# USACE Enterprise Dredge Material Management Tool Supports Houston Ship Channel & Gulf Intracoastal Waterway Pilot Demonstration

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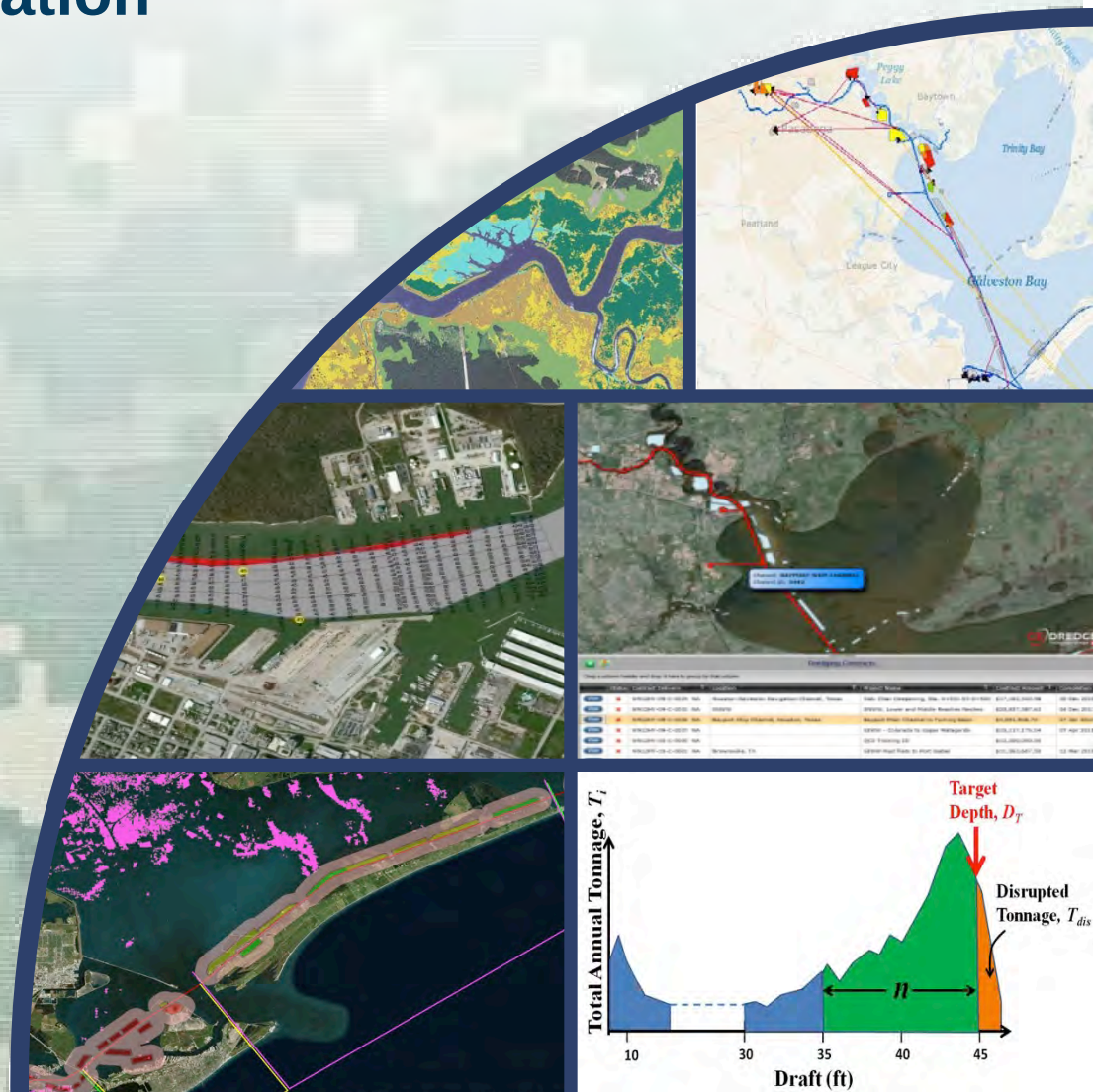
Spatial Data
MOBILE DISTRICT

US Army Corps of Engineers
**BUILDING STRONG®**

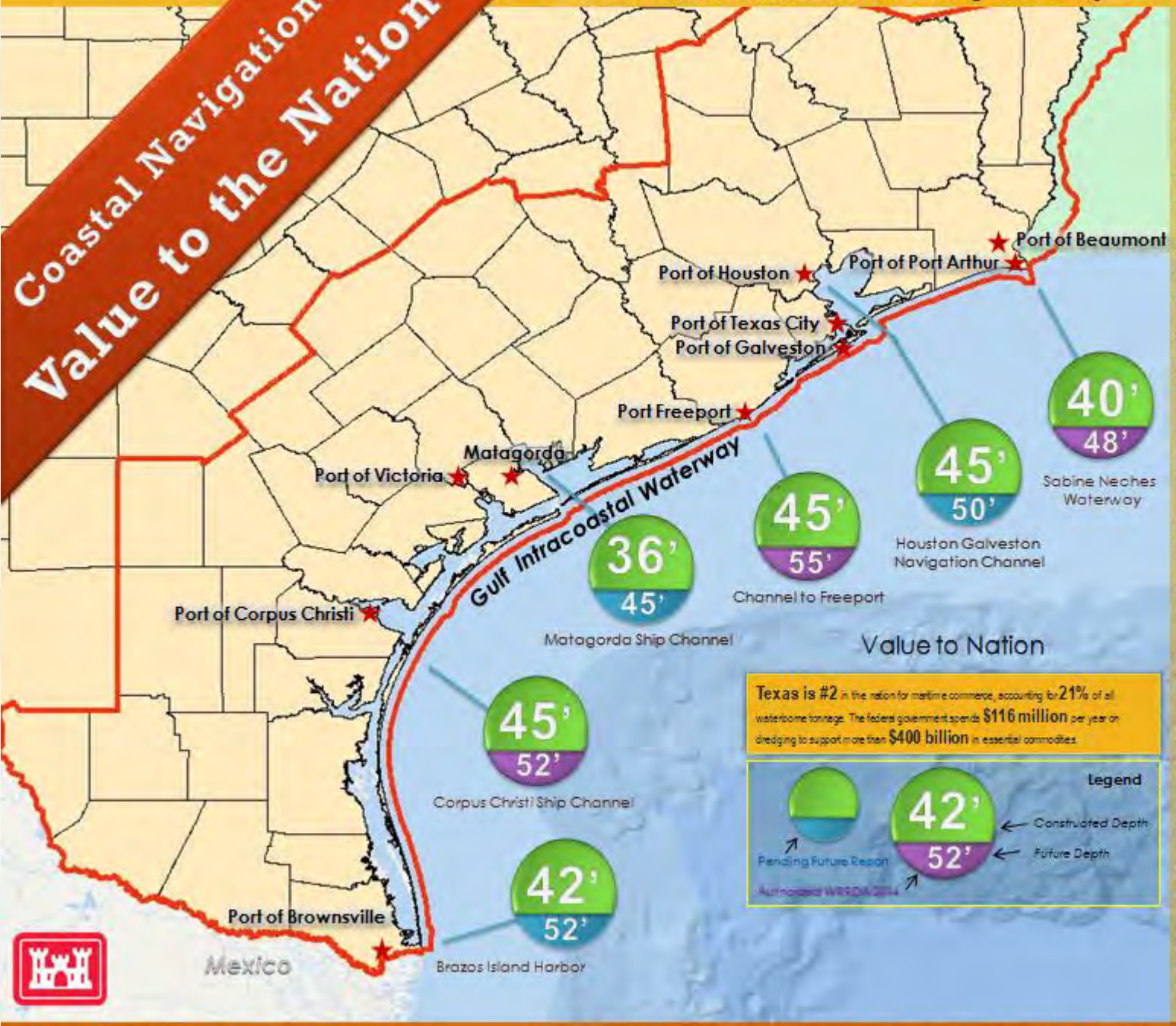


# USACE Galveston District


- Navigation
- Flood Risk Management
- Regulatory
- Ecosystem Restoration
- Emergency Management
- Interagency & International Support

- 50,000 square mile district boundary encompassing the Texas coast
- 28 ports
- **1,000+ miles of channels**
  - **750 miles shallow draft**
  - **270 miles of deep draft**
- 367 miles of Gulf coastline
- **30 to 40 million cubic yards of material dredged annually**
- 16 Congressional districts
- 48 Texas counties
- 18 Coastal counties - bays / estuaries
- 9 watersheds
- 2 Louisiana parishes

# Coastal Navigation: Value to the Nation




## LEADING U.S. PORTS
(2013 Tonnage)

**Houston (#2 – 229.2 million tons)**
#1 Foreign Tonnage & #2 Total Tonnage

**Beaumont (#4 – 94.4 million tons)**
#1 Military Outload Port

**Gulf Intracoastal Waterway (79 million tons –Texas portion)**
#3 Inland Waterway

**Corpus Christi (#7 – 76.1 million tons)**
America's Energy Gateway

**Texas City (#13 – 49.6 million tons)**
Services Largest Petrochemical Complex

**Port Arthur (#18– 34.7 million tons)**
Vital Strategic Port

**Freeport (#32– 19.7 million tons)**
World Class LNG Facility

**Galveston (#49 – 11.4 million tons)**
#4 Cruise Ship Port

**Matagorda to include Port of Port Lavaca and Port of Point Comfort (#51 – 10.9 million tons)**
Generates Annual Business Revenues of Nearly $2 Billion

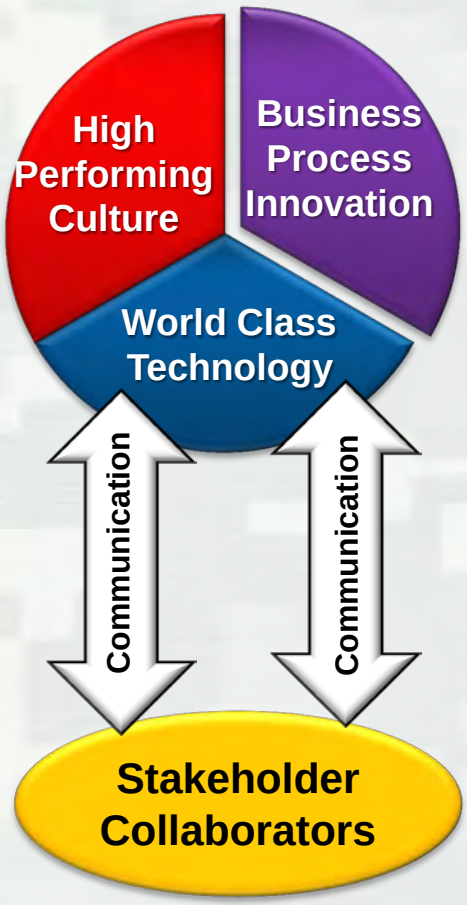
**Brownsville (#73 – 5.5 million tons)**
#1 Ship Recycling Port

**Victoria (#74 – 5.5 million tons)**
#2 Shallow-Draft Port for Domestic Crude Petroleum

# The Challenge

- With responsibility for maintaining and improving coastal channels, inland and intracoastal waterways, the Corps is committed to dredging and managing dredged sediments in an economically and environmentally sound manner.
- Corps completes annual Preliminary Assessments (PAs) or more extensive Dredge Material Management Plans (DMMPs)
  - Identifies and assesses plans for future placement of dredged material (beneficial use opportunities)
  - Can be static, quickly outdated, time consuming and costly
  - CESWG requested ERDC and CESAM to modernize the PA/DMMP technical process for more efficiency and effectiveness

# Strategy for Solution




## Lines of Effort

- Co-Development via RSM and EWN Proving Ground Teaming
- Integration of Enterprise Tools and Information
- Tool Pilot Demonstration
- Tool Mainstream Implementation

## Desired Outcomes

- Participation and Buy-in
- Use of R&D and District Investments
- Setting to Enable Experimenting and Learning
- Improved Program Planning and Execution

## End State

Leap ahead capability to interactively engage stakeholders in dredging project planning and evaluation that is objective, technically informed, dynamic, and visual, which results in valuable decision management.

# RSM Placement Area Optimization: Houston Ship Channel Modernization of Dredging Data, Analysis, & Management: GIWW


- **Phase 1: RSM Placement Area Optimization, Houston Ship Channel in Galveston Bay** Optimization of navigation channel network, historical sedimentation and dredging, and system of placement areas
- **Phase 2: Dredged Materials Management Modernization, GIWW (High Island to Brazos River Reach)** Streamline Preliminary Assessments / DMMP technical analyses and communication

# Dredging Cycle Questions/Tools

Where and when do I need to dredge?
What volume? What are the priorities?

eHydro-CSAT-CPT

When, Where, How much was historically dredged/placed?
What are placement area remaining capacities?
How have I managed the Placement Areas?

CE-Dredge Dredging Manager

Where are the navigation channels?
Where are the placement areas?

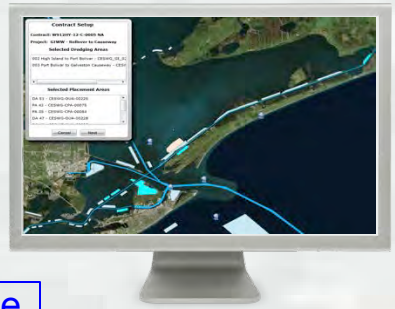
Nat'l Channel Framework DB
Nat'l Placement Area DB

SAGA

What are the sediment characteristics in Channels and Placement Areas?

What are the sediment sources?
Where do I need sediment?
What are natural transport pathways?

SBAS



EcoSyn

What are impacts to ecological habitat in dredge/place areas?

BU-ADMM

Are there potential new beneficial use opportunities in the region?

CE-Dredge Dredging Manager

SedMan & Dredging Technologies

What are the dredging and placement options?
What tools/models are available to evaluate the options?

Closeout: Final volumes, payment, reports, etc

D2M2

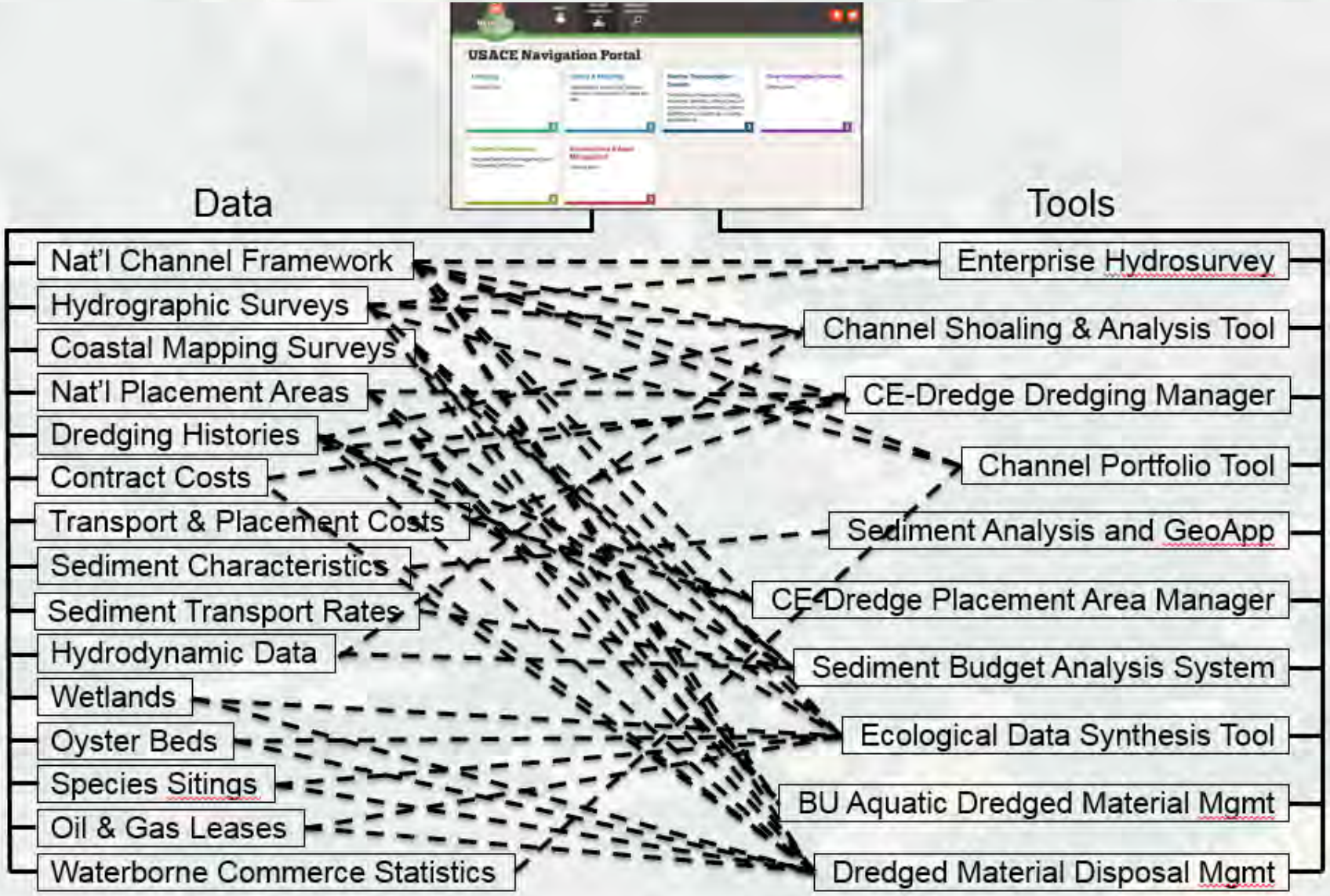
Is the construction going as planned?

DQM

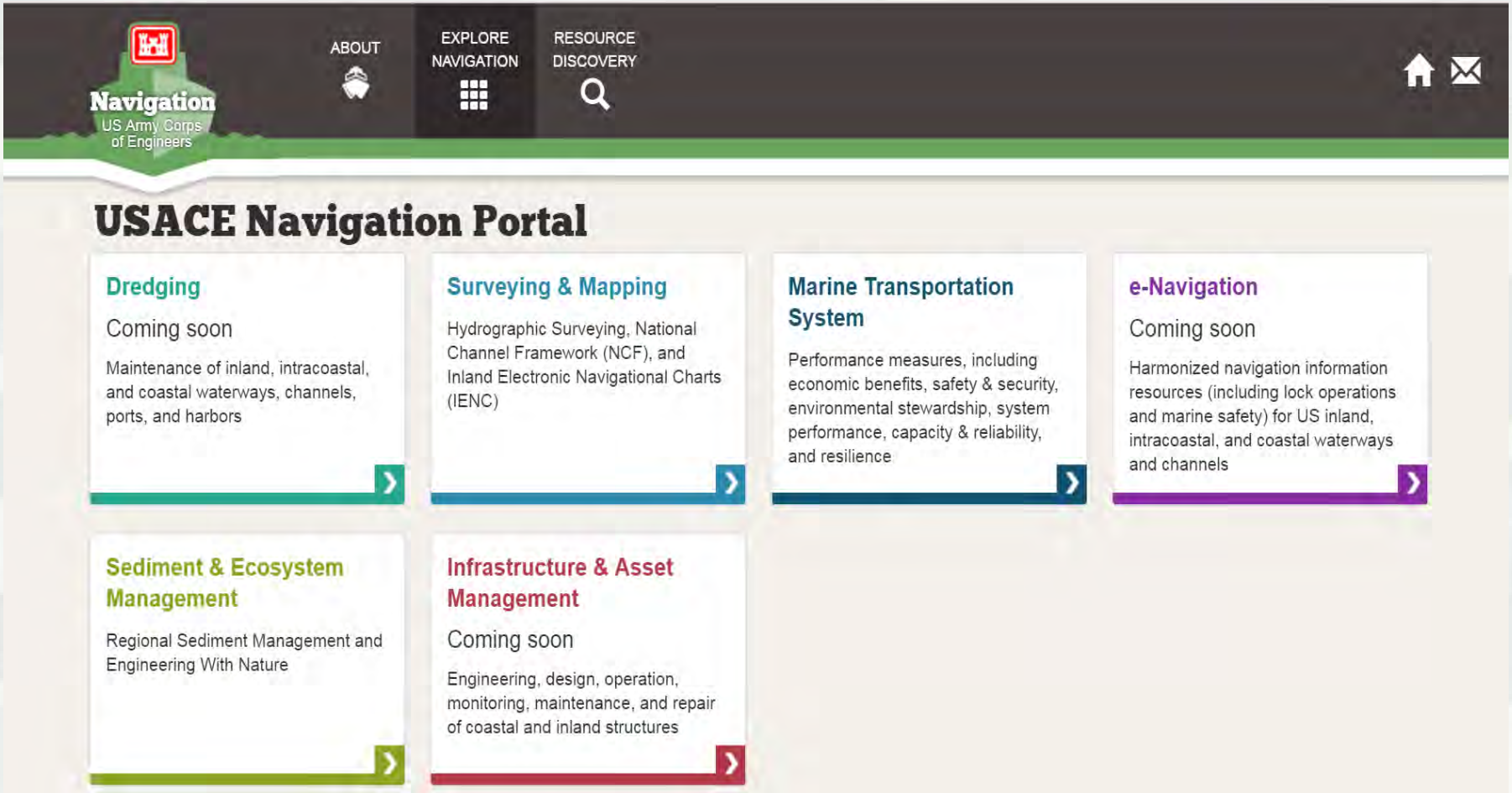
What are my stakeholders priorities?

What are the optimal dredging and placement options for our goals?

# DMM Data and Tools Interface



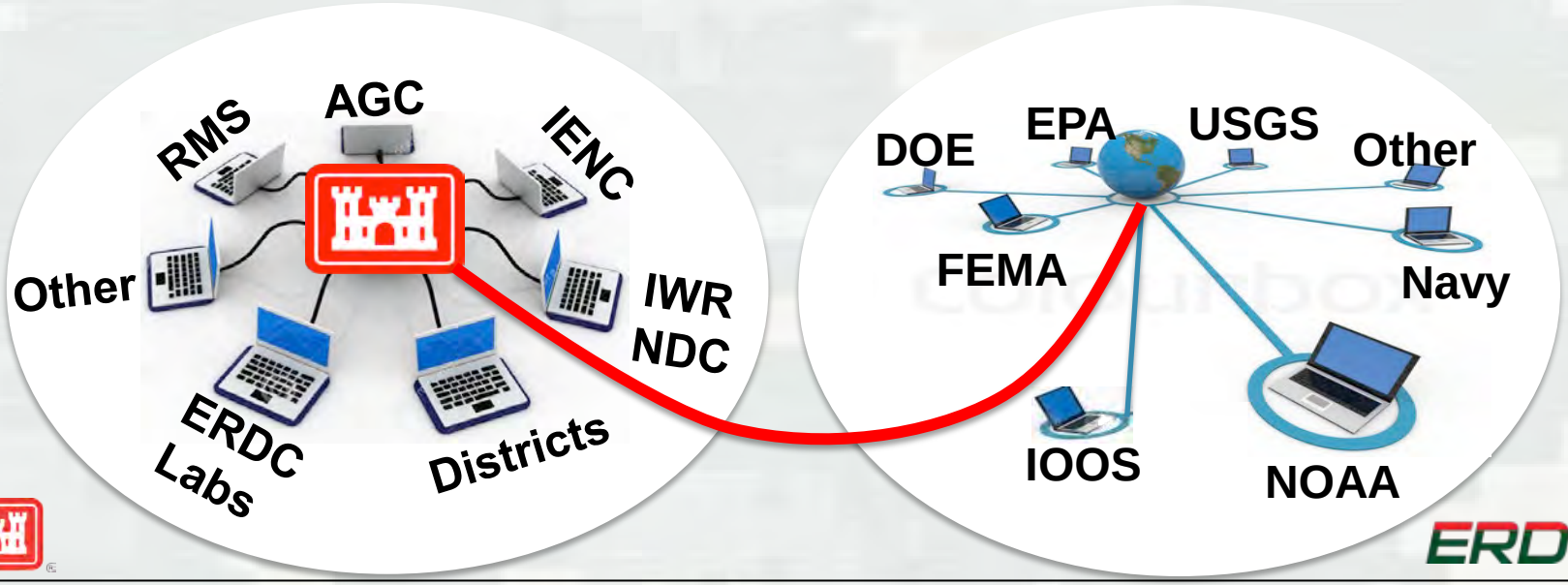
# navigation.usace.army.mil



# Connected Data Network

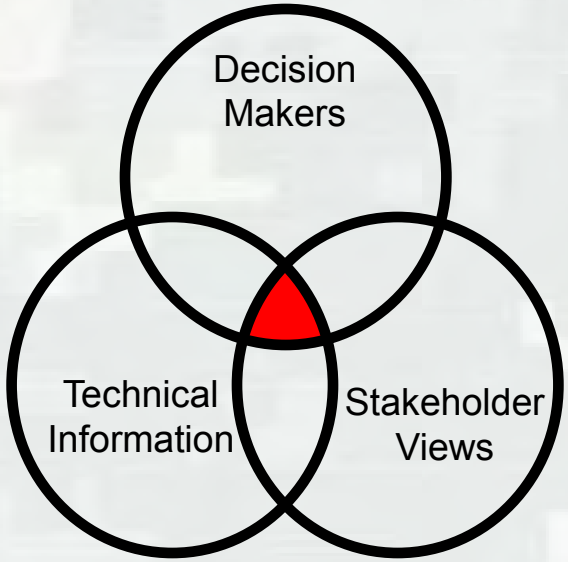
**Corps Network**
Distributed Network Accessed through Enterprise Servers

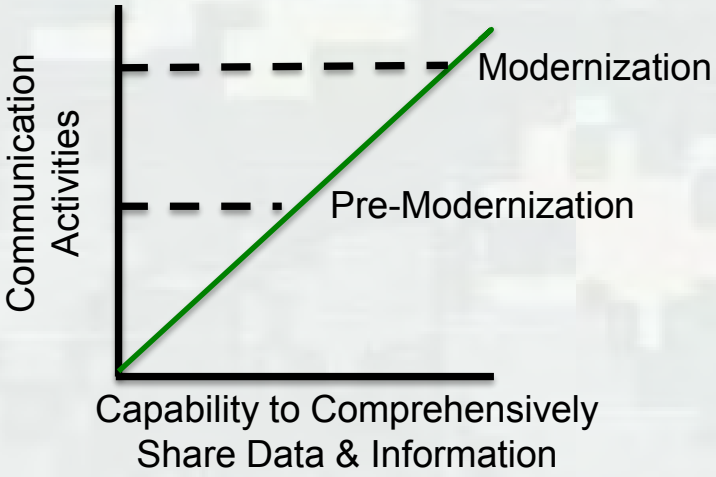
**Global Network**
Distributed Network Accessed through Web



# Value of Increased Integration of Information

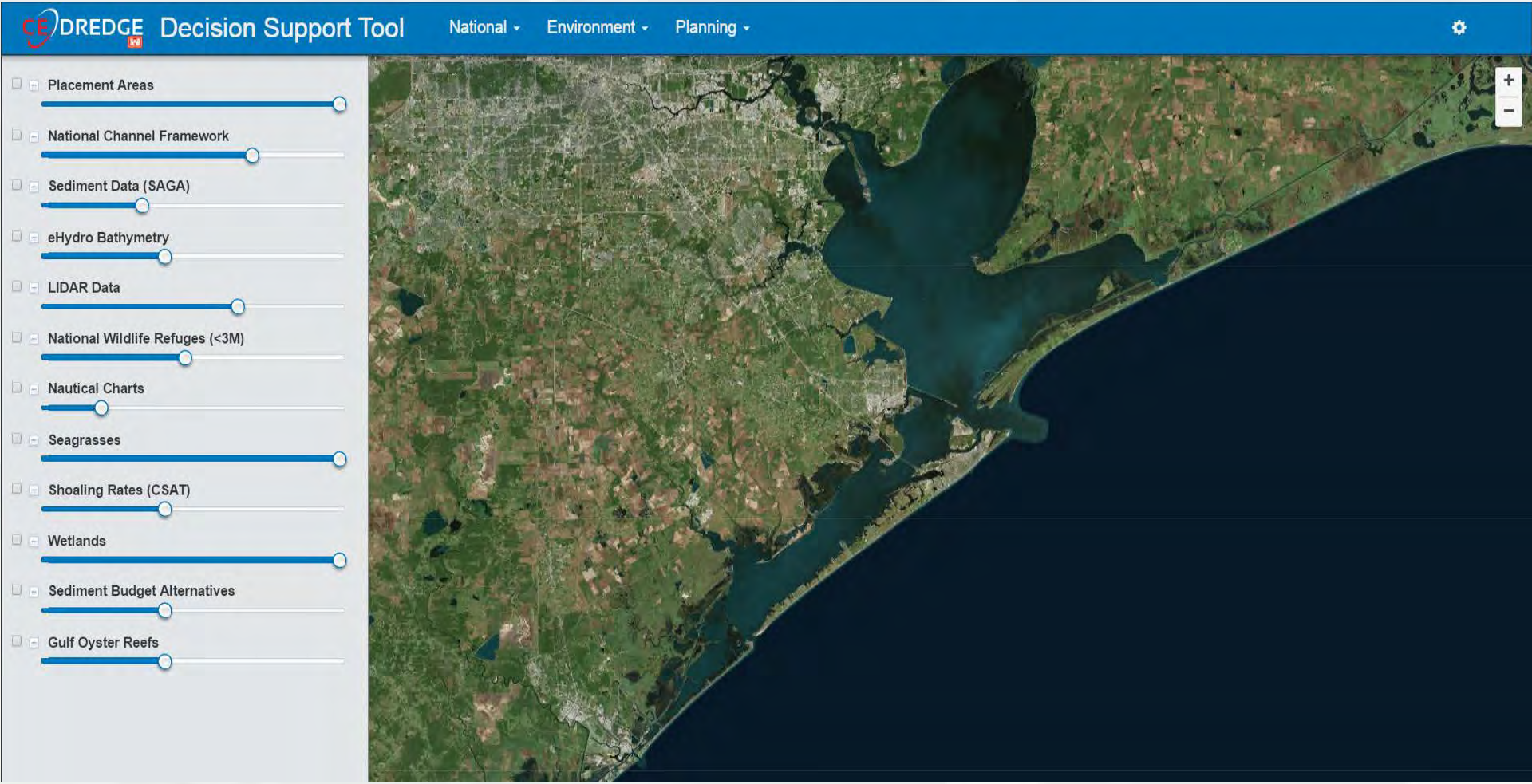
- Consistent access to authoritative data
- Simplified & expedited dredging analyses
- Multi-objective systems optimization
- Dynamic visualization
- Enhances communications
  - Within the district
  - With the vertical team
  - With non federal sponsors
  - With environmental agencies



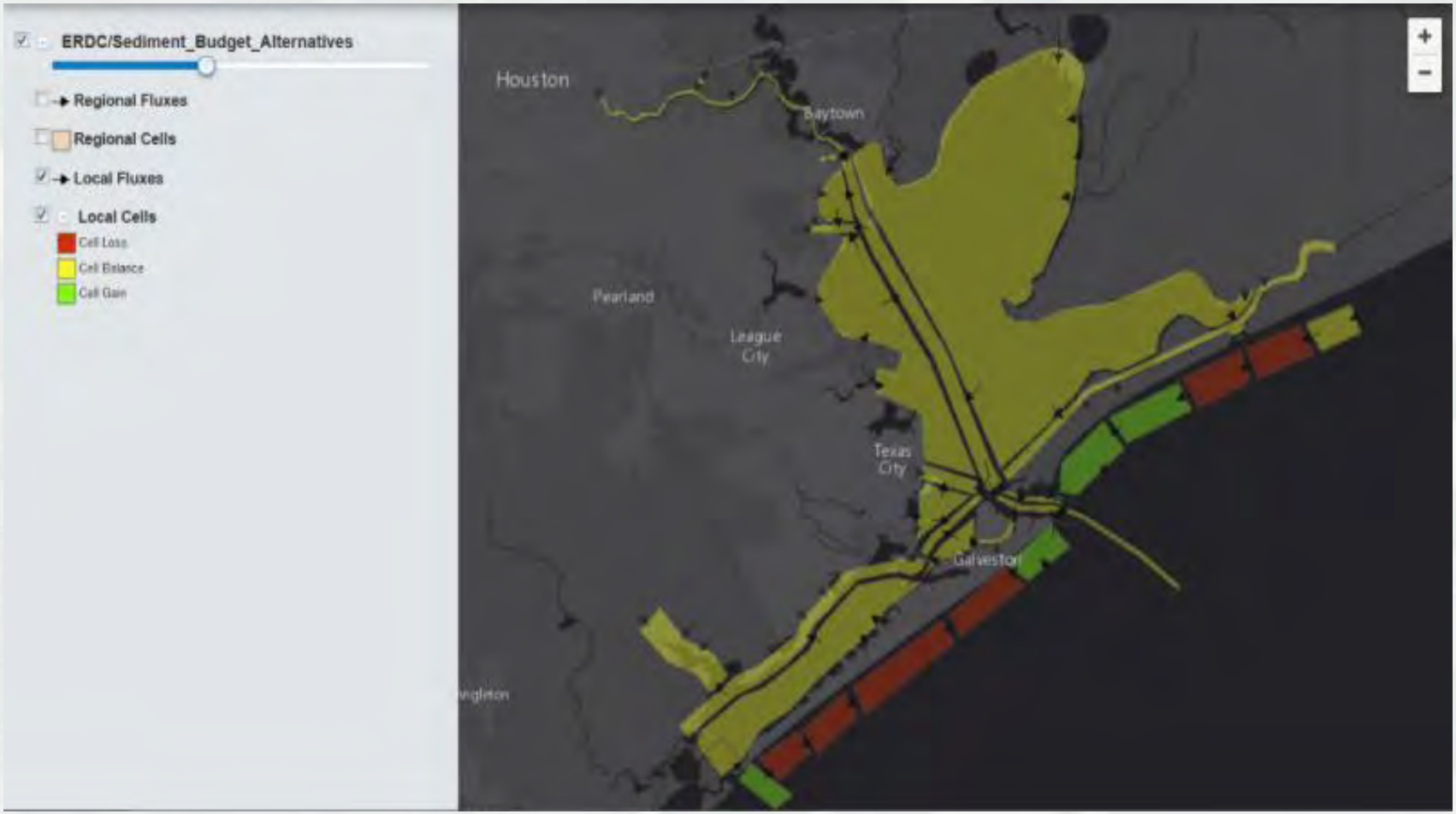




**Improved Communication, Shared Visioning, and Alignment of Mutual Objectives**

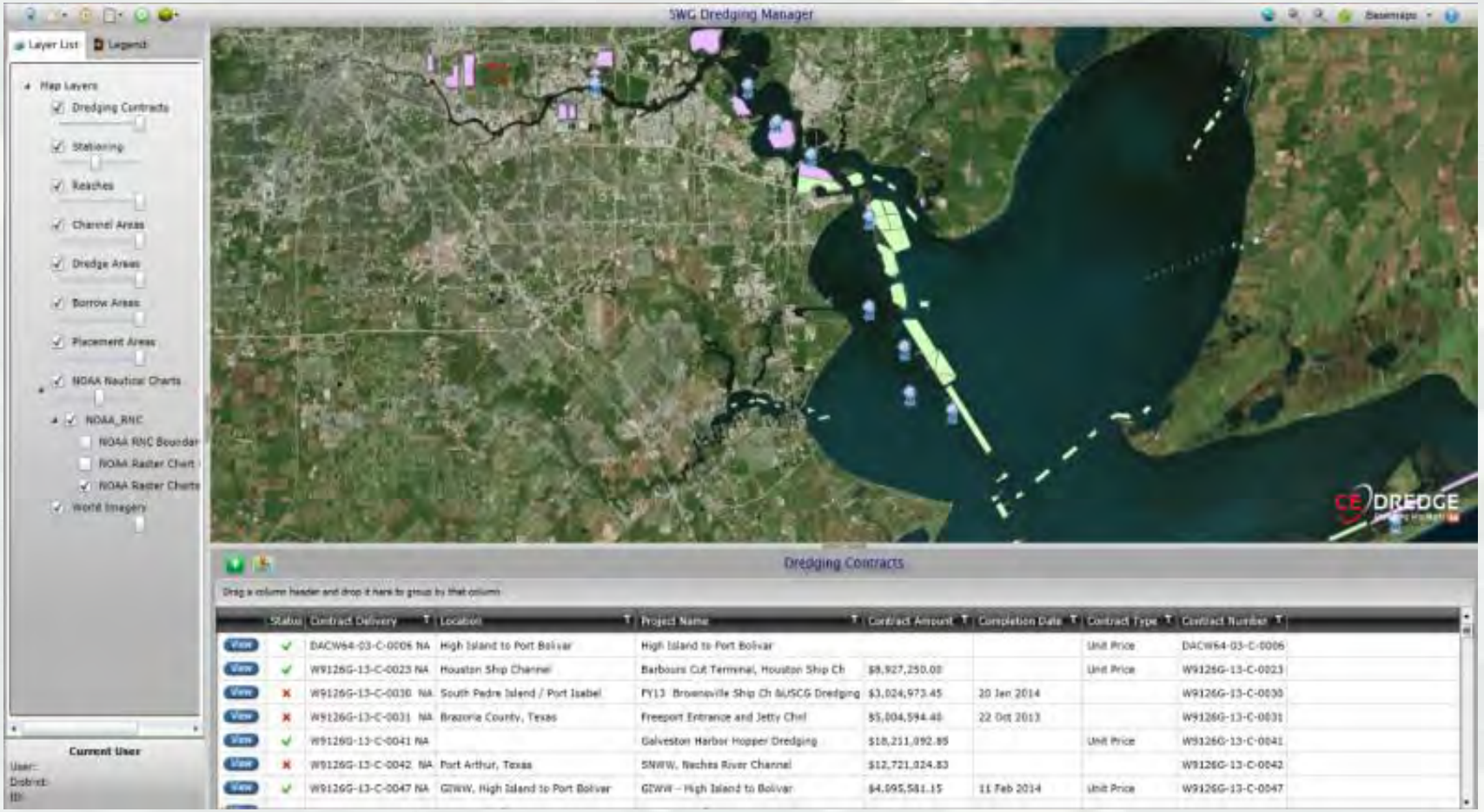
# CE-Dredge Decision Support Tool



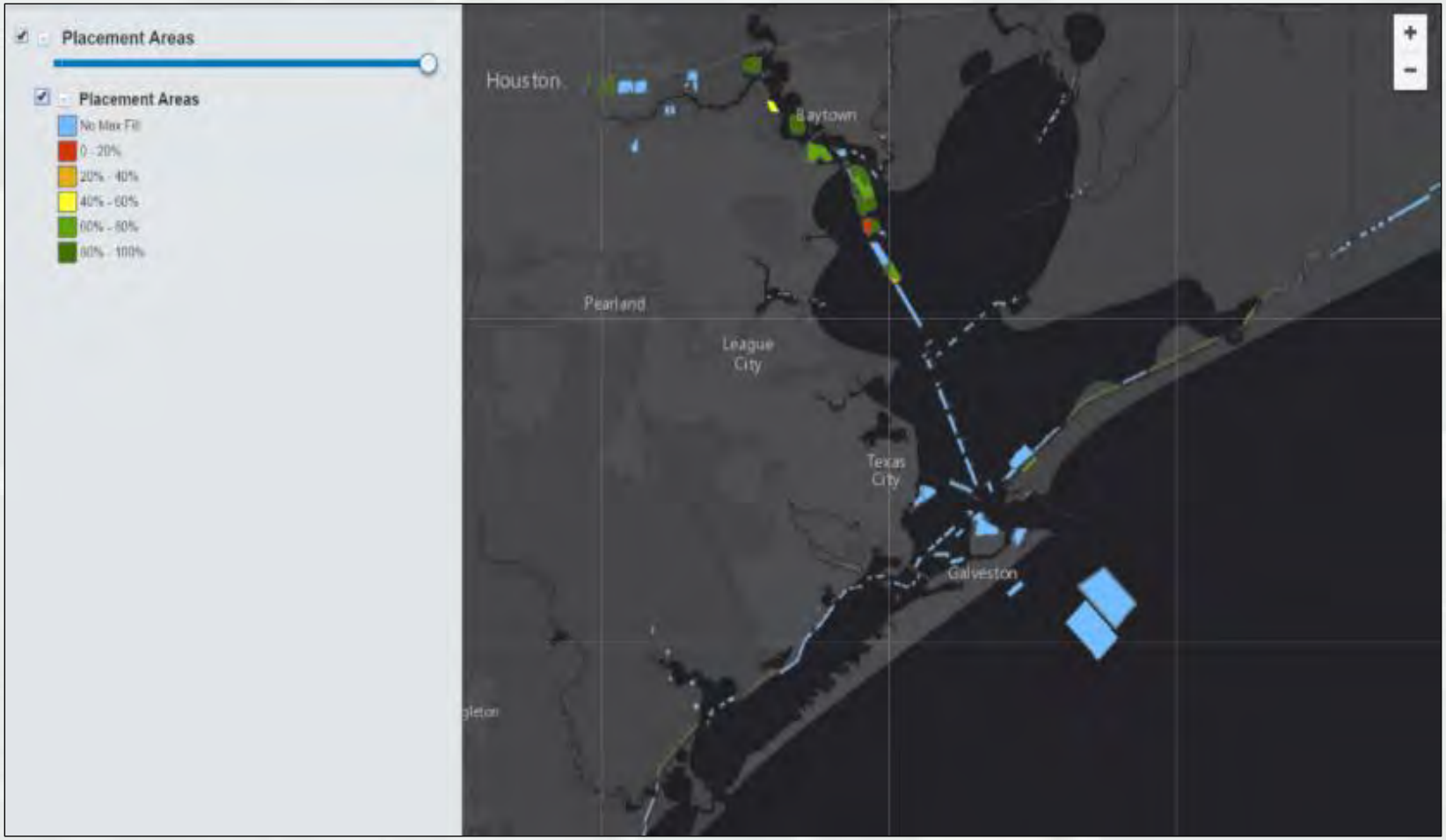
# Sediment Budget Analysis System (SBAS)



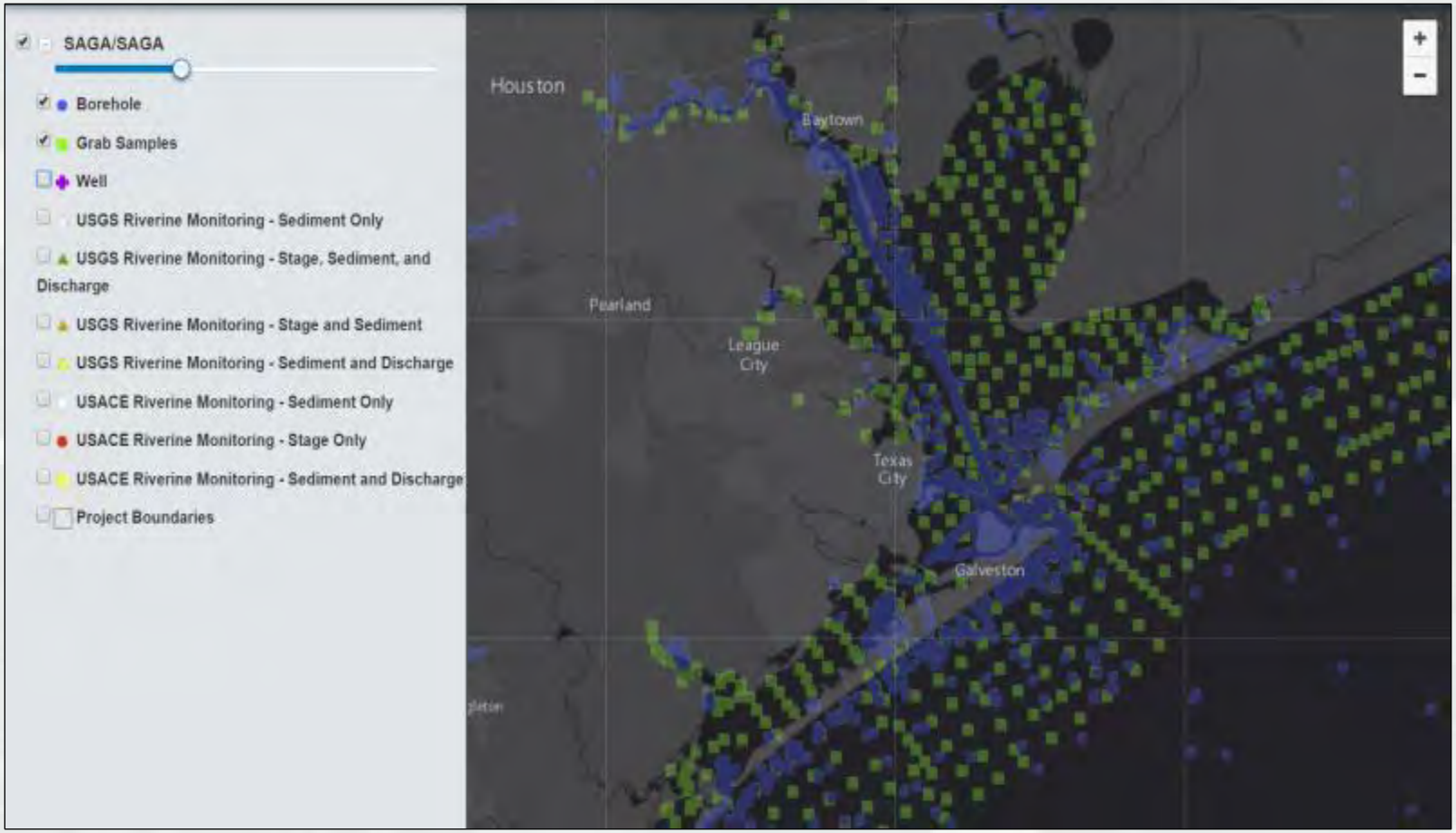
# CE-Dredge Dredging Manager (Inspector and Viewer)



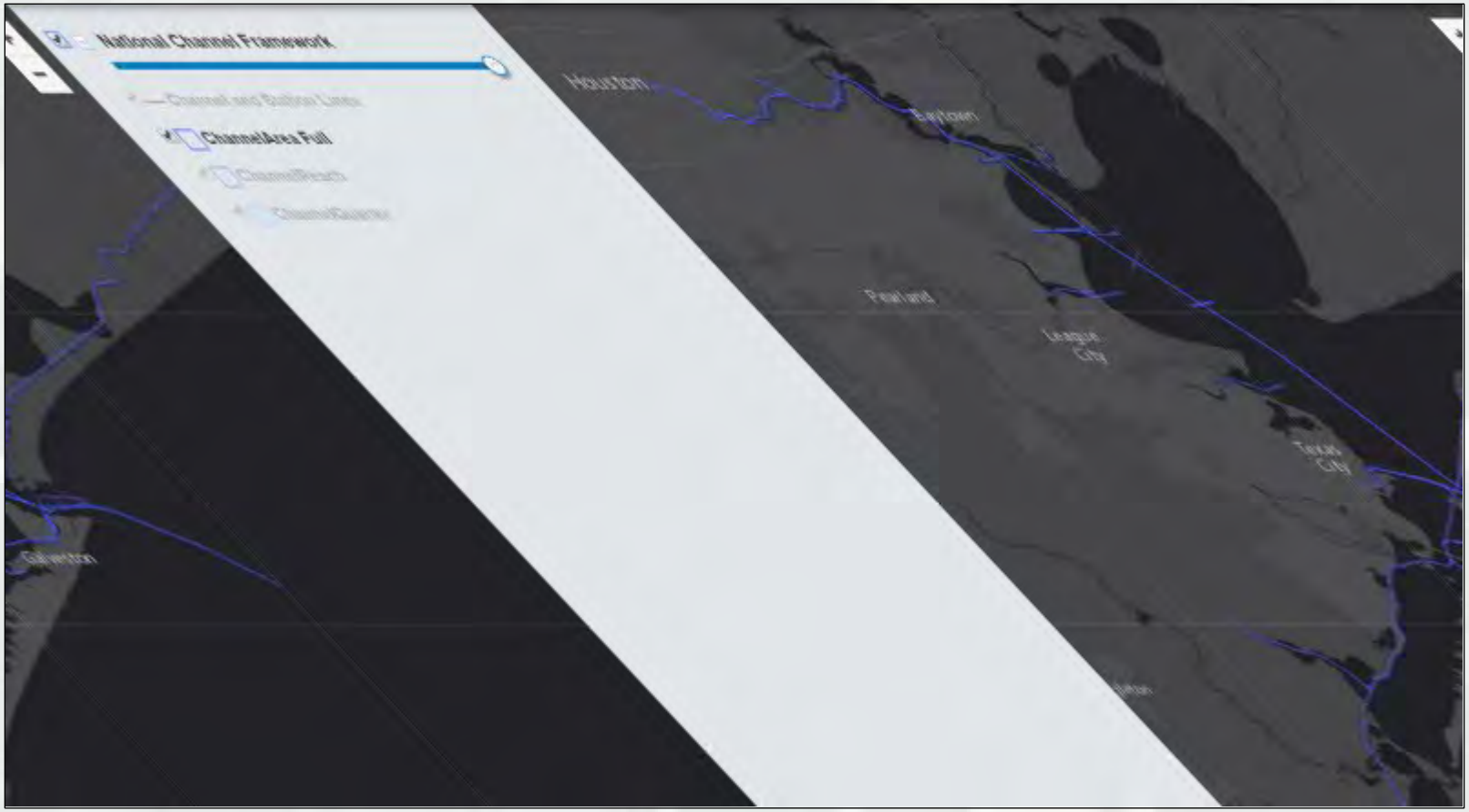
# Placement Area Database



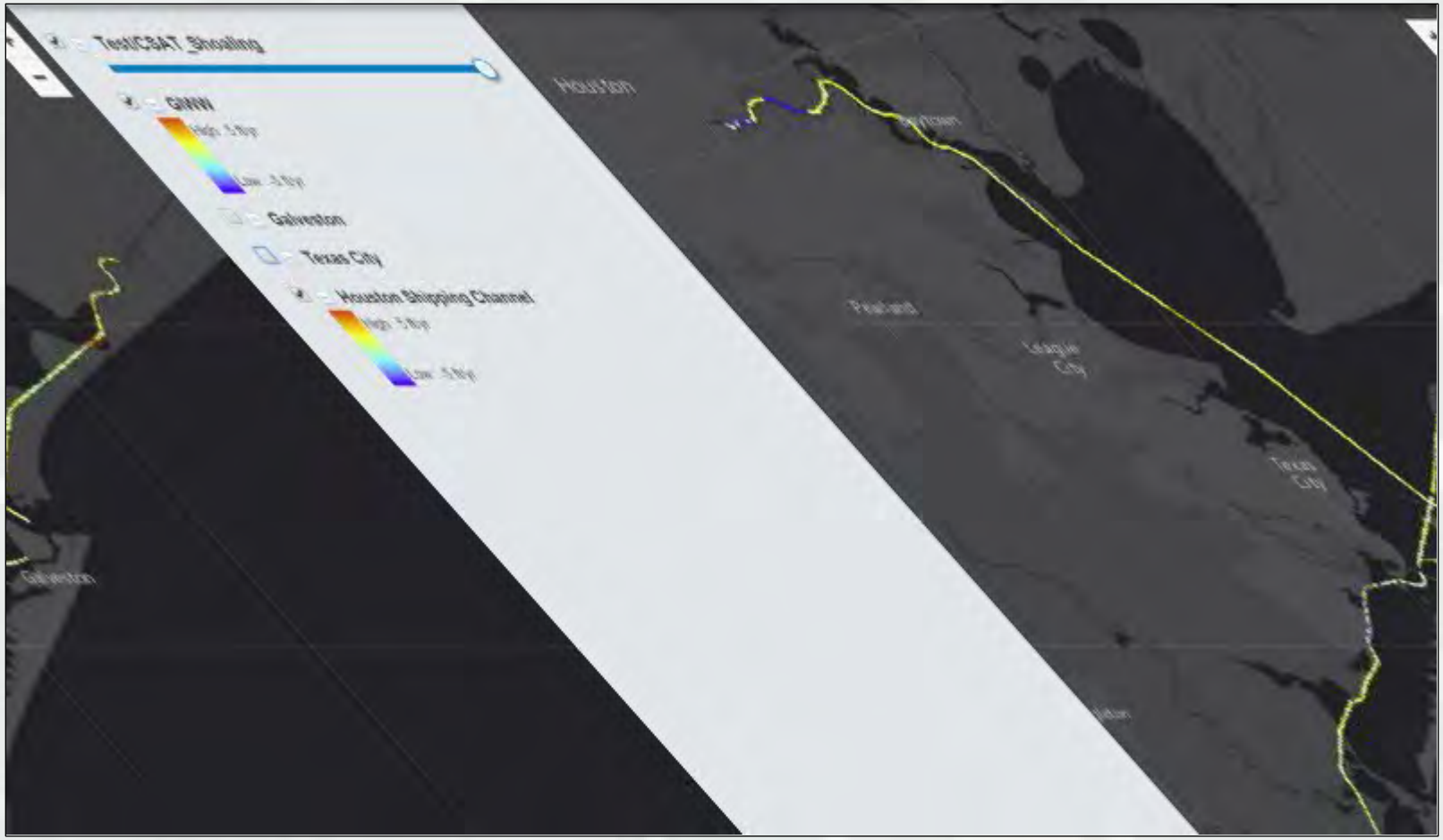
# Sediment Sampling Database/Sediment Analysis and Geo-App (SAGA)



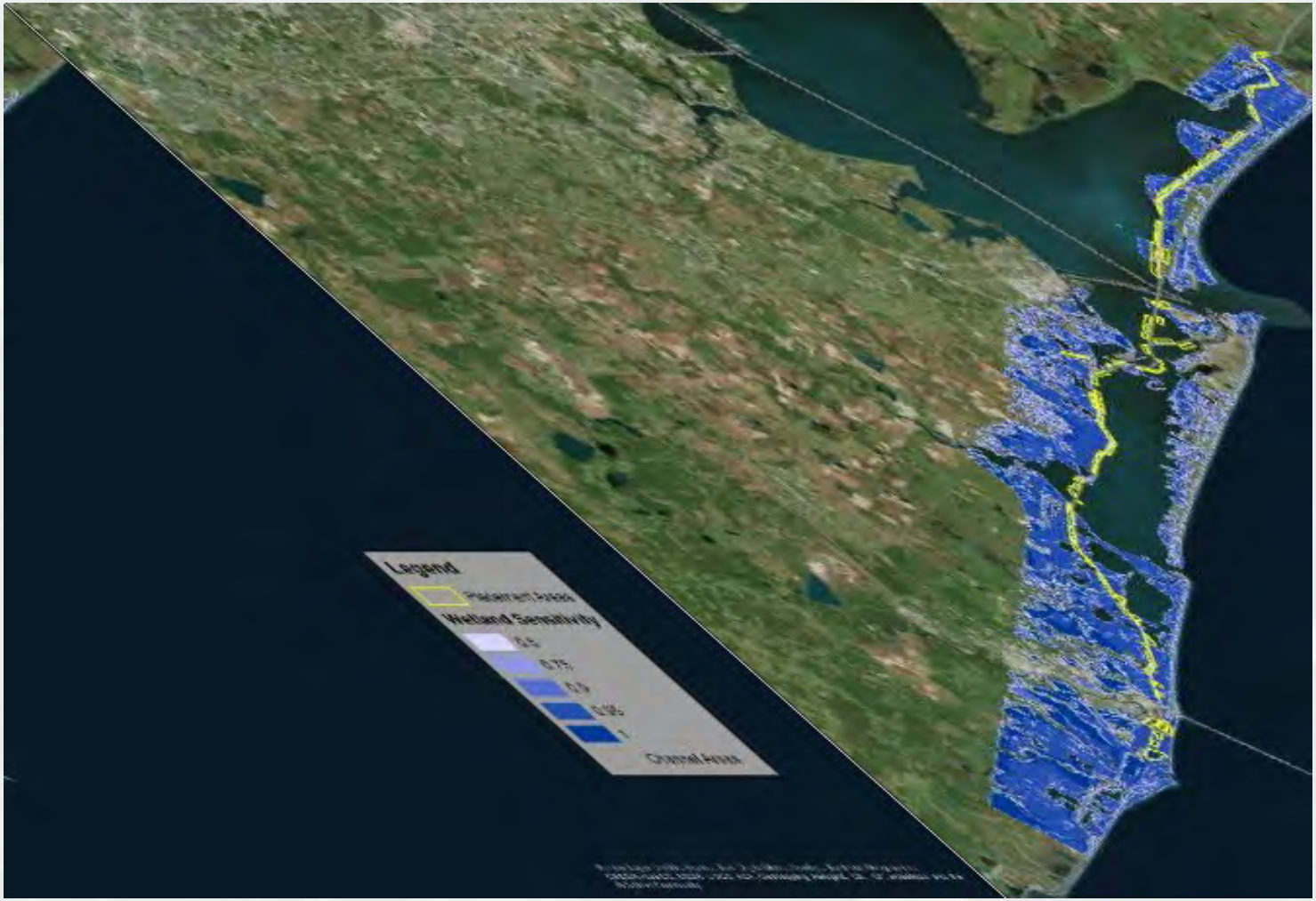
# National Channel Framework (NCF) Database



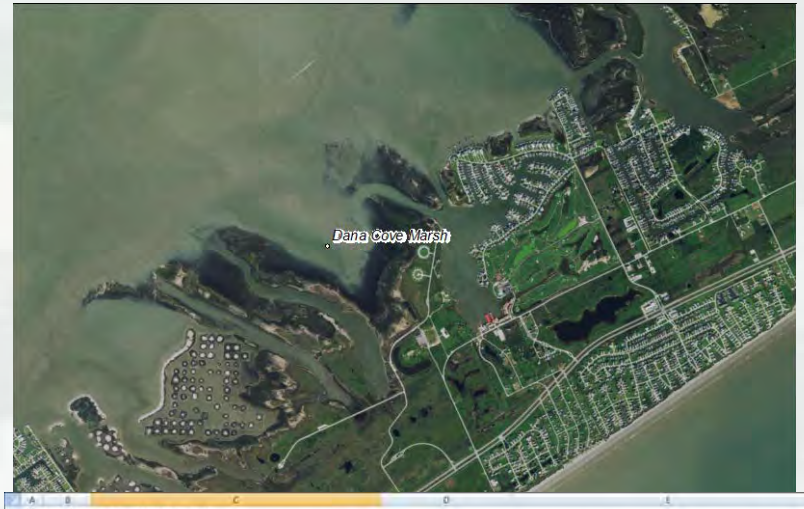
# Corps Shoaling Analysis Tool (CSAT)



# Ecological Data Synthesis Tool (EDST)



# Beneficial Use for Aquatic Dredged Material Management (BU-ADMM)




| | | | | |
|---|---|---|---|---|
| Alternative: | Dana Cove Marsh - Wetland | | | |
| Description: | Restoration of Dana Cove Marsh recommended as part of Texas Coastal Stork Risk Management and Ecosystem Restoration Draft Integrated Feasibility Report | | | |
| **Site Assessment** | | **Score** | | **Notes/Justification** |
| Is the elevation stable in relation to tidal datums? Is it "keeping up" with sea level rise? | | Moderately Unstable | | |
| Are open water areas stable or are tidal creek and pond edges eroding or subsiding? | | Moderately Unstable | | |
| Are there barriers to sediment transport that prevent stable sediment loading? | | Minor Barriers | | Some breakwaters present |
| Is the marsh edge stable and free from signs of active erosion? | | Yes, Stable | | Breakwaters |
| Is the vegetation percent cover and community type stable? | | ○ Yes | ◉ No | ○ Unknown Loss of NDVI |
| Is the vegetation percent cover, community type/habitat range appropriate for the location? | | ○ Yes | ◉ No | ○ Unknown Little veg cover |
| Are any exotics/invasives present? | | ○ Yes | ○ No | ◉ Unknown |
| Is local lateral erosion offset by accretion in another area of the wetland? | | ○ Yes | ○ No | ◉ Unknown Placement ongoing so difficult to tell |
| Is the wetland connected to other wetlands or other transitional habitat? | | ◉ Yes | ○ No | ○ Unknown |
| Is the wetland hydrologically connected to the larger marine/estuarine system through a well-developed system of naturally formed/maintained tidal networks? | | ◉ Yes | ○ No | ○ Unknown |
| Would sediment placement interfere with any ecologic or economic | | ○ Yes | ◉ No | ○ Unknown |

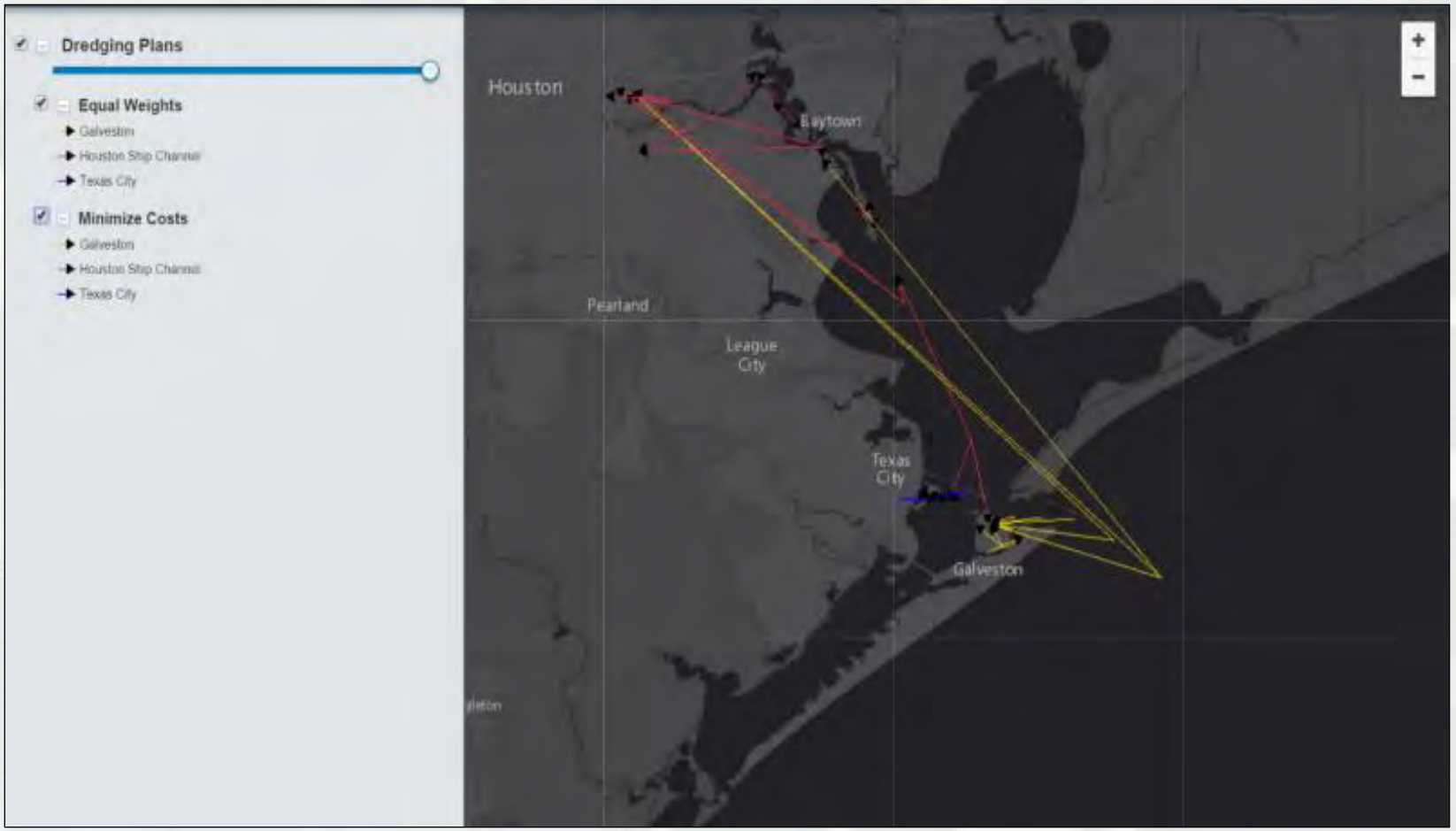
Assesses site's condition and need for sediment

| | | | | |
|---|---|---|---|---|
| **Additional Benefits** | | | | |
| Does the feature support or protect infrastructure, or otherwise contribute to the Flood/Coastal Storm Risk Management mission? | | ◉ Yes | ○ No | ○ Unknown |
| Does the feature lie adjacent to other valuable habitats, support habitat, or otherwise contribute to the Environmental Restoration mission? | | ◉ Yes | ○ No | ○ Unknown |
| Can the feature reduce future dredging needs, or otherwise contribute to the Navigation mission? | | ◉ Yes | ○ No | ○ Unknown Protect |
| Is the feature rare in the landscape, but appropriate for the region? | | ○ Yes | ◉ No | ○ Unknown |
| Is the feature in an area at low risk for future development or other anthropogenic impacts? | | ◉ Yes | ○ No | ○ Unknown Close to |
| Can the feature be utilized for more than one dredging cycle? | | ◉ Yes | ○ No | ○ Unknown |
| Is the feature already permitted as a placement area? | | ○ Yes | ◉ No | ○ Unknown |
| **Placement Constraints** | | | | |
| Is permanent containment or protection required (e.g. sills, berms, etc.)? | | ○ Yes | ◉ No | ○ Unknown Some breakwaters already present |
| Is containment required during construction? | | ◉ Yes | ○ No | ○ Unknown Possible SAV in area |
| Are there special restrictions that apply (e.g. dredging or placement windows)? | | ◉ Yes | ○ No | ○ Unknown |
| Does the placement require special equipment? | | ◉ Yes | ○ No | ○ Unknown |
| Will placement reduce dredge efficiency / production rate? | | ○ Yes | ◉ No | ○ Unknown |
| Is additional site work required post-placement (e.g. grading, planting?) | | ◉ Yes | ○ No | ○ Unknown planting/seeding |
| Is the placement site within a reasonable distance from the dredge site such that booster pumps, tows, cribbing, etc. are not required? | | ○ Yes | ◉ No | ○ Unknown >3 mi from GIWW |
| Is the placement site easily accessible by personnel either from land or | | ◉ Yes | ○ No | ○ Unknown |

Identifies potential benefits derived from placement

Identifies any potential constraints including negative impacts

# Dredged Material Management Decisions (D2M2)



# Path Forward


- **Completion of Phase 2: GIWW, High Island to Brazos River Reach:** Modernize and streamline Preliminary Assessments / DMMP technical analyses and communication, which will involve:
  - Populating enterprise databases
  - Integrating tools – streamline access to data (input / output)
  - Incorporate data and results into Navigation / Dredging Portal
  - Technical transfer and training with SWG
  - Stakeholder engagement
- **Future:** Scheduling / budgeting parametric tool for 5-yr plan annual updates and repository for all historical project records

# Concluding Thoughts

- Traditionally, PAs and DMMPs have been costly and time-consuming to complete.
  - Drivers are the time and cost required to locate, analyze, and review all of the required data which is labor-intensive
- CESWG, ERDC and CESAM have developed an extensible framework for the HSC and GIWW that uses available Corps enterprise databases and integrates data collection and analysis tools.
- The tool arms CESWG with the capability to gather and analyze the data required for PAs and DMMPs in a more efficient, timely, and cost-effective manner.
- Most importantly, the database capabilities, tools, and methods developed for this project are easily extendable to other CESWG projects, and to other USACE Districts.

# The Team

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***Thank You for Your Attention!***