- Develop alternatives to reduce the deposition of sediment into the ship channel
- Implement alternative(s) which can effectively reduce shoaling and provide increased time between dredging cycles



BLUF: Implementation of alternatives which can reduce shoaling in the Matagorda Ship Channel will benefit deep draft ports, industry, and USACE by enabling SWG to more effectively manage the maintenance of the channel in order to ensure reliable deep draft navigation.

Galveston District, Matagorda Ship Channel RSM

Project Delivery Team Members

SWG

- Tricia Campbell, Operations Manager
- Sheri Willey, Planning Lead
- Samantha Lambert, Hydraulic Engineer
- Andrew Smith, Civil Engineer

ERDC

- Robert Thomas, Research Hydraulic Engineer
- Lihwa Lin, Research Hydraulic Engineer
- Honghai Li, Research Physical Oceanographer

Leveraging/Collaborative Opportunities

funding, data, tools, models, etc
with Other Projects, Programs, Partners, etc

- Coastal Inlets Research Project (CIRP)
- Dredging, Operations, and Environmental Research Program (DOER)
- Existing models

Stakeholders

- Ports of Point Comfort, Port Lavaca, Port O'Connor
- Calhoun County Port Authority
- Industries
- Pilots

Milestones/Deliverables

- Sediment Budget
- Model Calibration
- Selection of Alternatives
- Testing of Alternatives w/ Refined Model
- Report

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Galveston District, Matagorda Ship Channel RSM

Goals

- Hopefully will solve shoaling problem in upper reaches (save money).
- Have a better understanding of how sediment moves in system.
- Find opportunities for future RSM studies in area.

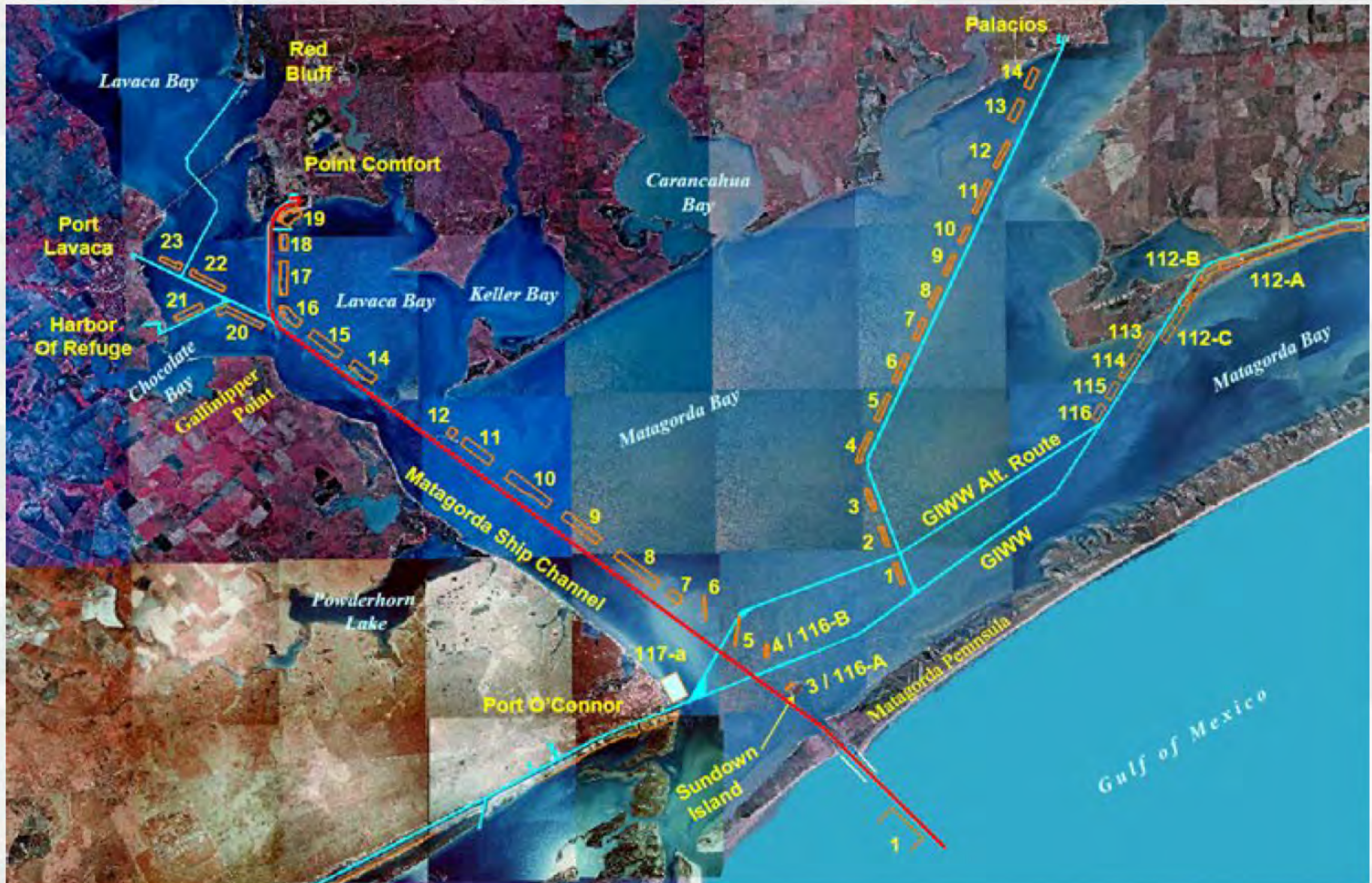
Approach

- Data search and review
 - Past Reports and Studies
 - Dredging History Database
 - Hydrographic Condition Surveys
- Coastal Modeling System (CMS) modeling performed for currents, sediment movement, and fluid mud
- Calculated sediment volume placed into open water placement areas adjacent to the channel
- Developed sediment budget in Sediment Budget Analysis System (SBAS)
- Identified alternatives and used CMS to determine which alternative was most effective



Galveston District, Matagorda Ship Channel RSM

Present Configuration of Matagorda Ship Channel (MSC), 200' wide, 36' deep



Galveston District, Matagorda Ship Channel RSM Area of Focus



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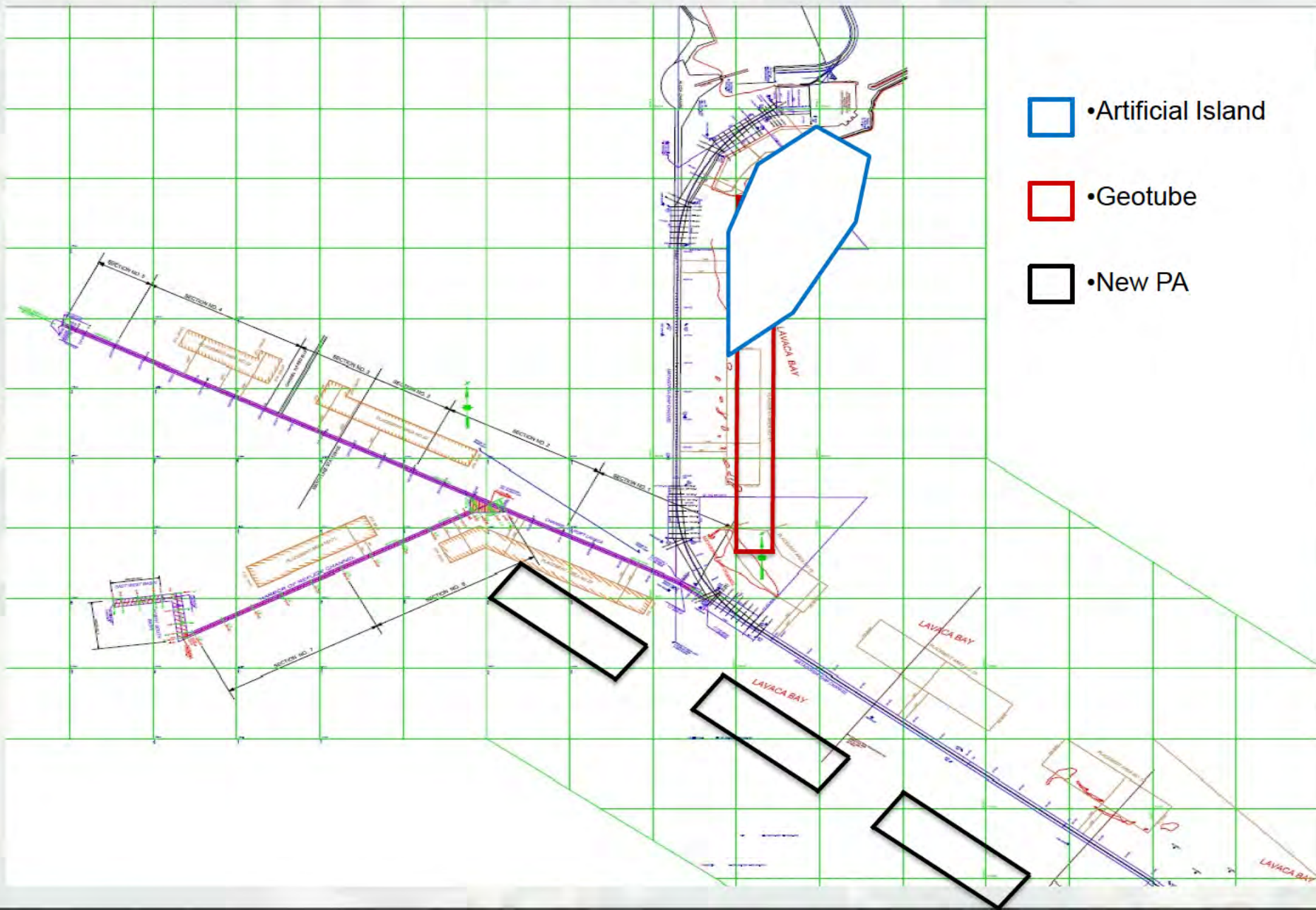


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Galveston District, Matagorda Ship Channel RSM Sediment Budget Analysis System (SBAS)

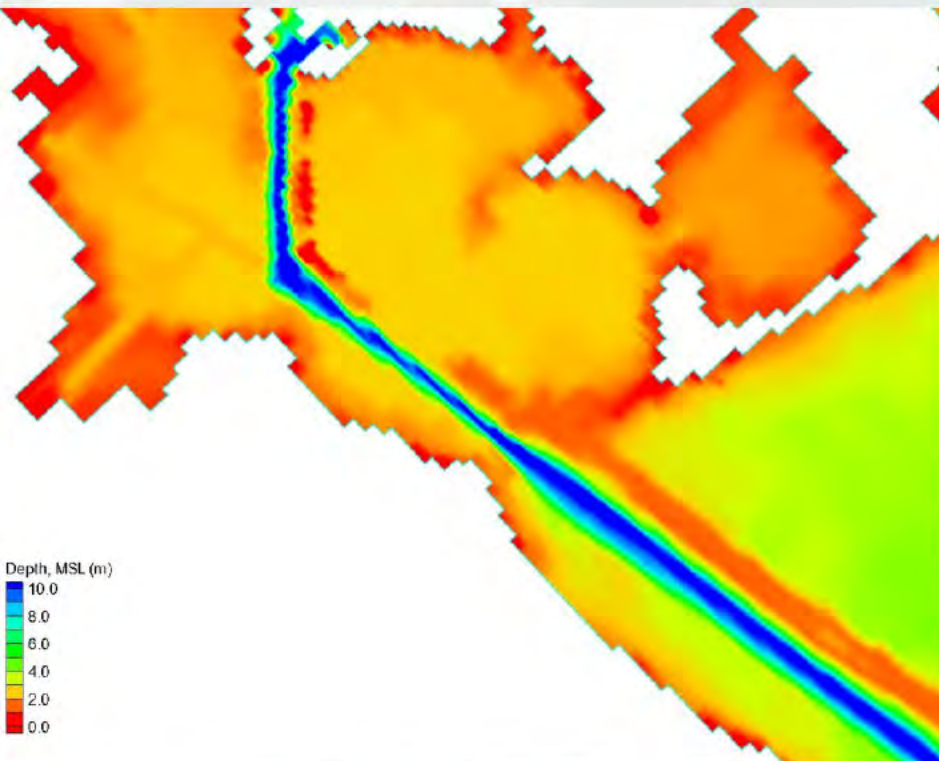


Galveston District, Matagorda Ship Channel RSM Alternative Identification



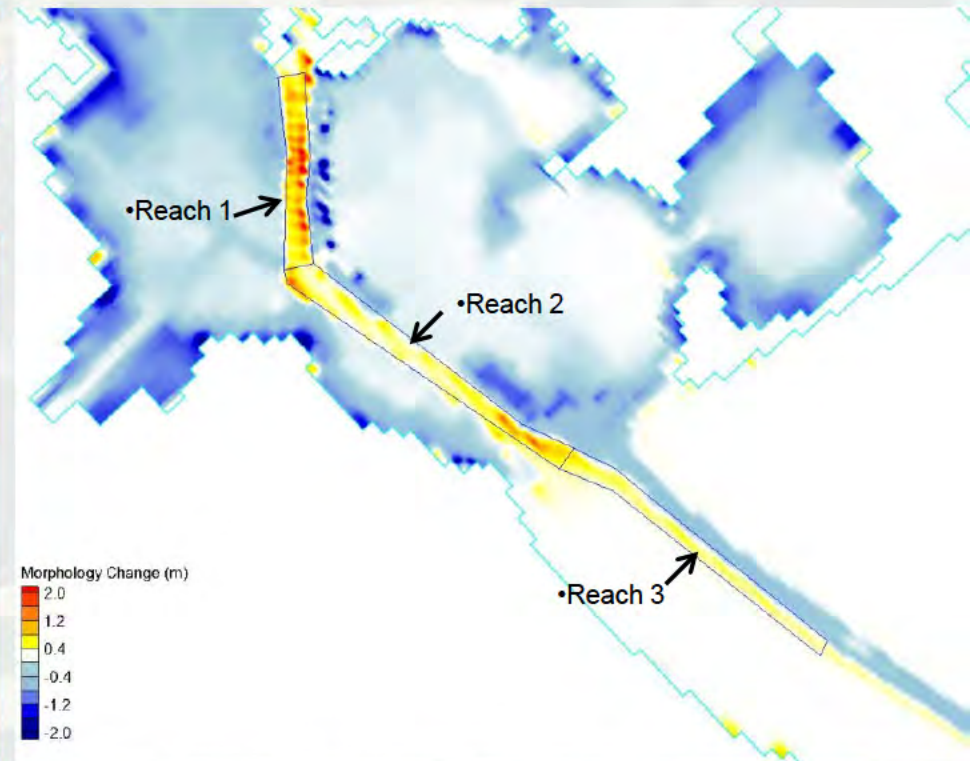
Galveston District, Matagorda Ship Channel RSM Morphology Change

- Existing Condition - Sep 2006 to Feb 2007



Initial depth (Sep 2006)

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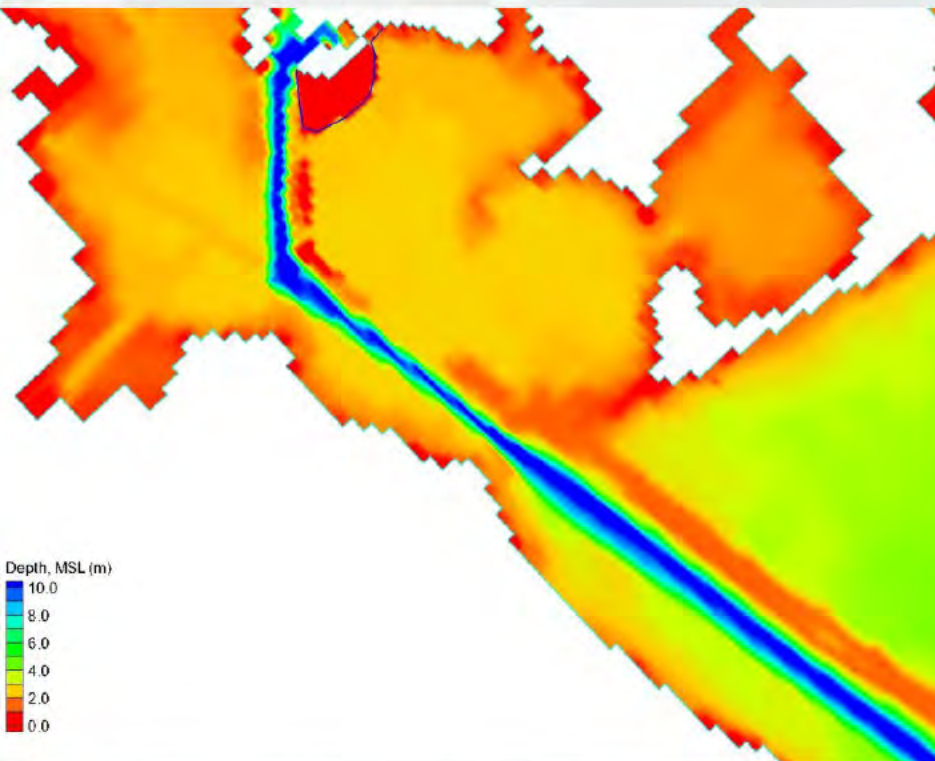
Change in depth (6 months)



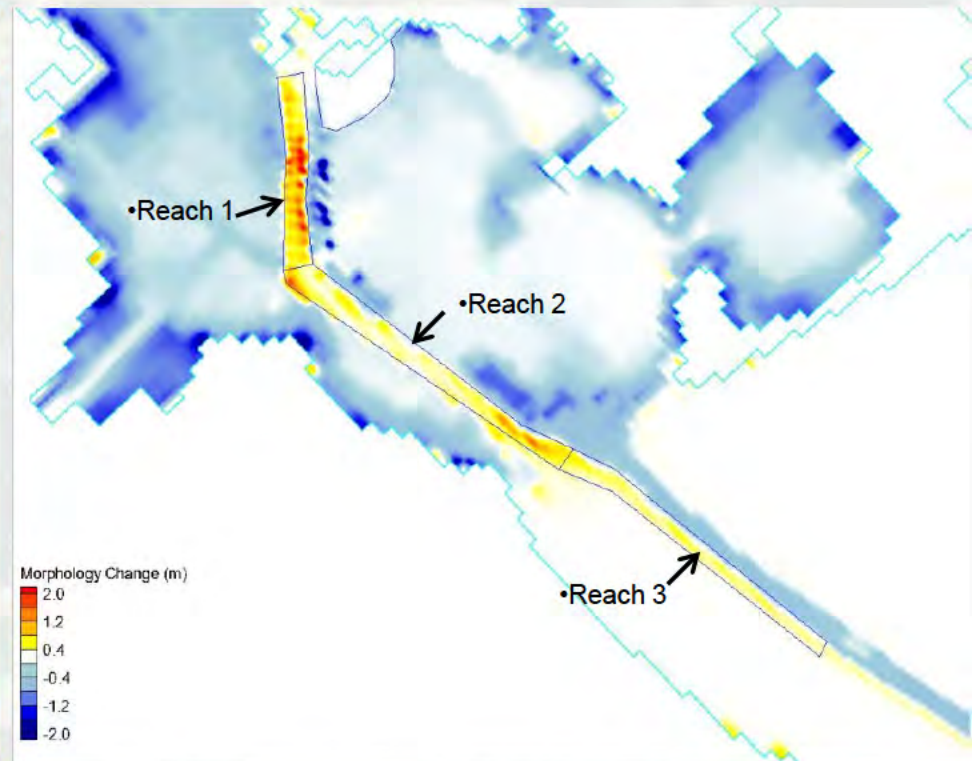
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Galveston District, Matagorda Ship Channel RSM Morphology Change

Alternative 1: Create Artificial Island - Sep 2006 to Feb 2007



Initial depth (Sep 2006)



Change in depth (6 months)

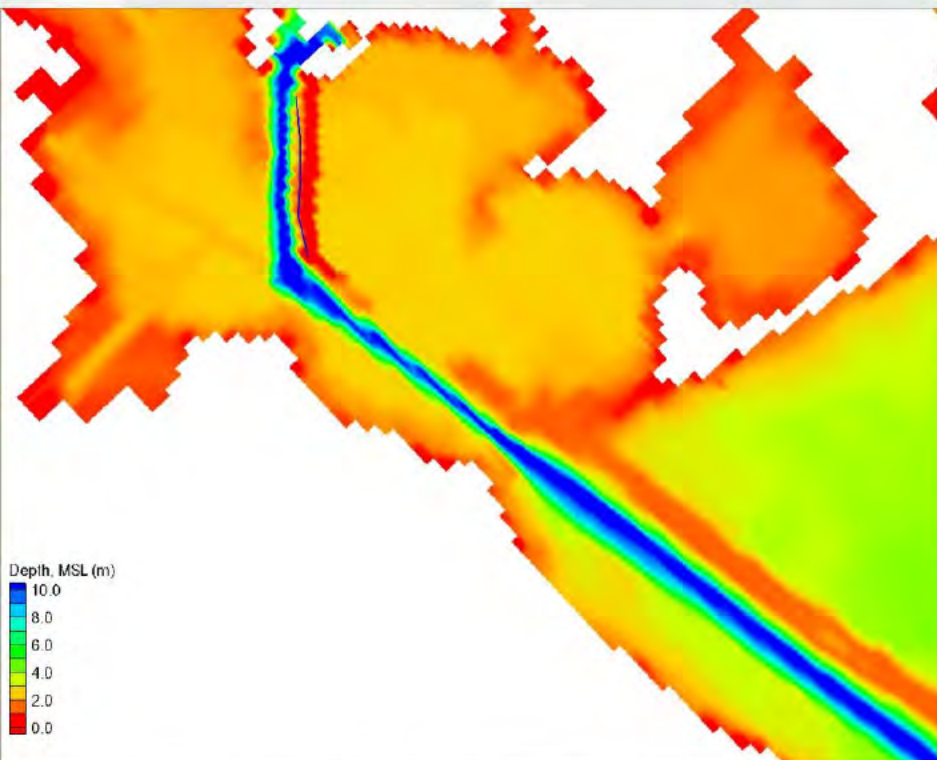
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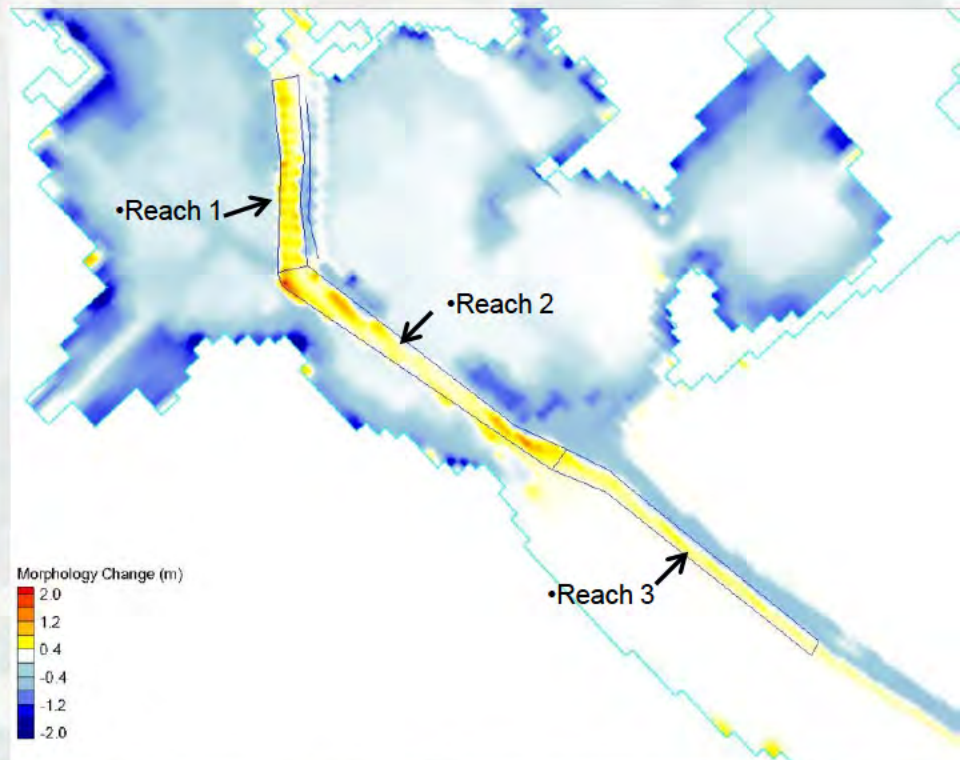
Galveston District, Matagorda Ship Channel RSM Morphology Change

Alternative 2: Place Geotube Adjacent to Channel - Sep 2006 to Feb 2007



Initial depth (Sep 2006)

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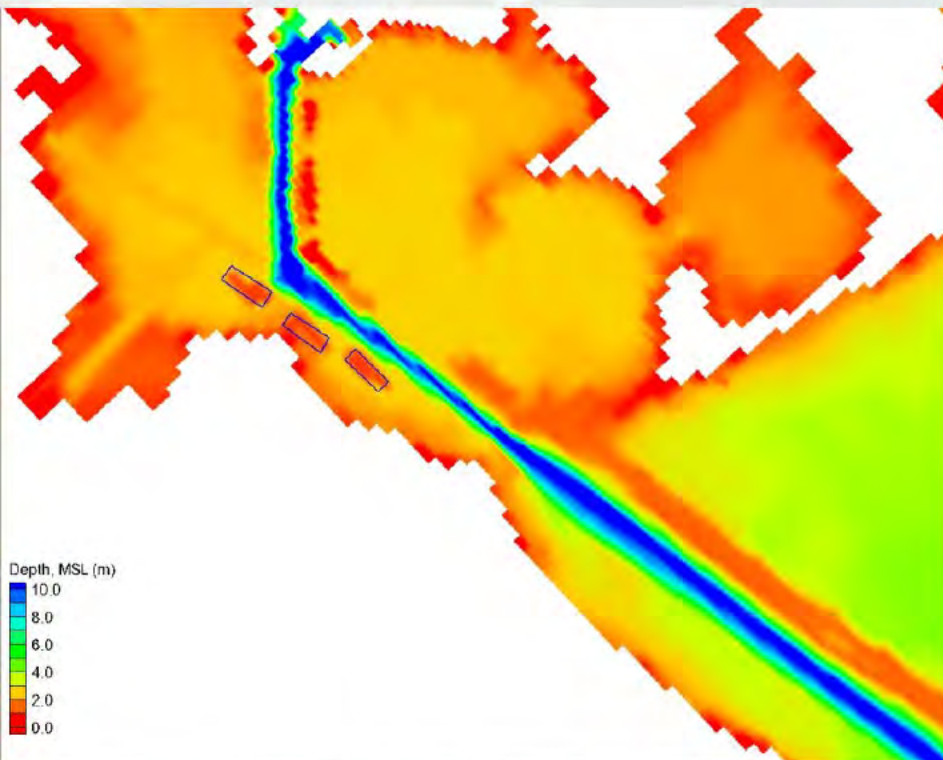
Change in depth (6 months)



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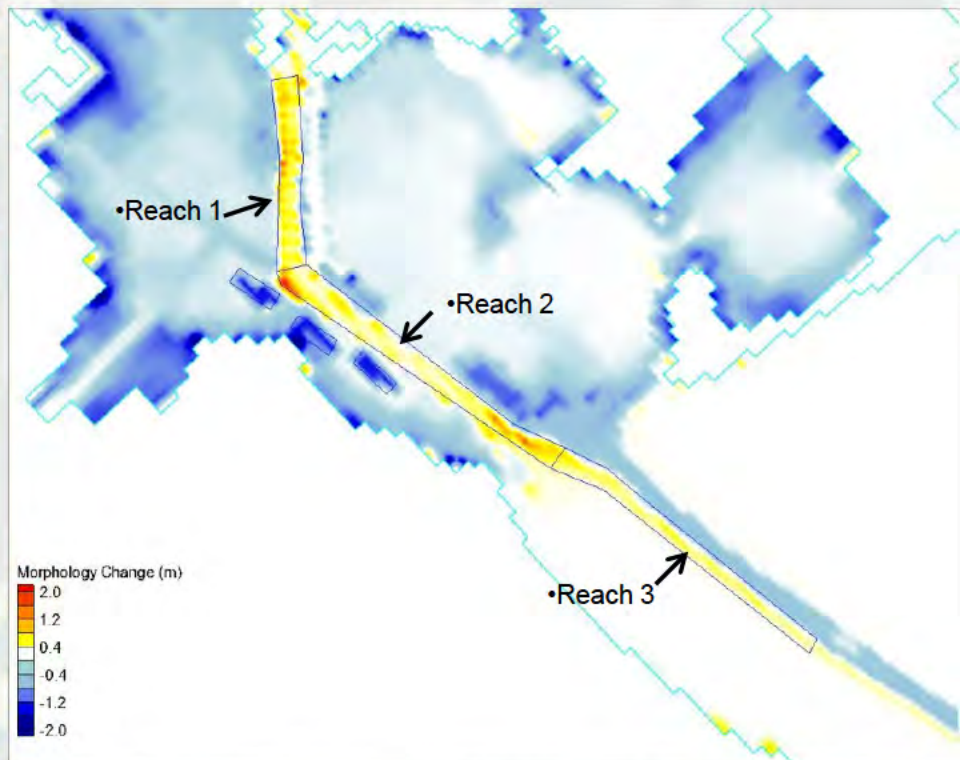
Galveston District, Matagorda Ship Channel RSM Morphology Change

Alternative 3: Relocate Placement Areas to Opposite side of Channel-
Sep 2006 to Feb 2007



Initial depth (Sep 2006)

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Change in depth (6 months)



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Galveston District, Matagorda Ship Channel RSM Calculated Sediment Volume Change

•Cumulated Sediment Volume Change (cubic yard), Sep 2006 – Feb 2007

Configuration	Reach 1	Reach 2	Reach 3	Reach 1-3	% Reduction
Existing Configuration	2.04	1.33	0.47	3.84	
Create Artificial Island	1.90	1.24	0.44	3.58	-7
Place Geotube Adjacent to Channel	1.00	1.44	0.41	2.85	-26
Relocate PAs to Opposite Side of Channel	1.10	1.35	0.44	2.89	-25



Galveston District, Matagorda Ship Channel RSM

Accomplishments

- Verified problematic shoaling in upper reaches of Matagorda Ship Channel by using survey data, dredging history database, and CMS modeling
- Developed alternatives and modeled them in CMS to see which worked best
- Developed sediment budget for Matagorda bay system which will be useful for any future projects in the area



Galveston District Gulf Intracoastal Waterway, FY13 Regional Sediment Management (RSM)

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Galveston, Gulf Intracoastal Waterway RSM

Description/Challenges

- PA's along the GIWW are eroding on both the channel and the bay side due to currents, wind generated waves and ship wakes
- Once breached, material is deposited into the GIWW
- Once they become submergent they become potentially unavailable

Objectives

- Determine/Confirm Erosion of barrier islands
- Identify causes of erosion and erosion rates (sediment budget)
- Design/Evaluate methods to decrease erosion



BLUF: SWG needs to identify sediment management options to prevent erosion of the Gulf Intracoastal Waterway (GIWW) Placement Areas. .

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Galveston, Gulf Intracoastal Waterway RSM

Approach

(including Tools/Models/Data Used)

- Aerial Imagery Analysis
- Sediment Budget
- Design of protection system / prioritization of areas
- CMS modeling Scenarios
- Review of Modeling, quantify the impacts

Deliverables

- Problem Statement Brief (27NOV12)
- Workshop (19FEB13)
- CHETN – Identification of alternatives to reduce shoaling in the GIWW and prevent erosion of the barrier islands (TBD, SEP13)

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Galveston, Gulf Intracoastal Waterway RSM

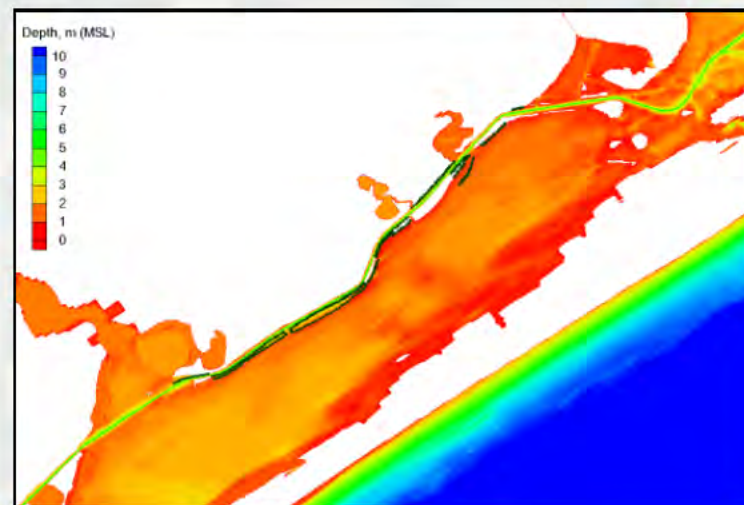
Accomplishments/Benefits/Lessons Learned

- Verified importance of barrier islands in reducing channel shoaling.
- Put forward several design alternatives (both structural and non structural) to protect the barrier islands and reduce shoaling in the GIWW.
- Developed a cost comparison to determine the most economical designs for the channel & Bay sides.
- Used CMS to verify reduction in shoaling when proposed structures are placed in the system.

Opportunities to take action

- Implement construction by phase: PA 62 through PA 64 - Phase 1, North of Greens Lake & PA 65 to Chocolate Bay - Phase 2.
- Address each individual reach according to its designated priority - How rapid is channel shoaling and shoreline erosion here?
- Recommend rip rap revetment on the channel side of the barrier islands based on cost, but ACB is more practical for this reach.
- Recommend a combination of oyster castles, rip rap revetment, and sacrificial berms on the Bay side.

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CMS Model Bathymetry with All Proposed Structures and Berms



Proposed layout of protection along PA 62

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Galveston, Gulf Intracoastal Waterway RSM

District PDT Members

- Tricia Campbell, PE, Navigation
- CPT Derek Thornton, Navigation
- Kimberly Townsend, Coastal H&H
- Eric Wood, Coastal H&H
- Sheri Wiley, Planning
- Robert Thomas, ERDC
- Jantzen Miller, Project Engineer

Stakeholders and Partners

- GIWW ICT
- TX-GLO
- TXDOT
- GICA
- USFW
- TX Parks and Wildlife
- Galveston Bay Foundation

Leveraging/Collaborative Opportunities

- SWG O&M
- FY12 RSM Upper Texas Coastal Sediment Budget Analysis

Channel Sections	Existing Channel	Priority 1 Structures	All Priorities
1	83,985	84,045	85,530
2	51,920	45,090	22,650
3	42,270	15,640	13,730
4	480	1,620	2,060
5	6,120	6,100	5,220
6	16,490	16,430	17,860
Total (Sec1-6)	201,260	168,930	147,050

Table 3. Model volume change (CY), Jan-Mar 2010



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FY 14 RSM Project

Galveston Entrance Channel RSM



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Galveston District Galveston Entrance Channel RSM Project

Description/Challenge

- 18 month Dredging Requirements
- Limited Funding for Dredging
- Costly Draft Restrictions for waterway users

Goals/Issues to Address

- Determine source of sediment
- Develop alternatives to reduce the deposition of sediment into the ship channel
- Implement alternative(s) which can effectively reduce shoaling and provide increased time between dredging cycles to reduce operations and maintenance costs

Stakeholders

- Ports of Galveston, Texas City, and Houston
- Industries along channels
- Pilots
- Galveston Park Board of Trustees
- Texas General Land Office

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Galveston District Galveston Entrance Channel RSM Project

Products

- Identify Potential Alternatives
- Quantify impacts of each alternative solution
- Report and presentation

Leveraging/Collaborative Opportunities

- Galveston Sand Management Project
- Sabine to Galveston Feasibility Study
- Houston Ship Channel Monitoring Completed Navigation Projects (MCNP) Program
- Coastal Inlets Research Project (CIRP)
- Dredging, Operations, and Environmental Research Program (DOER)
- Existing models, technical notes, sediment budgets



**Galveston District
Galveston Entrance Channel RSM Project**

Questions?

