FY17 RSM IPR
SWG - GIWW Bolivar Flare Study
POC: Seth Jones, GIWW OM

BLUF: The Galveston District dredges approximately 350,000 CYs of predominantly sandy material from the Gulf Intracoastal Waterway (GIWW) Bolivar Flare annually. This Regional Sediment Management (RSM) study will look at ways to reduce dredging costs and potential options for beneficial use of shoal material.

Challenge

- The high shoaling rate of the GIWW Bolivar Flare has historically been an obstruction to navigation and requires annual maintenance dredging.

Objectives

- Identify methods to reduce the shoaling rate, therefore creating a safer environment for navigation as well as reducing annual dredging requirement.
- Work with local stakeholders and agencies to identify Beneficial Use (BU) opportunities.

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District/Other USACE PDT Members

- Seth Jones, SWG GIWW OM
- Paul Hamilton, SWG H&H
- Jantzen Miller, SWG Project Engineer
- Lihwa Lin, ERDC
- Ashton Burgin, SWG Operations

Leveraging/Collaborative Opportunities

- GIWW High Island to Brazos River Feasibility Study
- FY15 Galveston Entrance Channel RSM Study
- Galveston Bay Sediment Budget
- North Texas Sediment Budget
- ERDC-developed DMMP tools currently being developed for GIWW and HSC projects.
- Coastal Texas Study

Stakeholders and Partners

- Texas General Land Office
- Gulf Intracoastal Canal Association

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Approach

Task 1: Data Collection

- Define Study Area.
- Gather XYZ files for channel surveys conducted from 2011-2017.
- Examine grain size for material in the study area
- Document Federal and private dredging history in the study area.

Task 2: Shoaling and Dredging Analysis

- eHydro
- Processing with Corps Shoaling Analysis Tool (CSAT)
- Sediment Budget Analysis System (SBAS)
- Analysis of other dredging operations in the area

Task 3: Review Coastal Processes/ Develop Solutions

- Take into consideration modeling results of sediment transport in the study area, coastal processes, operations, and local policy.
- Propose solutions to reduce shoaling rate and/or place material into a BU Site.

Task 4: Analyze Potential Solutions

- Analyze alternatives to determine potential benefits.
- Identify realistic alternatives to provide consistent navigable water in the Federal Channel, while decreasing Federal dredging operation costs.
- Select a minimum of 3 alternatives for consideration and analysis.

Historical Satellite Images of Study Area: 1974 - Present


1995
Legend
Breakwater
GIWW Alignment
GIWW Bolivar Flare
Breakwater
GIWW Bolivar Flare
Google earth
Image U.S. Geological Survey
N
1000 ft


2004
Legend
Breakwater
GIWW Alignment
GIWW Bolivar Flare
Breakwater
GIWW Bolivar Flare
Google earth
Image U.S. Geological Survey
N
1000 ft


2006
Legend
Breakwater
GIWW Alignment
GIWW Bolivar Flare
Breakwater
GIWW Bolivar Flare
Google earth
Image U.S. Geological Survey
N
1000 ft

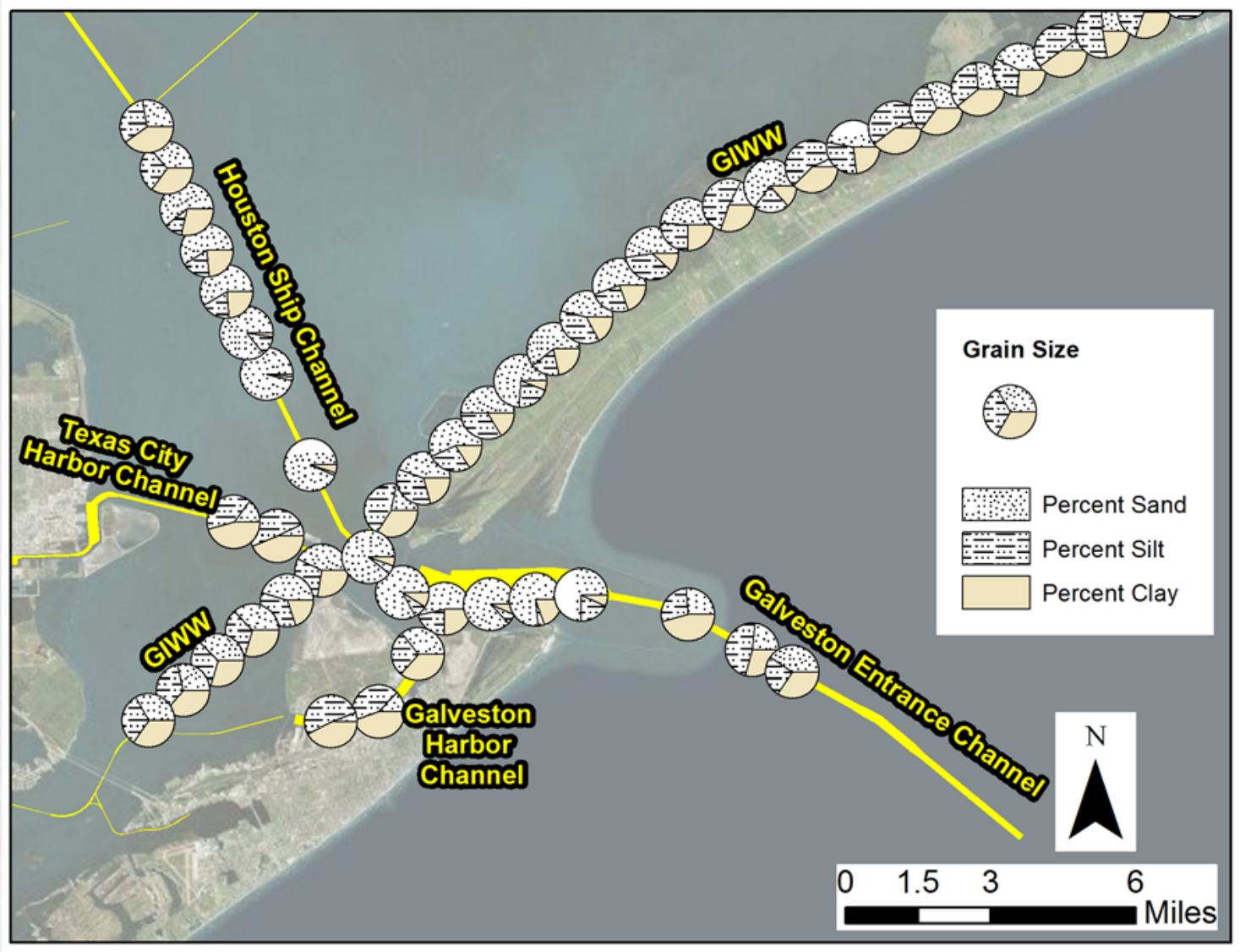

2008
Legend
Breakwater
GIWW Alignment
GIWW Bolivar Flare
Breakwater
GIWW Bolivar Flare
Google earth
Image U.S. Geological Survey
N
1000 ft


2011
Legend
Breakwater
GIWW Alignment
GIWW Bolivar Flare
Breakwater
GIWW Bolivar Flare
Google earth
N
1000 ft

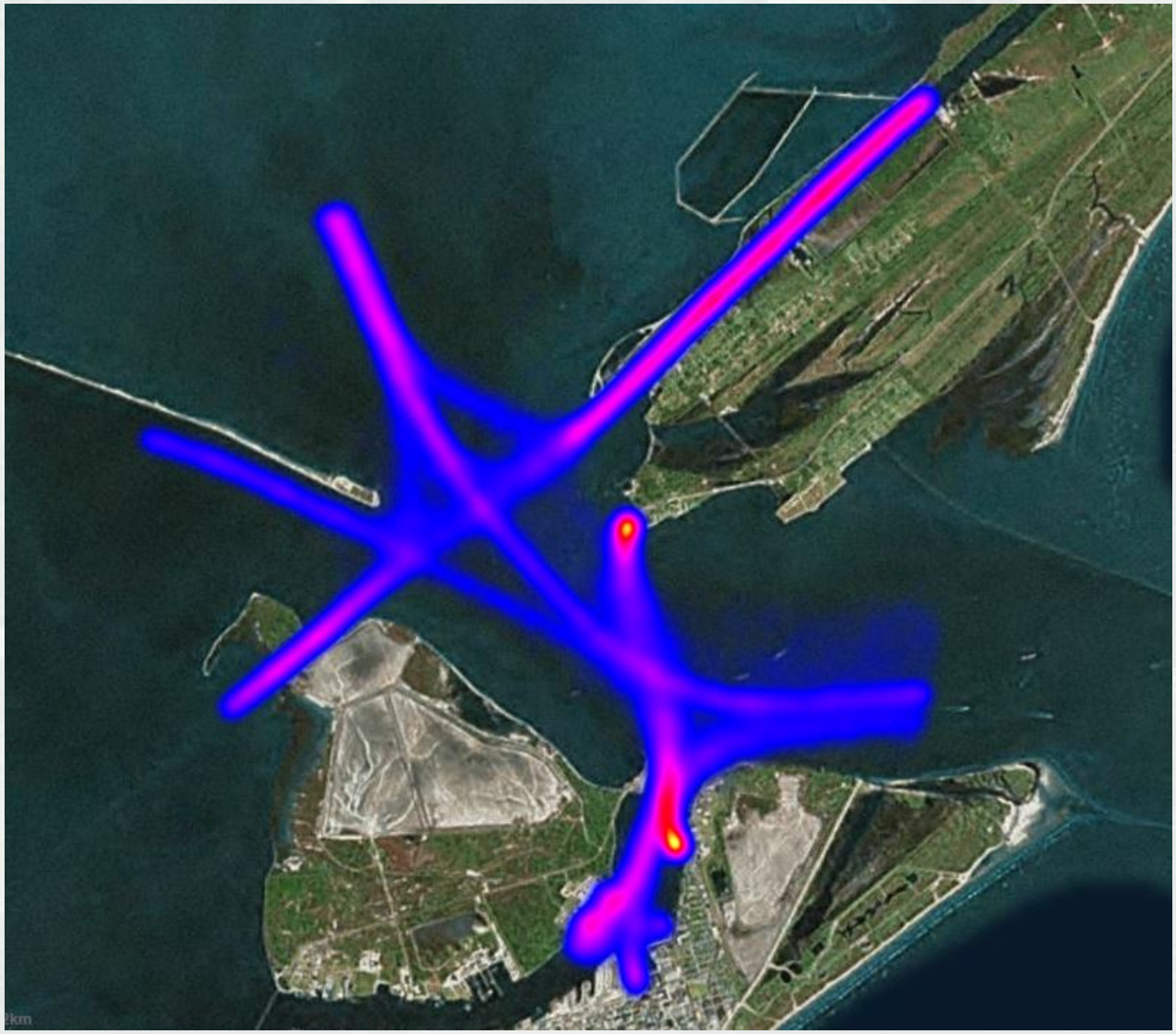

2014
Legend
Breakwater
GIWW Alignment
GIWW Bolivar Flare
Breakwater
GIWW Bolivar Flare
N
1000 ft
Google earth


Current Condition
Legend
Breakwater
GIWW Alignment
GIWW Bolivar Flare
Breakwater
GIWW Bolivar Flare
Google earth
1000 ft
N

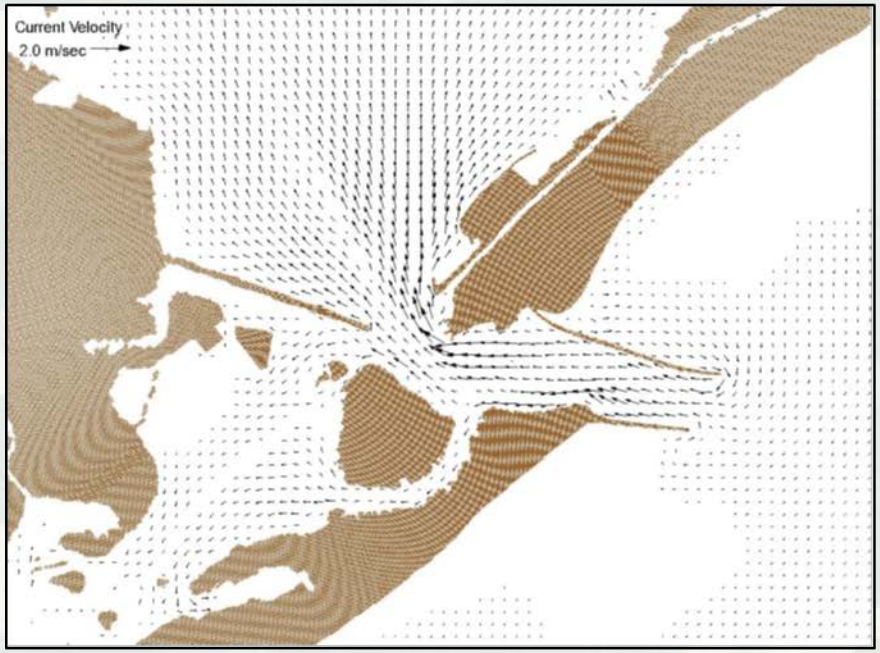
Grain Size Data Within the Study Area



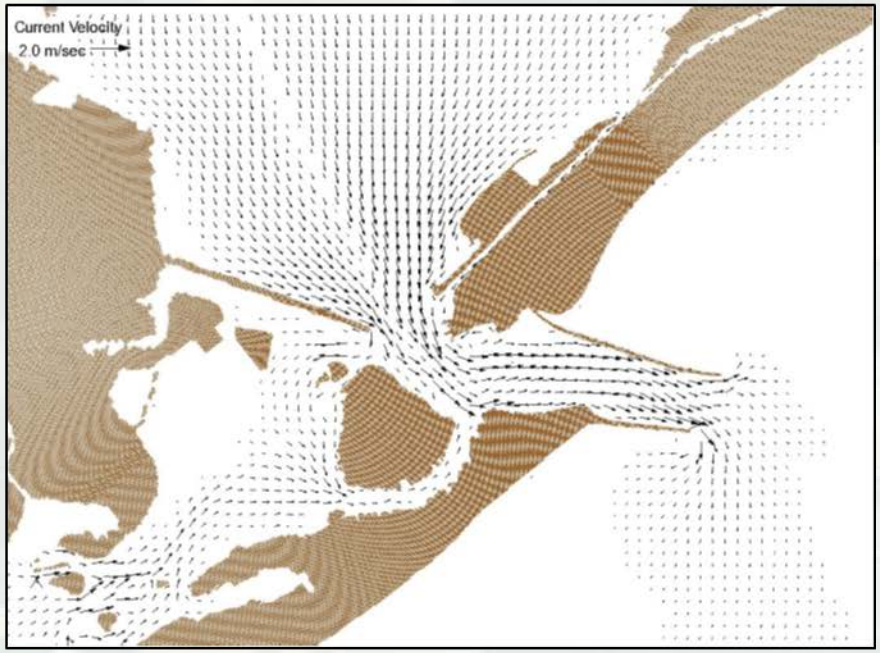
Vessel traffic within the study area for the year 2015. Accessed in AISAP.



Typical Flood and Ebb Maximum Current Fields

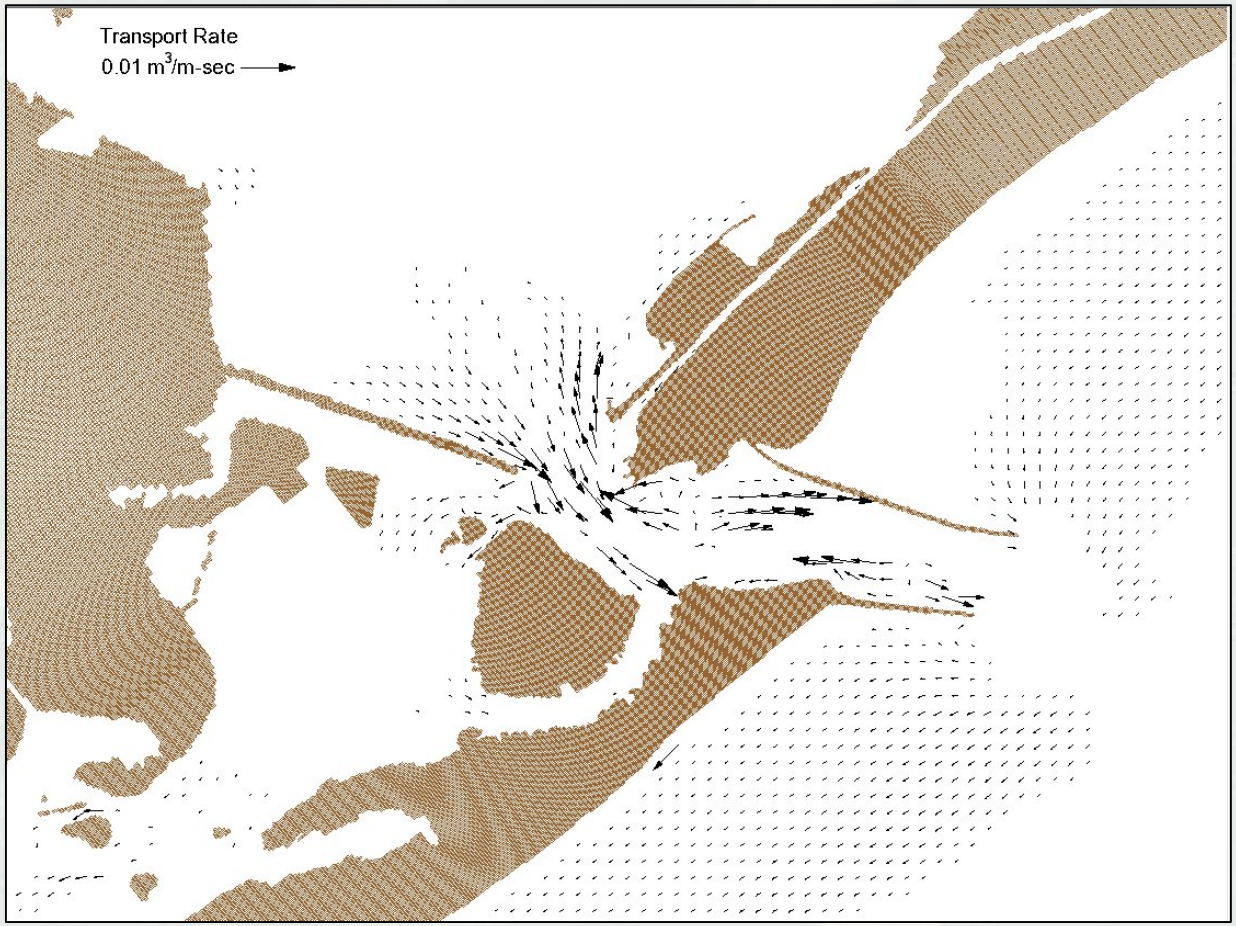


11 Jan. 2010 @ 00:00 GMT

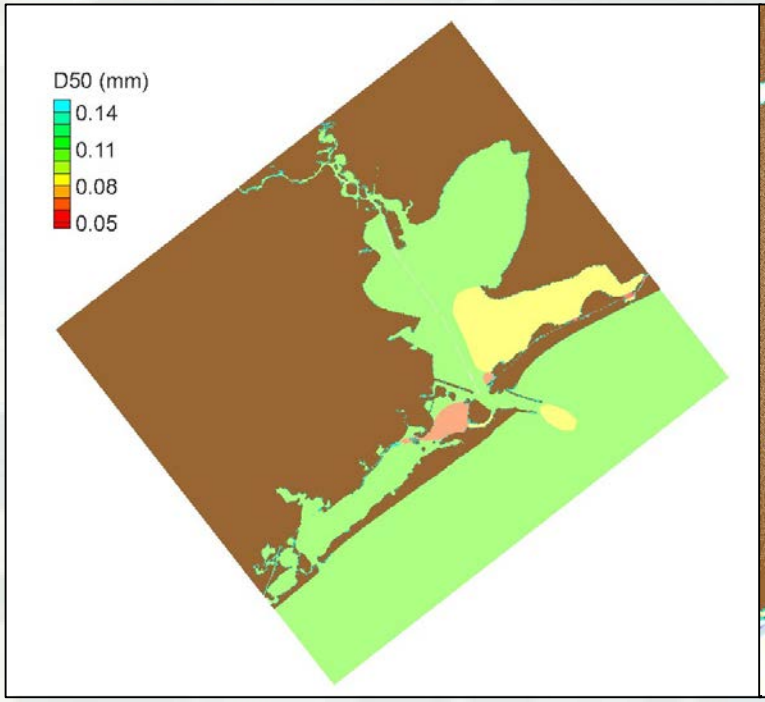


18 Jan. 2010 @ 00:00 GMT

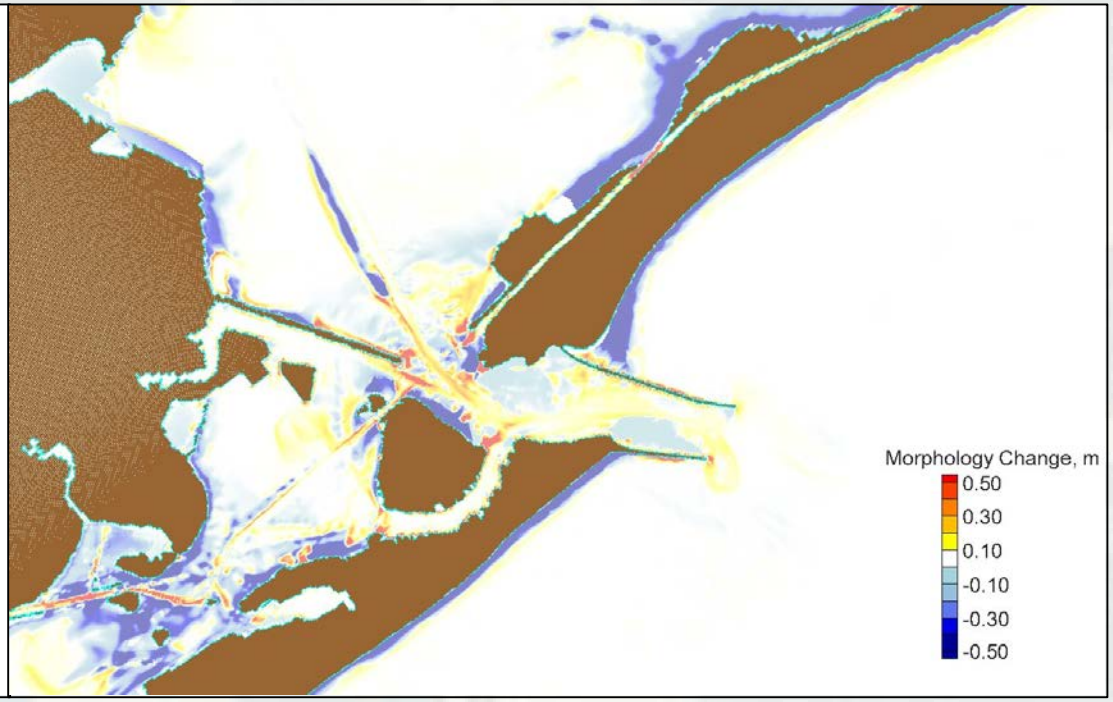
Averaged Sediment Transport Rate in 2010



Preliminary Modeling Result – Existing Configuration



Median Sediment size D_{50} (mm)



Calculated Morphology Change in 2010

Expectations of Alternatives Analysis and Expected Issues

Group 1 – Likely to meet objectives and be cost effective

- *TxDOT Dredging* **–** Ensure TxDOT dredging operations are not impacting the Bolivar Flare.
- *Make changes to PA43* **–** options here include groins in the PA and changes to the containment structure at the SW end, or some combination of the two.

Group 2 – May minimally or incompletely meet objectives or is potentially cost prohibitive

- *Do Nothing* **–** this would incompletely meet objectives, i.e., it would not reduce the dredging costs associated with the Bolivar Flare. Review BUDM opportunities as a part of this alternative in light of the current placement areas filling up.
- *Amend GIWW geometry* **–** manipulate the channel section. This should be cheap to do but may or may not be effective in reducing dredging costs.
- *Dredge a sediment trap* **–** this would be risky in terms of the location, i.e., would it be dredged in the right spot, and may not reduce dredging costs.
- *Sediment Backpassing/Bypassing* **–** this would have some of the same risk in terms of location as above, but with more permanency after installation. Installation could be costly, but installed properly this could prevent shoaling.

Group 3 – Unlikely to meet objectives or likely cost prohibitive

- *Wall or Jetty SE of Bolivar Flare* **–** though this could detain sediment it is: (1) risky and (2) costly. The risk is that it would be built in the wrong spot and the cost would be high relative to expected savings.

BU Opportunities for Material (No Action for Flare):

Group 1 – Beach Nourishment

- Utilization of large sand quantities for BU opportunities on Bolivar and Galveston beaches; Bolivar Flare dredging (sand) can be utilized for on Galveston Beach; PA 42 (sand from Bolivar Flare) can be continually mined for BU opportunities on Bolivar Peninsula.
- Placement of material on Texas City Dike beaches. 2 PAs located on Texas City Dike (DA 2A and DA 2B)
- Placement on nearby Bolivar Pocket Beach.

Group 2 – Island Creation/ Habitat Creation

- Island Creation Collaboration with GLO - Texas GLO has done several successful BU projects in the past using material from the GIWW. They will soon begin a study for sediment sources for 4 new bird islands located in Dickinson, East Matagorda, Rollover Bay Island, and Smith Point. Point of contact: Ray Newby.
- Supplying currently constructed HSC bird island Evia Island with additional material.

Group 3 – Marsh Creation

- Placement of material on Bolivar Marsh as a BU project. Bolivar Marsh is a BU site associated with HSC, but due to distance from the HSC channel it may be in need of material.
- Extension of Bolivar Marsh into adjacent PA 43 area.


Alternatives for RSM - GIWW Bolivar Flare
Legend
BU Sites
GIWW Alignment
GIWW Bolivar Flare
Possible Structures
Evia Island (Bird Habitat)
Bolivar Marsh
Marsh Creation / PA 43
Texas City Dike Beaches
Breakwater Extension
Groins
GIWW Bolivar Flare
Sediment Trap
Bolivar Pocket Beach
N
2 mi
Google earth

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How this project will benefit the USACE and Nation

Monetary

- Methods that reduce shoaling in this location will decrease the necessary dredging frequency and the long term maintenance costs of the GIWW.
- Methods may also reduce shoaling in the Houston Ship Channel and the Galveston Ship Channel.
- Use of material from the Bolivar Flare for marsh/wetland restoration and beach nourishment for Galveston beaches would add valuable ecosystem services including habitat creation, storm surge reduction, and incalculable economic benefits for the City of Galveston through tourism.

Efficiency

- Reduction of shoaling in the GIWW would also increase the safety of barge users in this reach of the channel.

Outreach:

- BU opportunities for dredged material may be coordinated with local agencies and stakeholders