Sediment Budget Components

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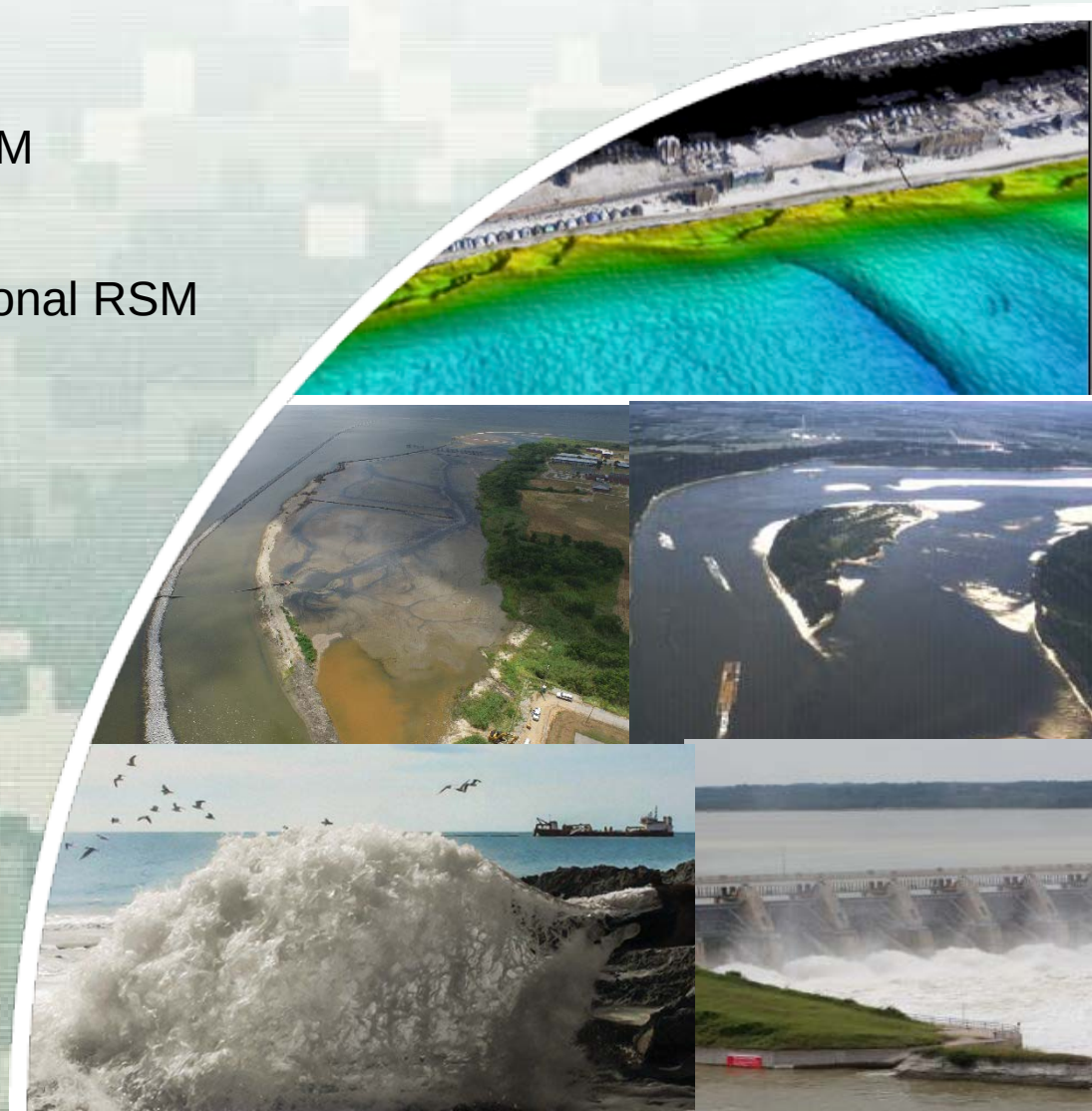


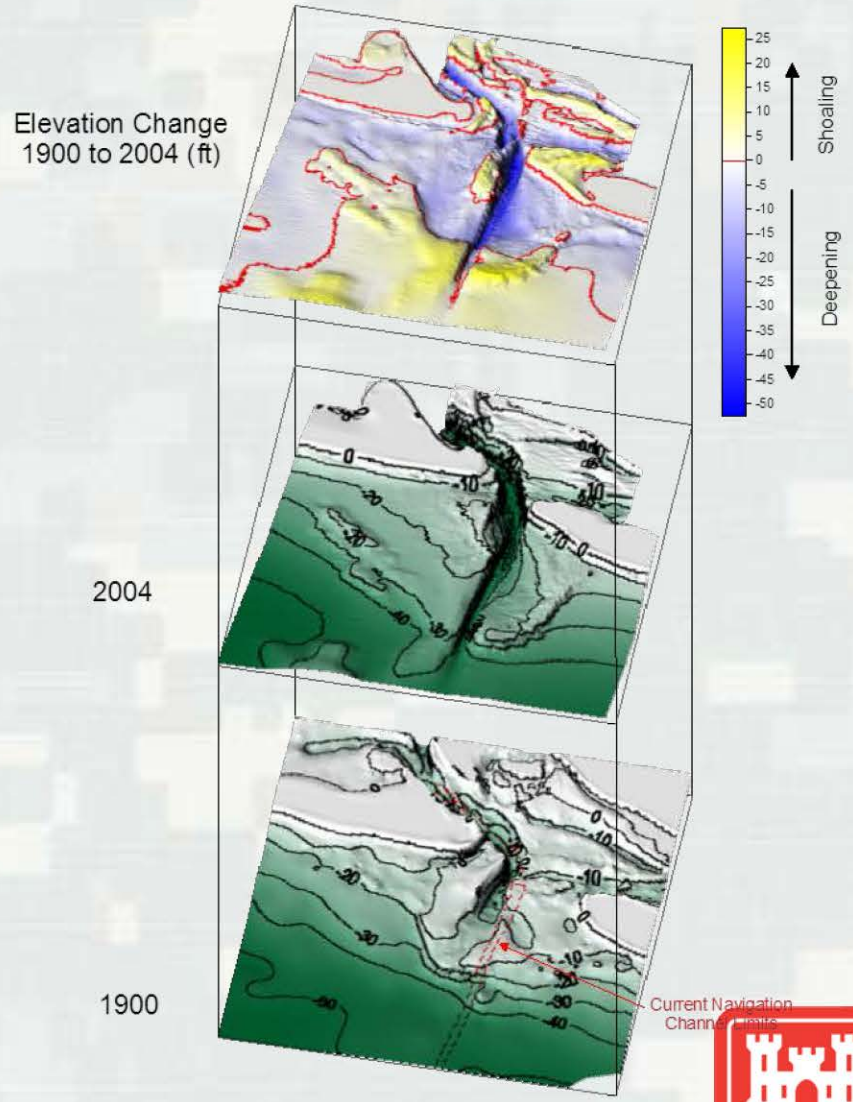
ERDC
Engineer Research and Development Center

Sediment Budget Components

1. Dredging
2. Beach Nourishment
3. Beach Volume and Shoreline Chg
4. Inlet Morphology
5. Coastal Processes
6. Cross-shore Change
7. Sediment Budget

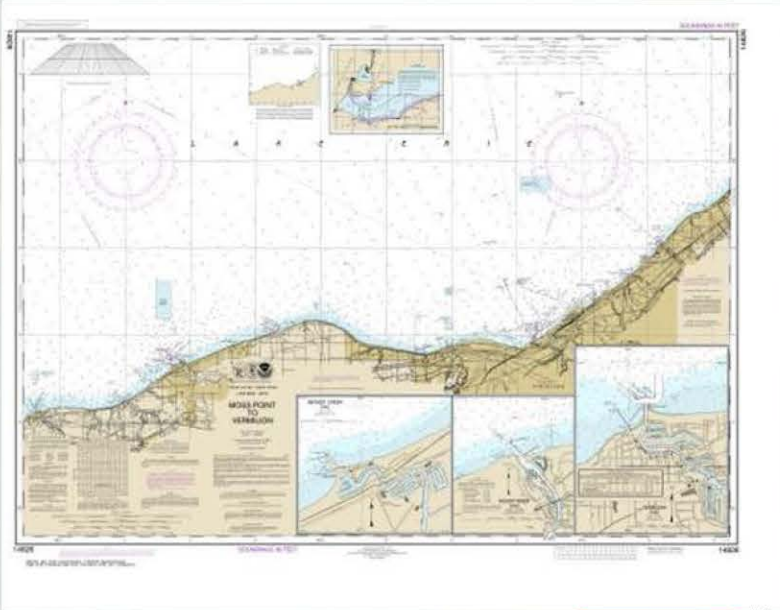
4. Inlet Morphology

- Conceptual
  - Reports, Historic Charts, Imagery
- Interim/Operational
  - Net Changes
  - Volumes
    - ArcGIS
      - Lidar
      - profiles
    - Surface Modeling
    - Change Rates
  - Equilibrium
    - Ebb Shoal Volume
    - Cross-Sectional Area



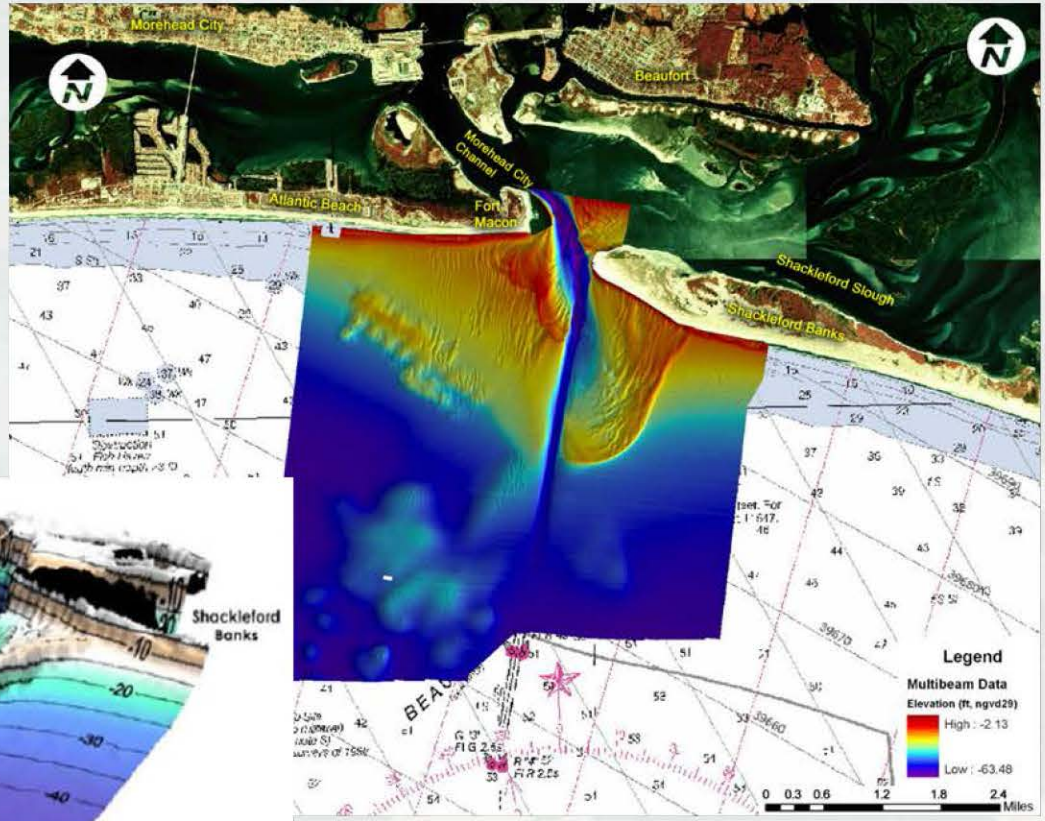
4. Inlet Morphology

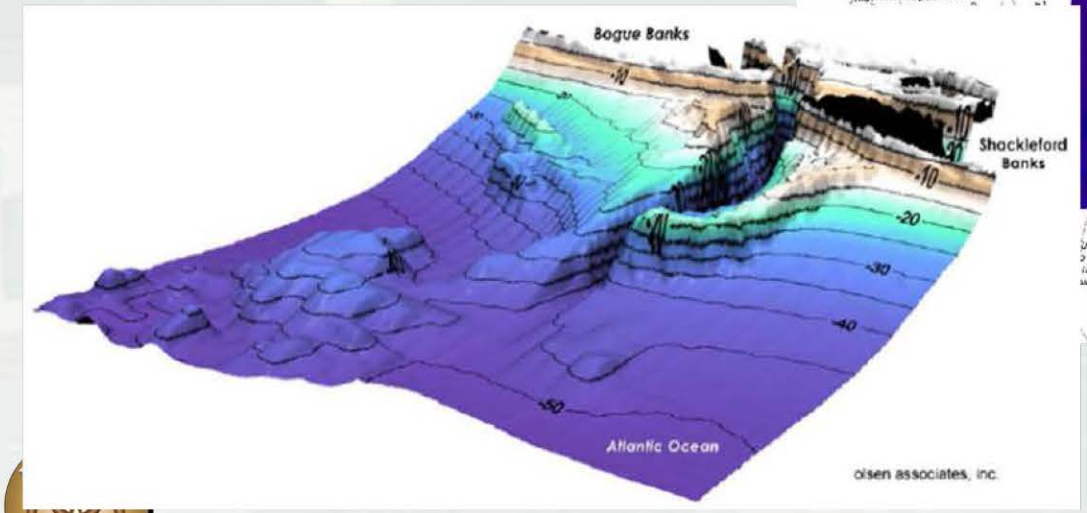
- Conceptual
- Inlets Online:
  http://www.oceanscience.net/inletsonline
  - Aerial images
  - Reports
- Historic Charts
- NOAA's Digital Coast – lidar data



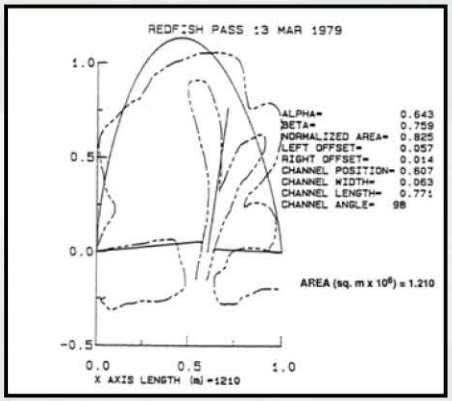
4. Inlet Morphology

- Interim/Operational
- Volumetric Analyses
  - Classify
  - Volume above Contour
  - Surface Comparisons

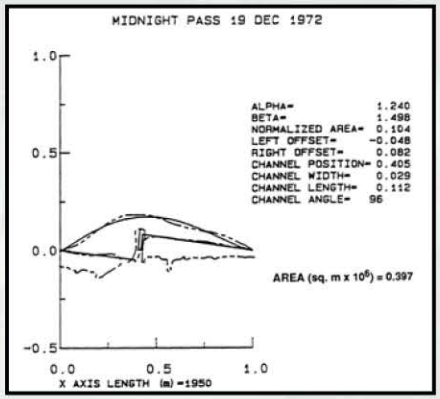




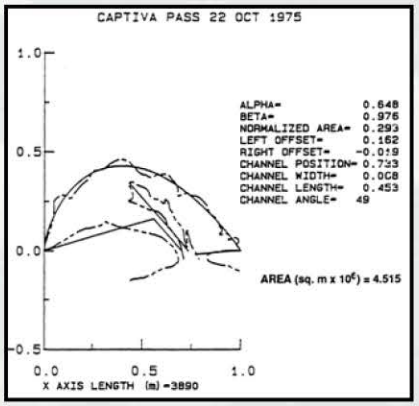
- Interim/Operational
- Classification of Ebb Shoals



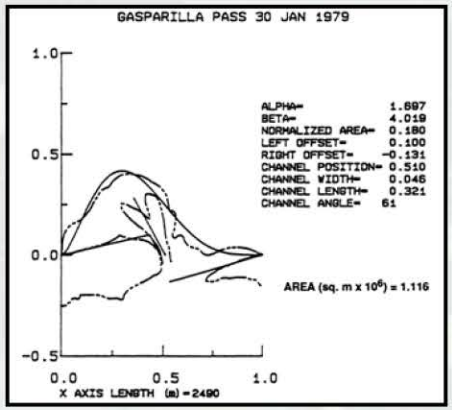
Tide Dominated



Wave Dominated



Mixed Energy



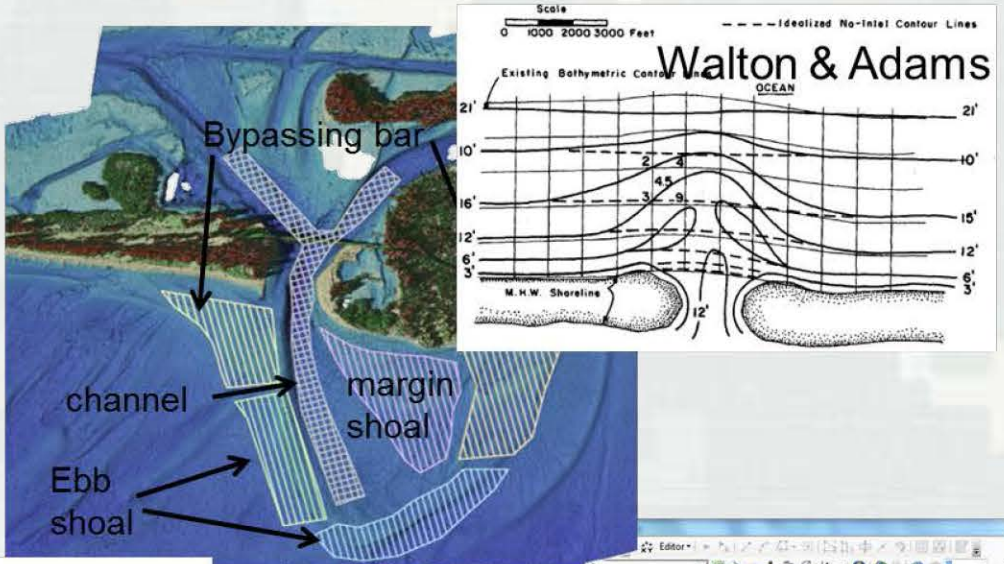
Mixed Energy - offset

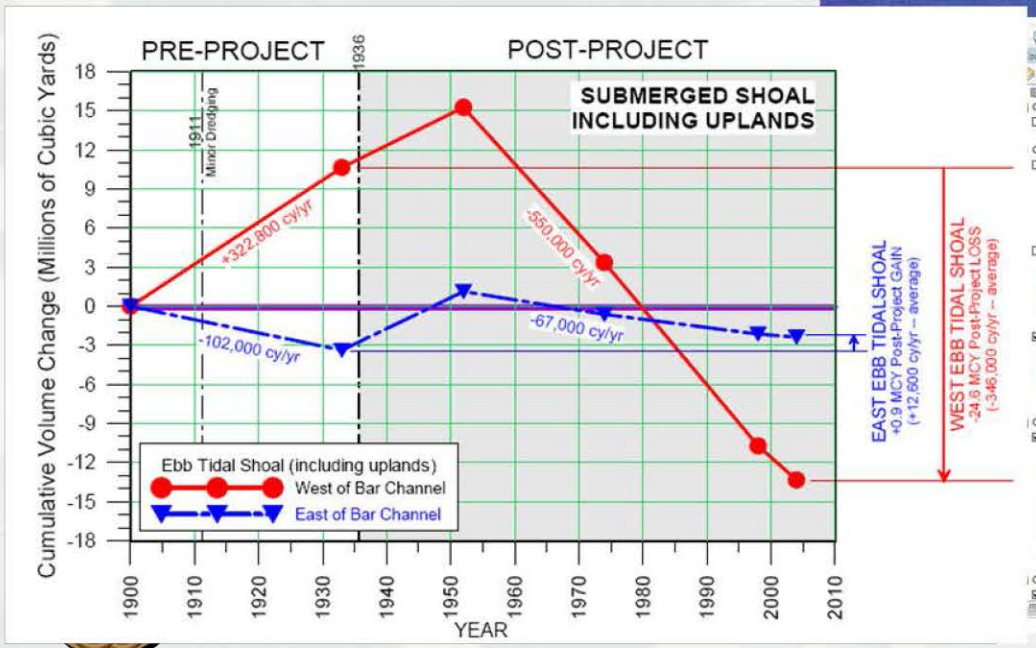
- 1) identify viable fill material and quantify impacts from mining the ebb shoal,
- 2) delineate sediment pathways to provide input to sediment budgets,
- 3) determine trends for the migration of the ebb shoal that could impact navigation, and
- 4) develop a long term sediment management plan.

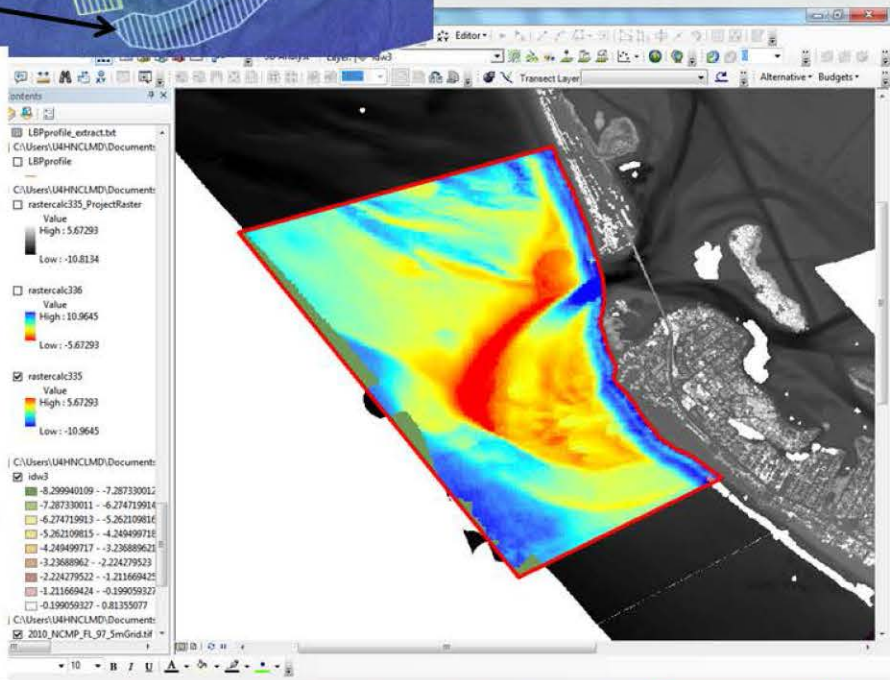
GIBEAUT, J.C. and DAVIS, R.A., Jr., 1993. Statistical geomorphic classification of ebb-tidal deltas along the west-central Florida coast. *Journal of Coastal Research*, Special Issue No. 18, 165-184. Fort Lauderdale (Florida). ISSN 0749-0208.

4. Inlet Morphology

- Interim/Operational
- Volume Above Contour
- ArcGIS
  - Regional Process Analysis Tool
  - Compare the idealized 'no inlet' bathymetry with the existing bathymetry

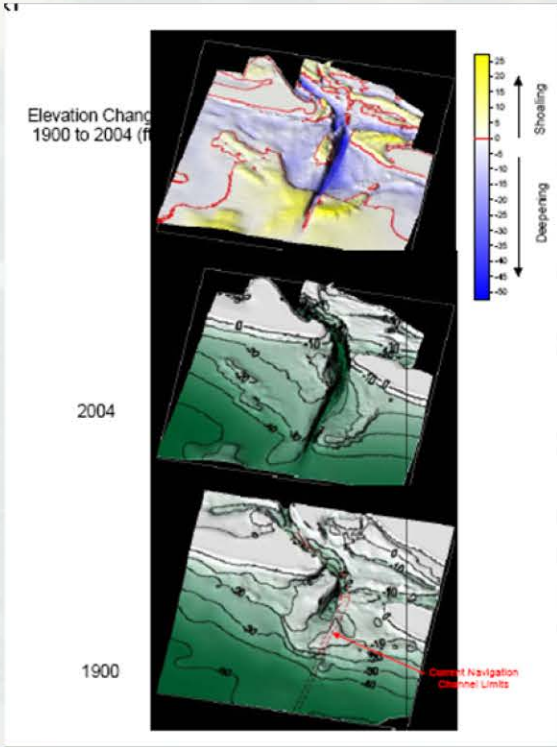






4. Inlet Morphology

- Interim/Operational
- Volumetric Analyses
  - Surface Comparisons
    - ArcGIS

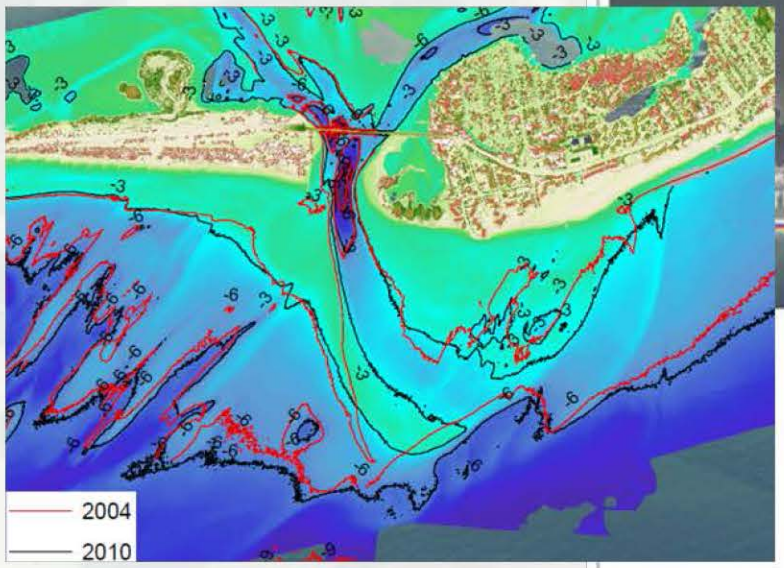


Volume Change (CY)

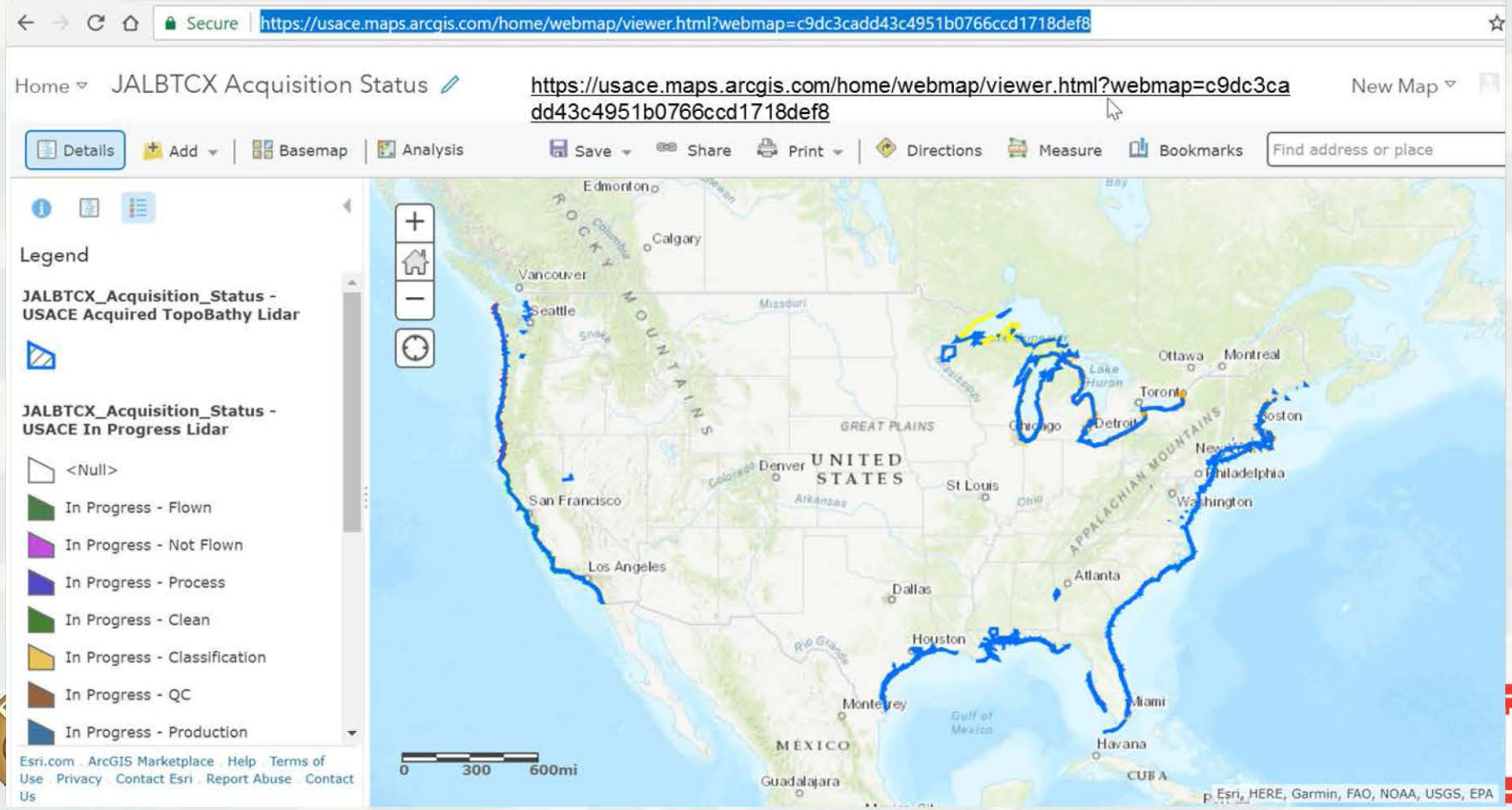
Survey	North Shoal	South Shoal	Total
10/2009--6/2004	266,158	174,736	440,894
10/2009--1/2006	232,284	150,703	382,987
1/2006--11/2004	106,561	21,548	128,109
11/2004--6/2004	-81,090	-64,643	-145,733

4. Inlet Morphology

- Interim/Operational
- Shoreline and Channel Changes
  - ArcGIS



- Big Picture

$$\sum Q_{source} - \sum Q_{sink} - \Delta V + P - R = \text{Residual}$$

- Coastal Inlets Research Program
- Joint Airborne Lidar Bathymetry Technical Center of Expertise