Texas General Land Office-MMS Upper Coast Sediment Investigations

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MMS-GLO Cooperative Agreement M07AC12518

- Sediments Investigations in Texas OCS areas
- Continue with GLO previous studies

MMS Phase 1: Reference Investigations (completed)

MMS Phase 2: Field Data Collection and Analysis (begins 2/2009)

Why does GLO search for sand?

Section 4 of the amended Subdivision (10), Section 33.203 of the Natural Resources Code to states that a “critical erosion area” has the meaning assigned to the term “critical coastal erosion area.” This section thus defines a critical coastal erosion area as a threat to

A. Public health, safety or welfare
B. Public beach use or access
C. General recreation
D. Traffic safety
E. Public property or infrastructure
F. Private commercial or residential property
G. Fish or wildlife habitat
H. An area of regional or national importance

Texas Sediment Investigations

Coastal sediments used, searched for, and needed under

- GLO Programs
  - Coastal Erosion Planning and Response Act (CEPRA) Projects
  - State and/or county projects conducted under GLO managed grants (CMP and CIAP)
- GLO-Federal projects including USACE, USFWD, EPA, NOAA and MMS

Texas General Land Office Sediment Related Programs

- State and/or county projects conducted under GLO managed grants (CEPRA, CMP and CIAP)
  - Sand sources studies, beach nourishment, habitat restoration, shoreline protection, and education

Texas General Land Office Sediment Programs

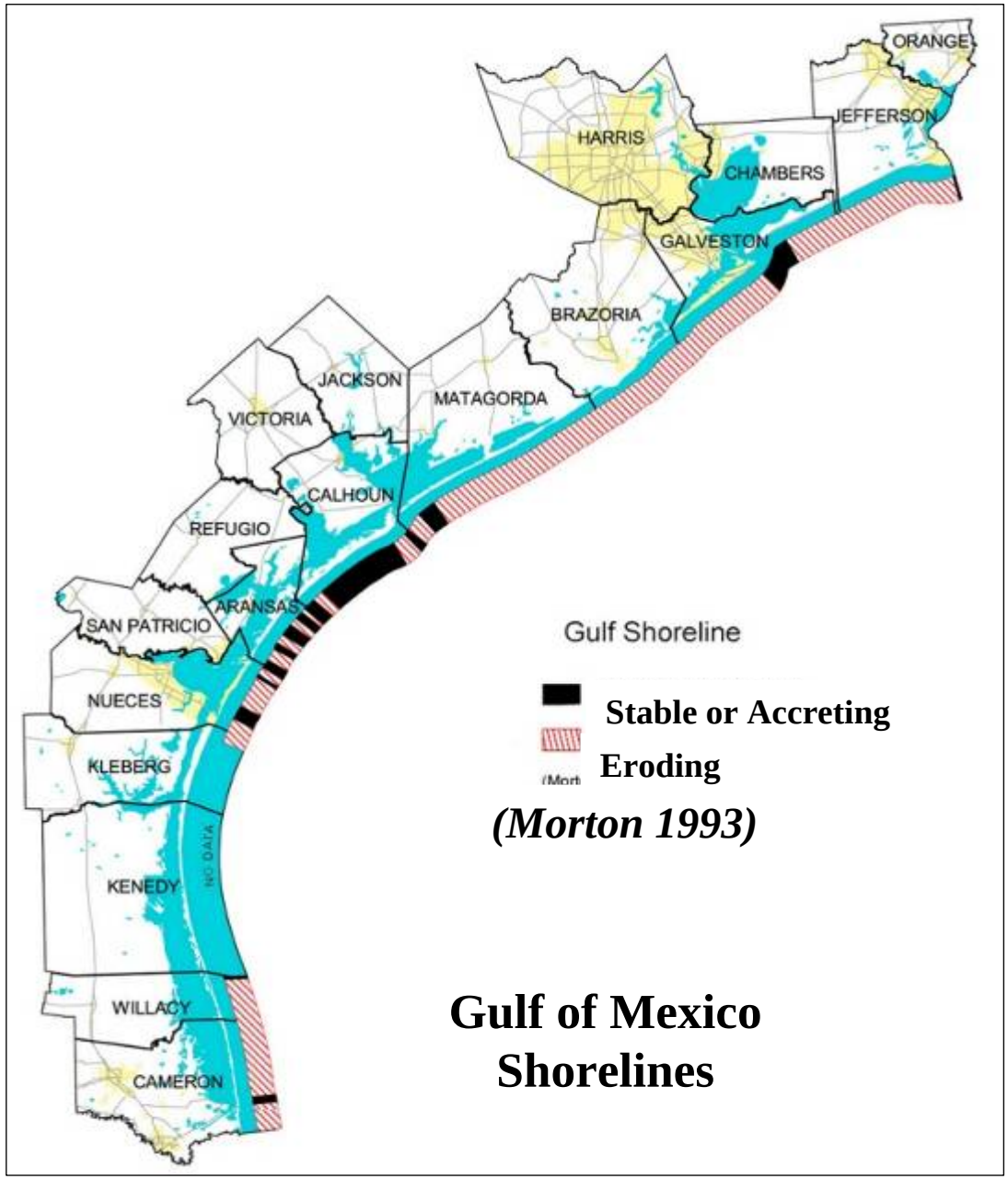
- GLO-Federal projects including U.S. Army Corps of Engineers, U.S. Fish & Wildlife Service, Environmental Protection Agency, National Oceanic & Atmospheric Administration and Minerals Management Service.
  - Sediment studies for coastal protection and restoration
  - BUDM studies and construction for coastal protection and restoration

Texas Shoreline Erosion Rates

Erosion Rates

Accretion:
Up to 20 ft per year

Erosion:
Up to 45 ft per year



Areas with Critical Erosion

- 367 miles of gulf shoreline
- 229 miles of critical erosion (> 2 to >10 ft/yr)

- 3,300 miles of bay shoreline
- More than 1,600 miles of critical erosion

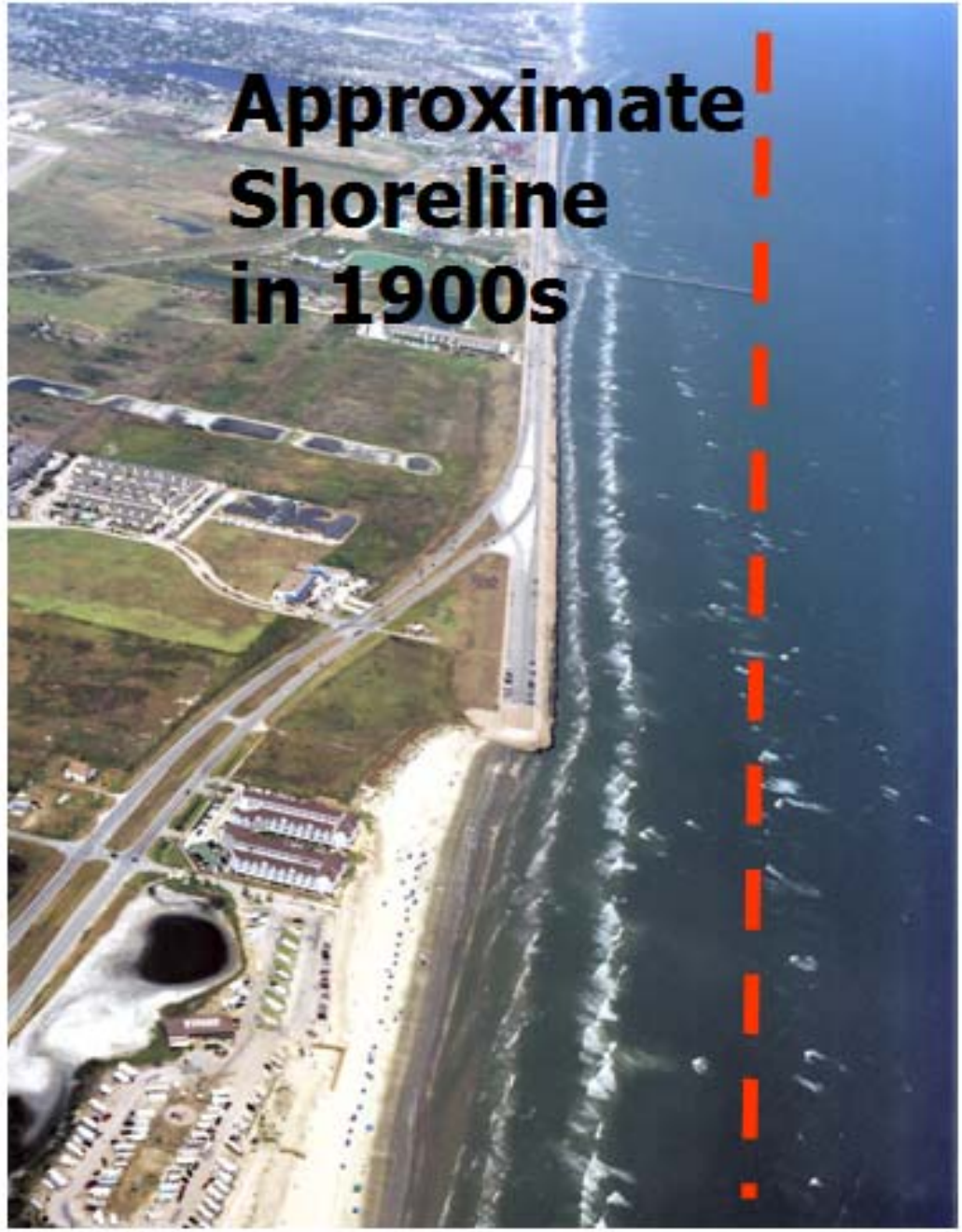
Texas-MMS Sediment Projects in the Upper Coast: After Katrina, Rita, & Ike

Gulf Shorelines:
Sand priorities in the past for:

- beach nourishment
- habitat restoration
- dune restoration
- storm protection

Sand needed now for:

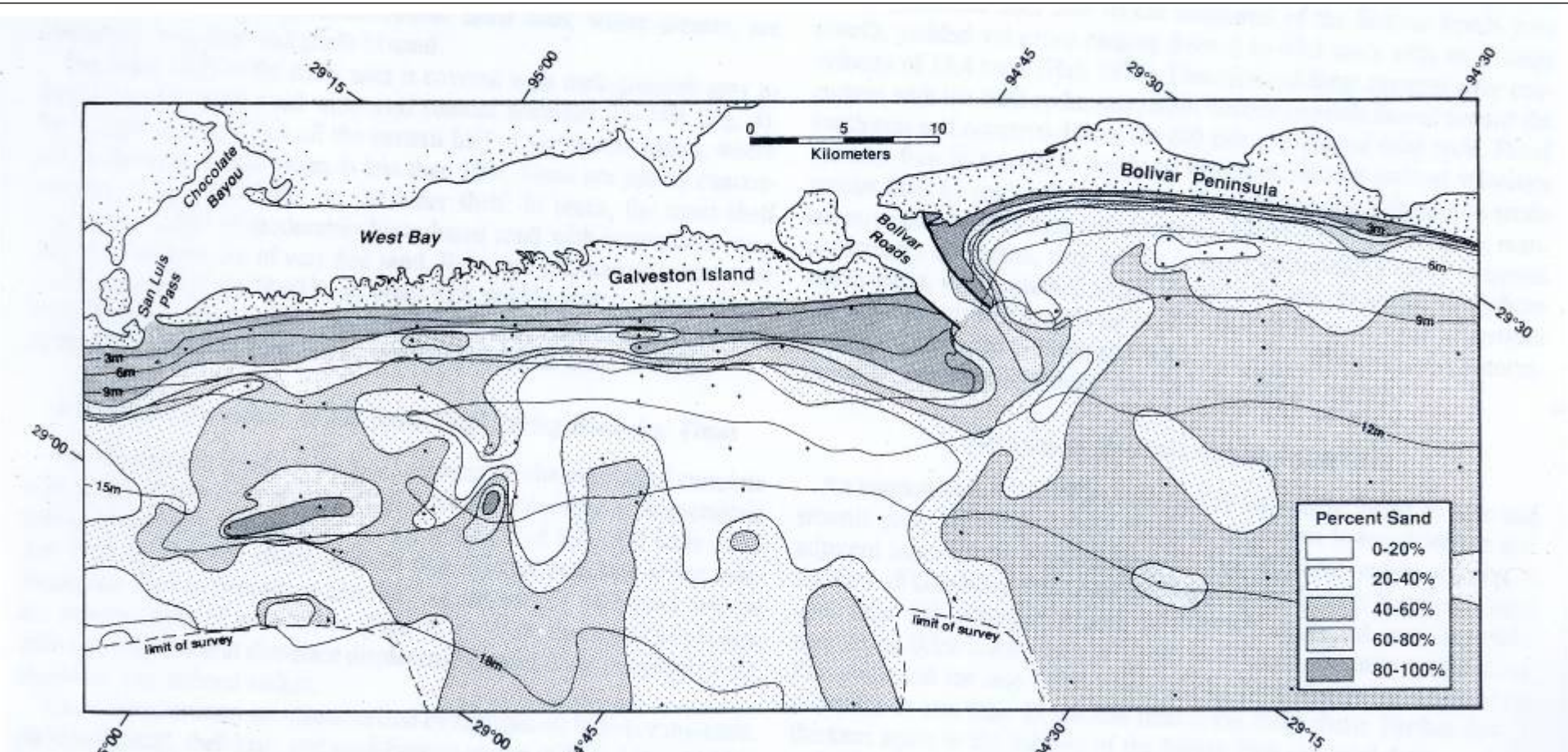
- storm recovery
- beach nourishment
- dune restoration



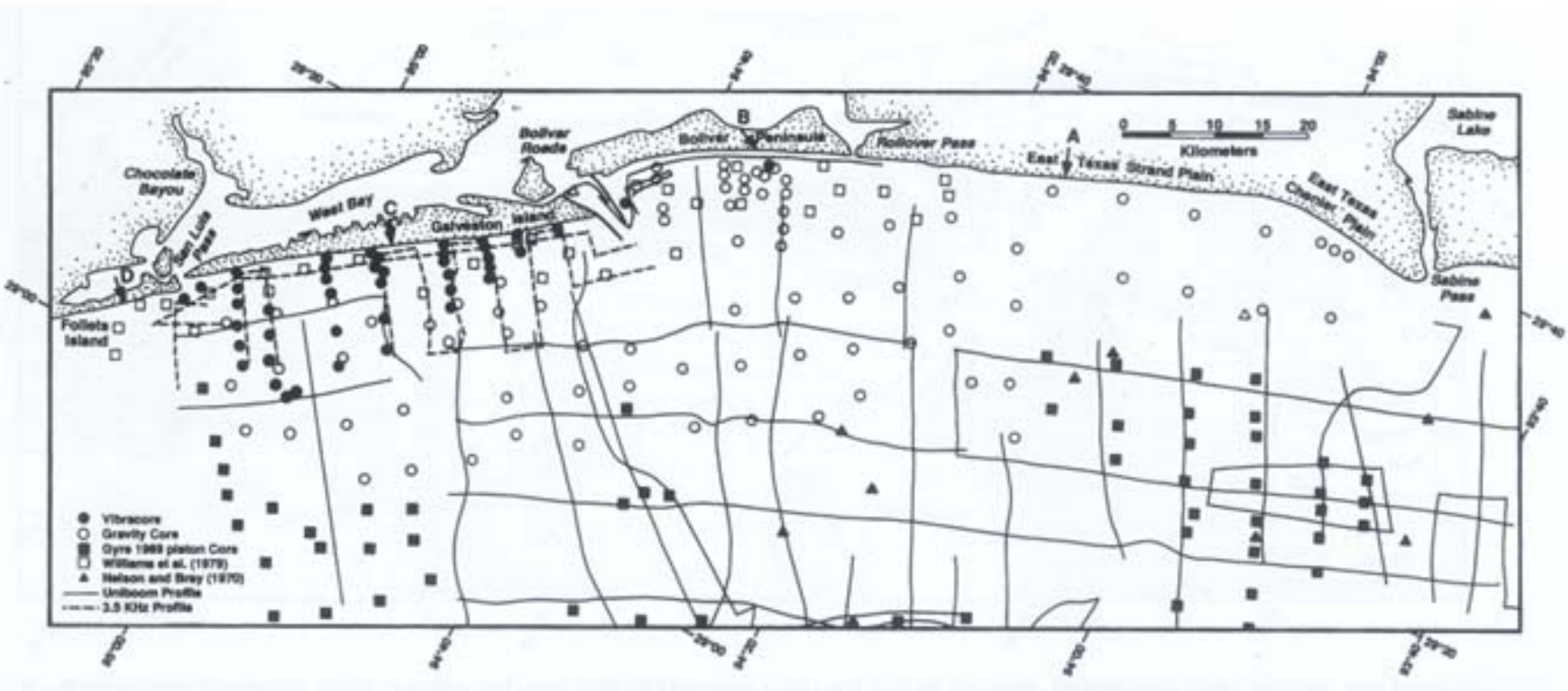
Challenging Sand Sources Investigations

- Texas Upper Coast: mud dominated environment
- Limited sand sources
- No river systems available or reaching the coast
- High erosion rates

Previous studies on sand sources: Siringan and Anderson 1994

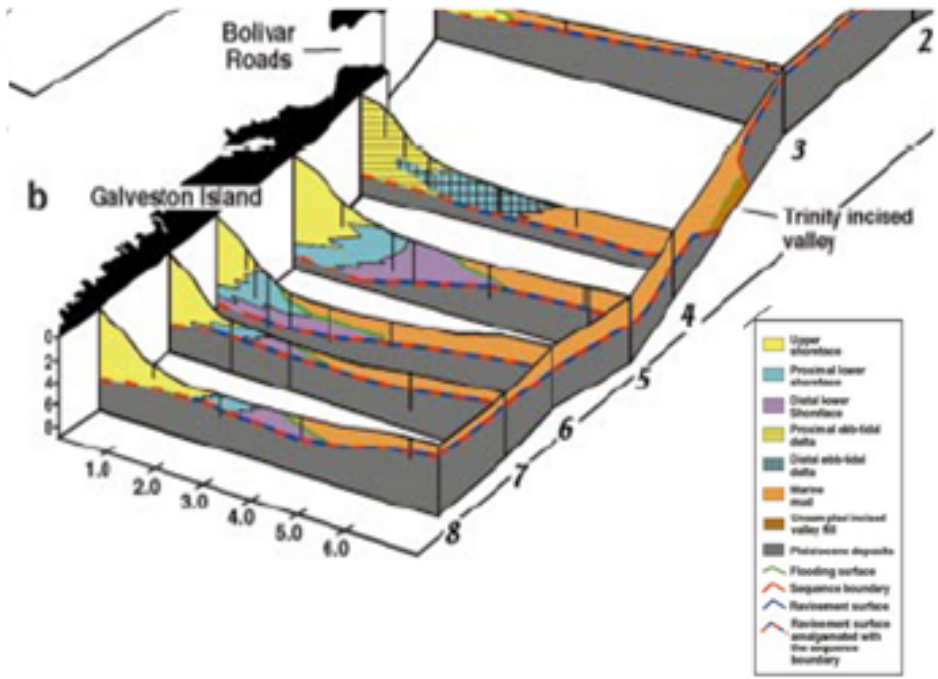


Seismic lines, cores, and selected boreholes from Siringan and Anderson 1994

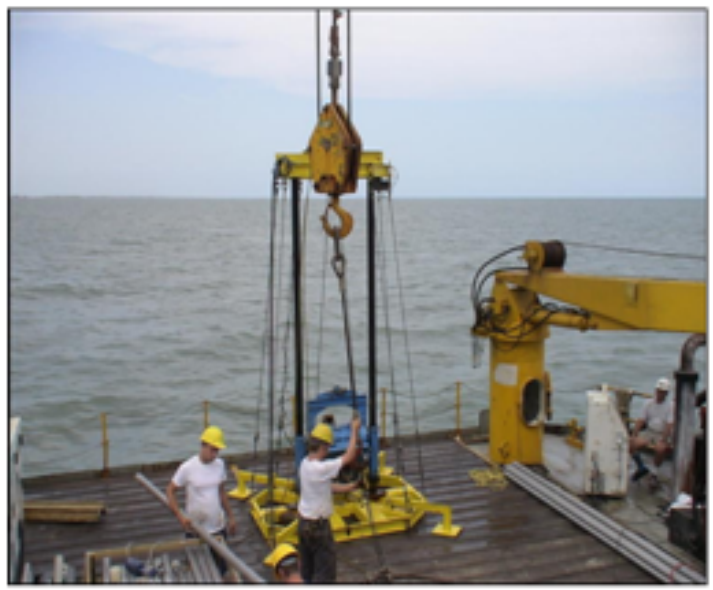


Galveston Island Shoreface Architecture from Rodriguez et al. 2004

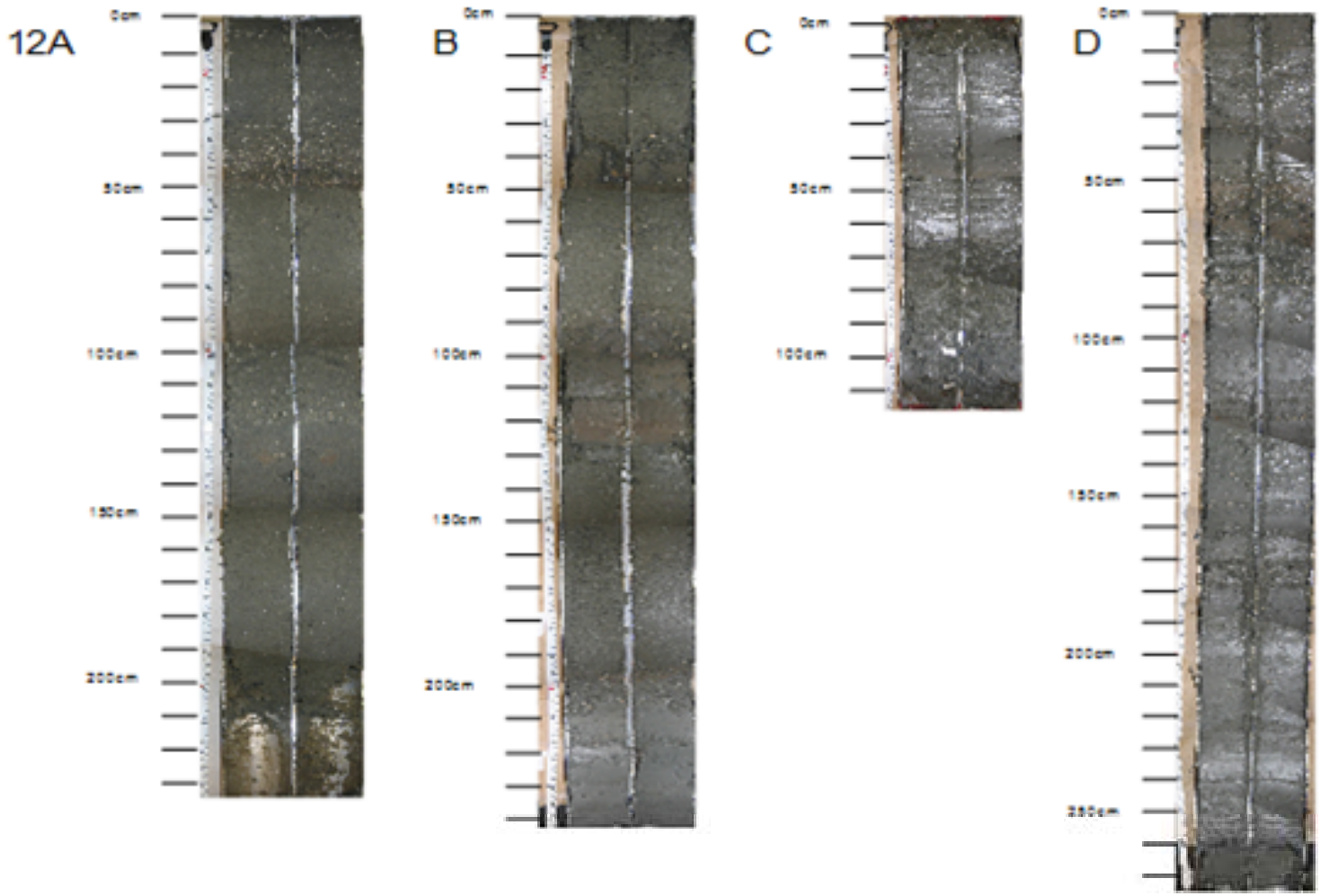
Well-known Texas Geology: Barrier Island-Shoreface



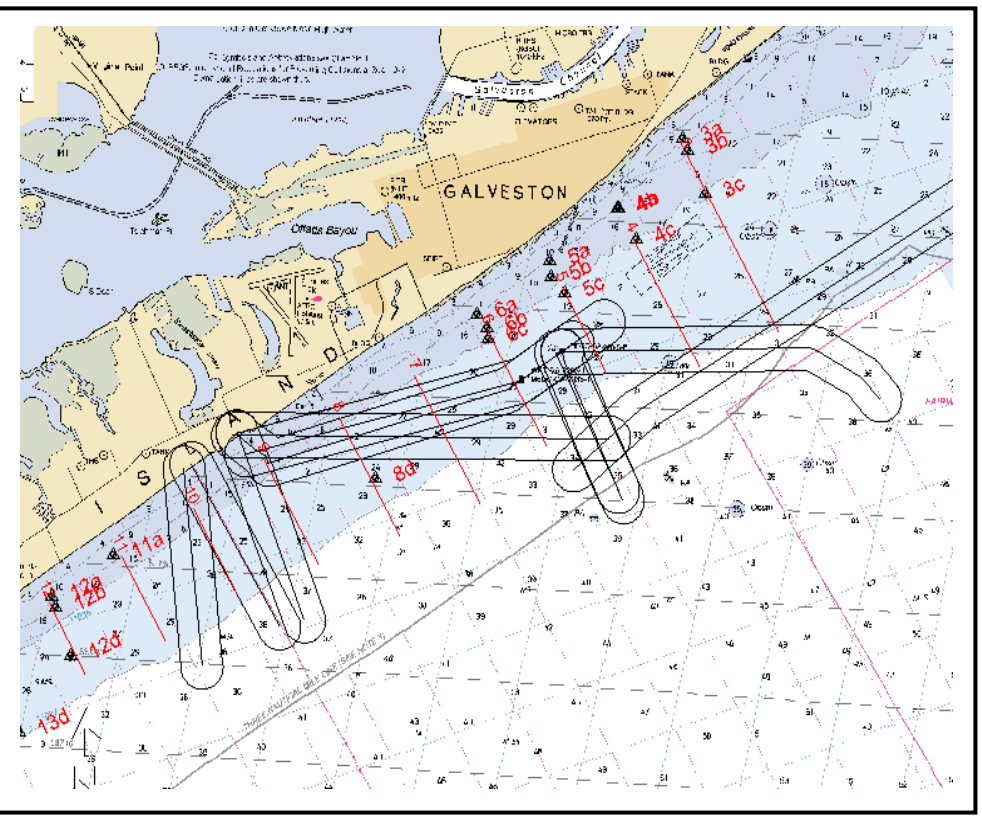
Previous Texas A&M Sediment Investigations: Lift Boat Pontchartrain Rigged with a Submersible Vibra Core Rig

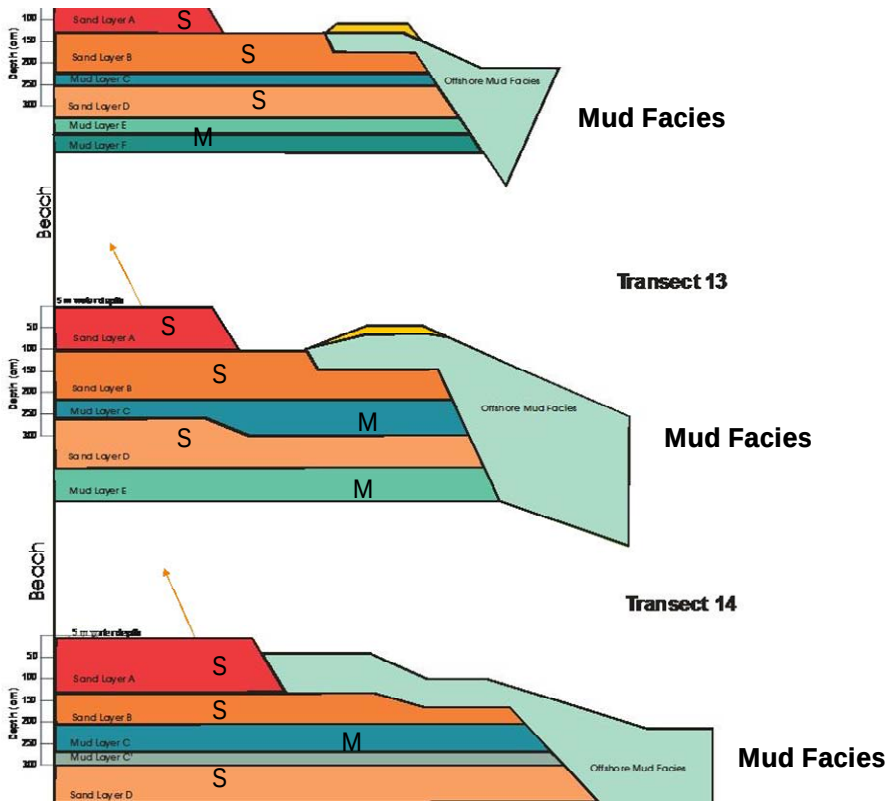


Detailed Core Descriptions and Analysis



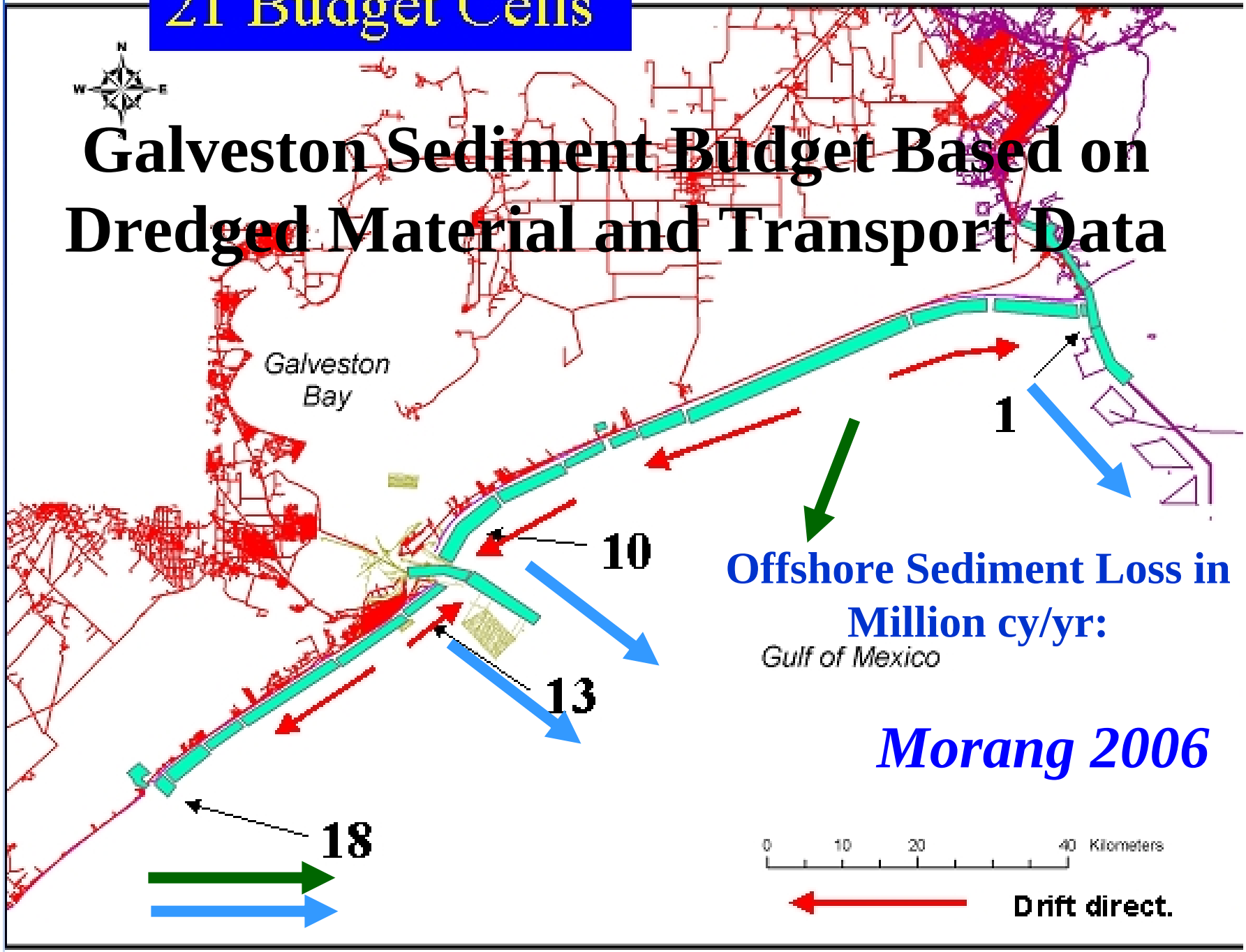
Block stratigraphic correlations on the Galveston Island shoreface, after Dellapenna et al. 2006

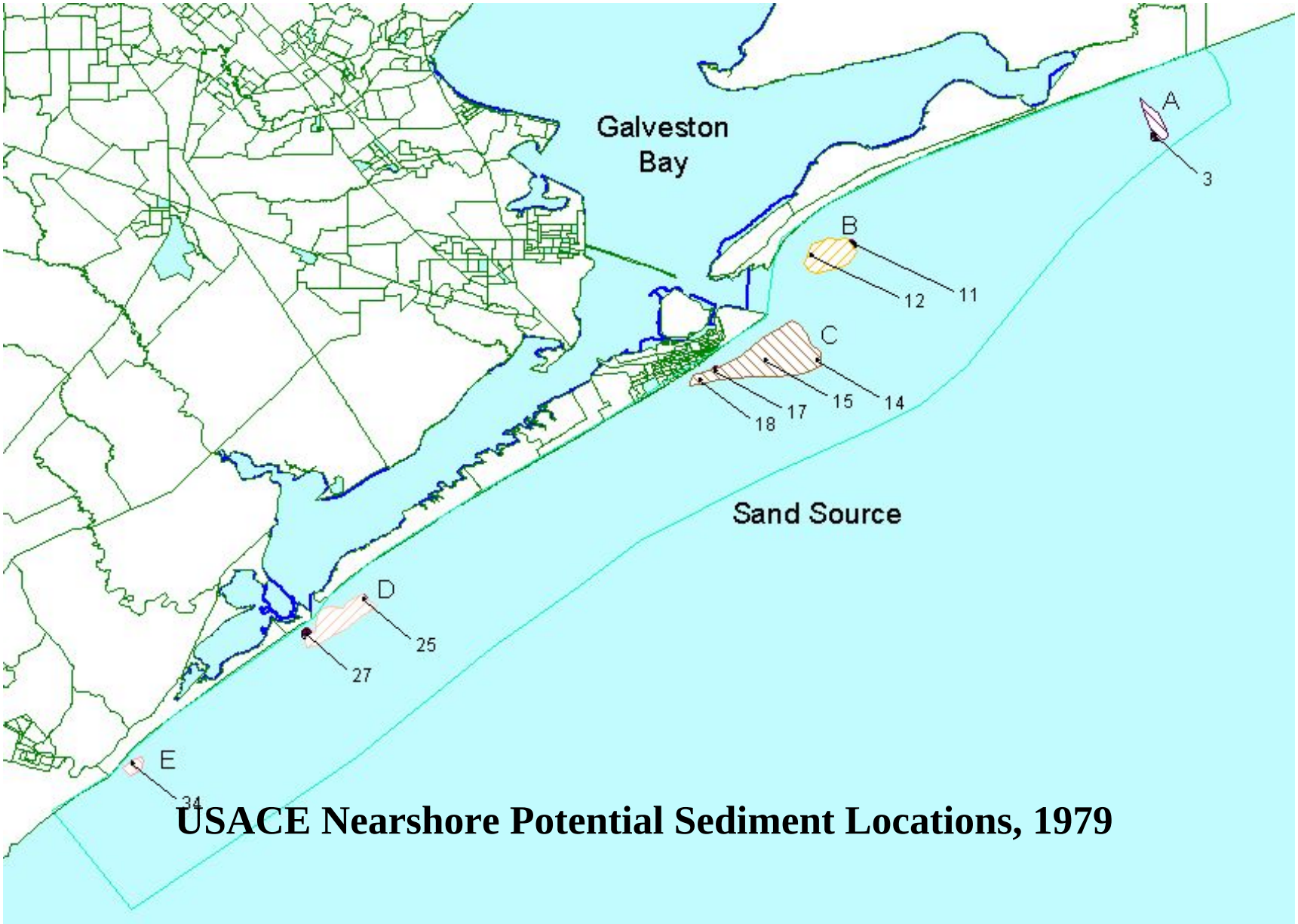




21 Budget Cells

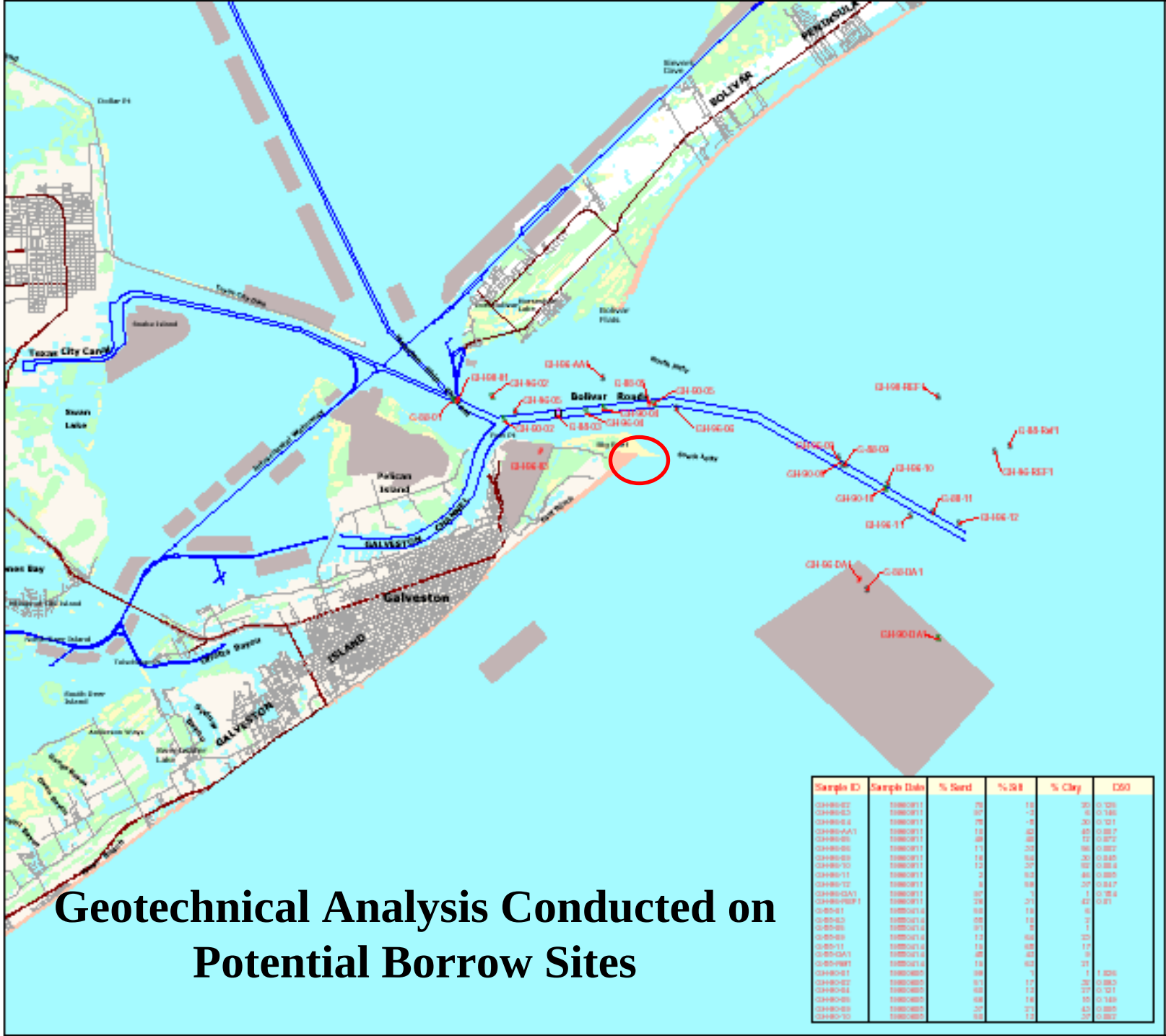
Galveston Sediment Budget Based on Dredged Material and Transport Data





USACE Nearshore Potential Sediment Locations, 1979

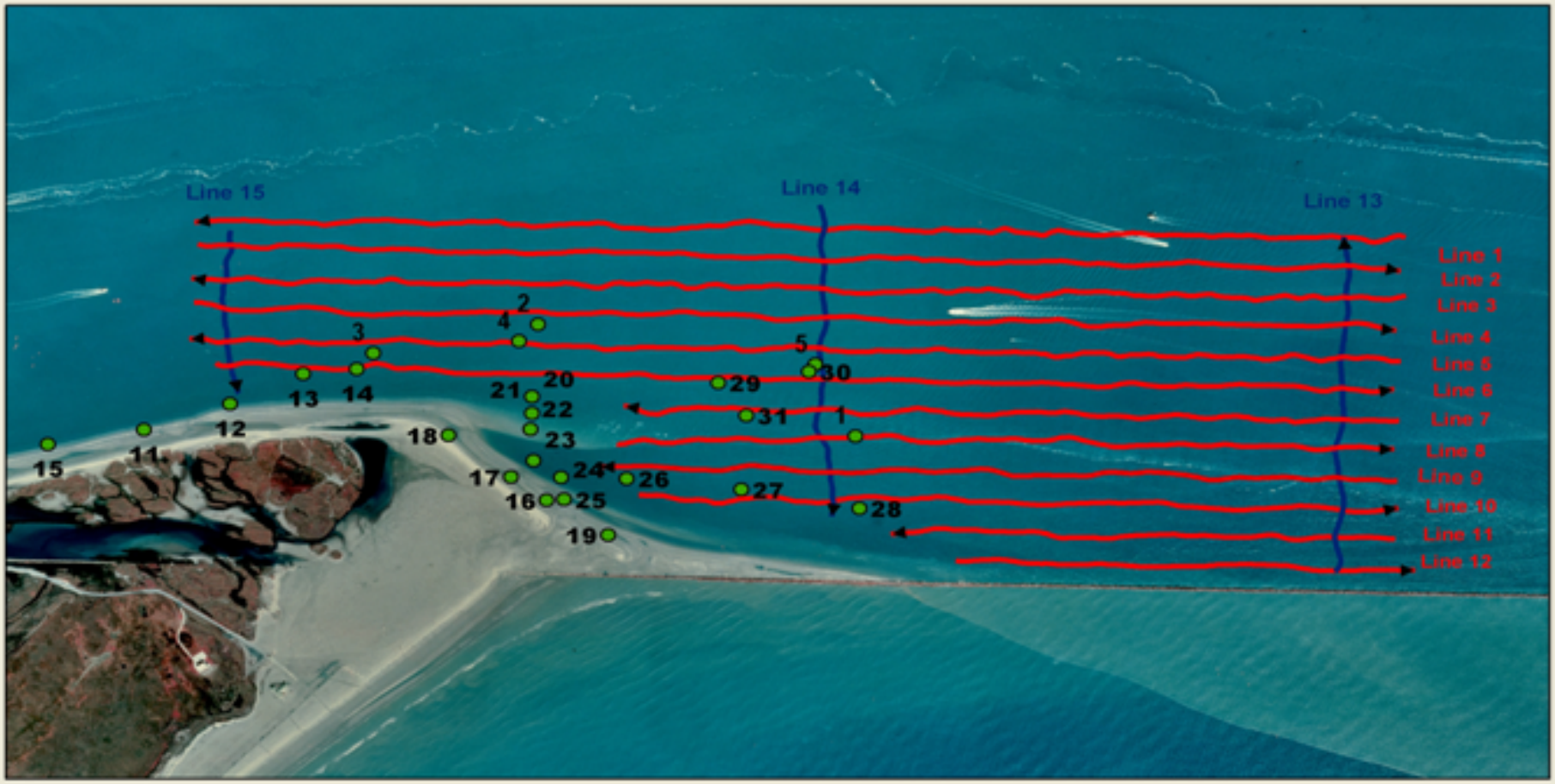
Recent Sand Sources



Geotechnical Analysis Conducted on Potential Borrow Sites

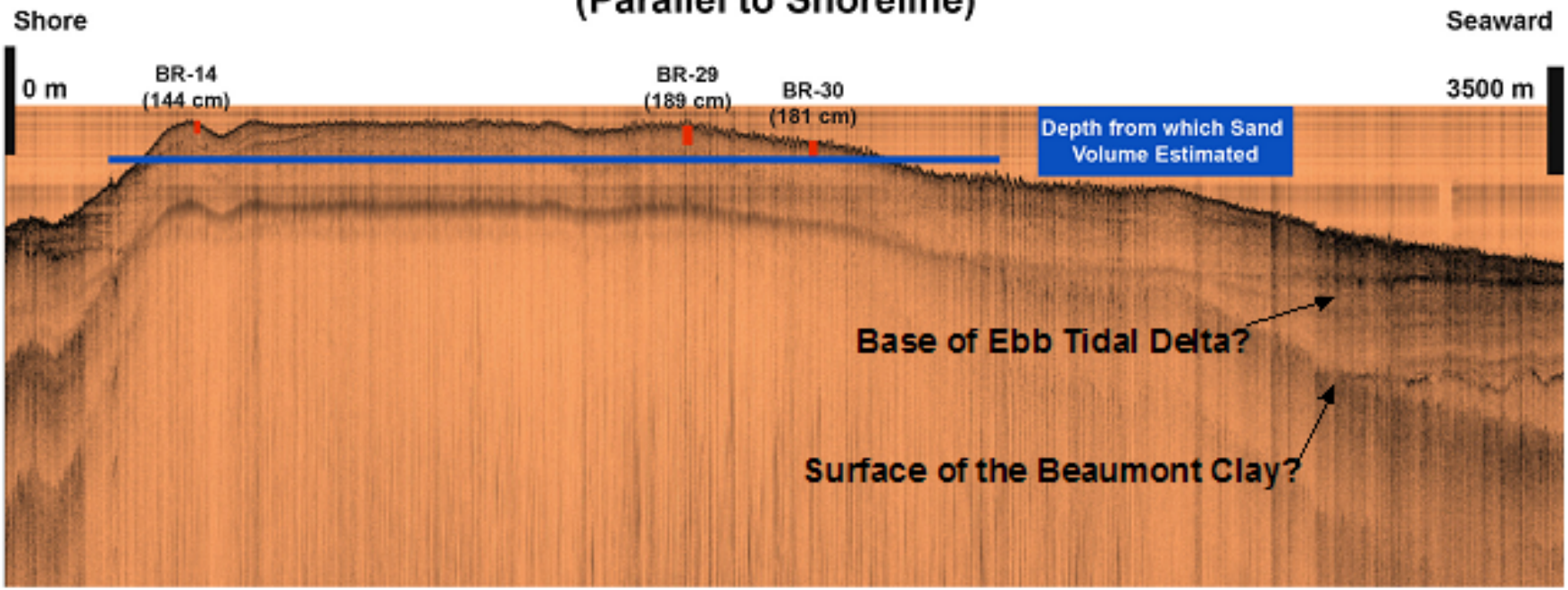
Future Beneficial Use of Dredged Material

South Jetty Core Locations and Chirp Lines

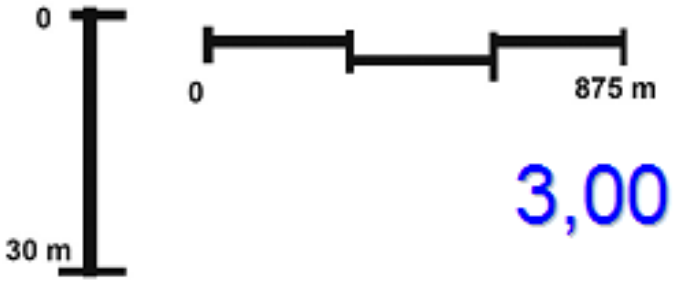


South Jetty Chirp Line 6

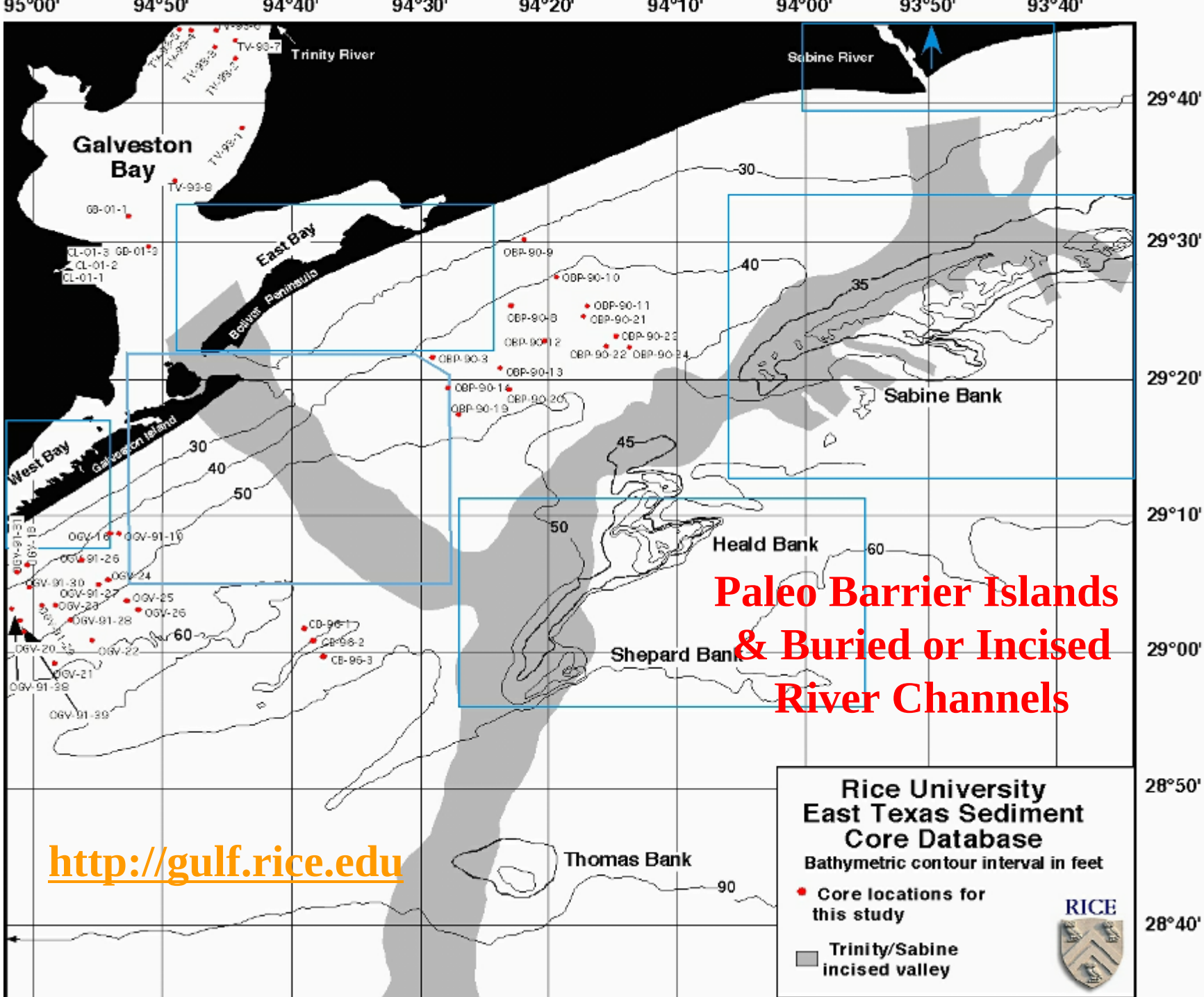
(Parallel to Shoreline)



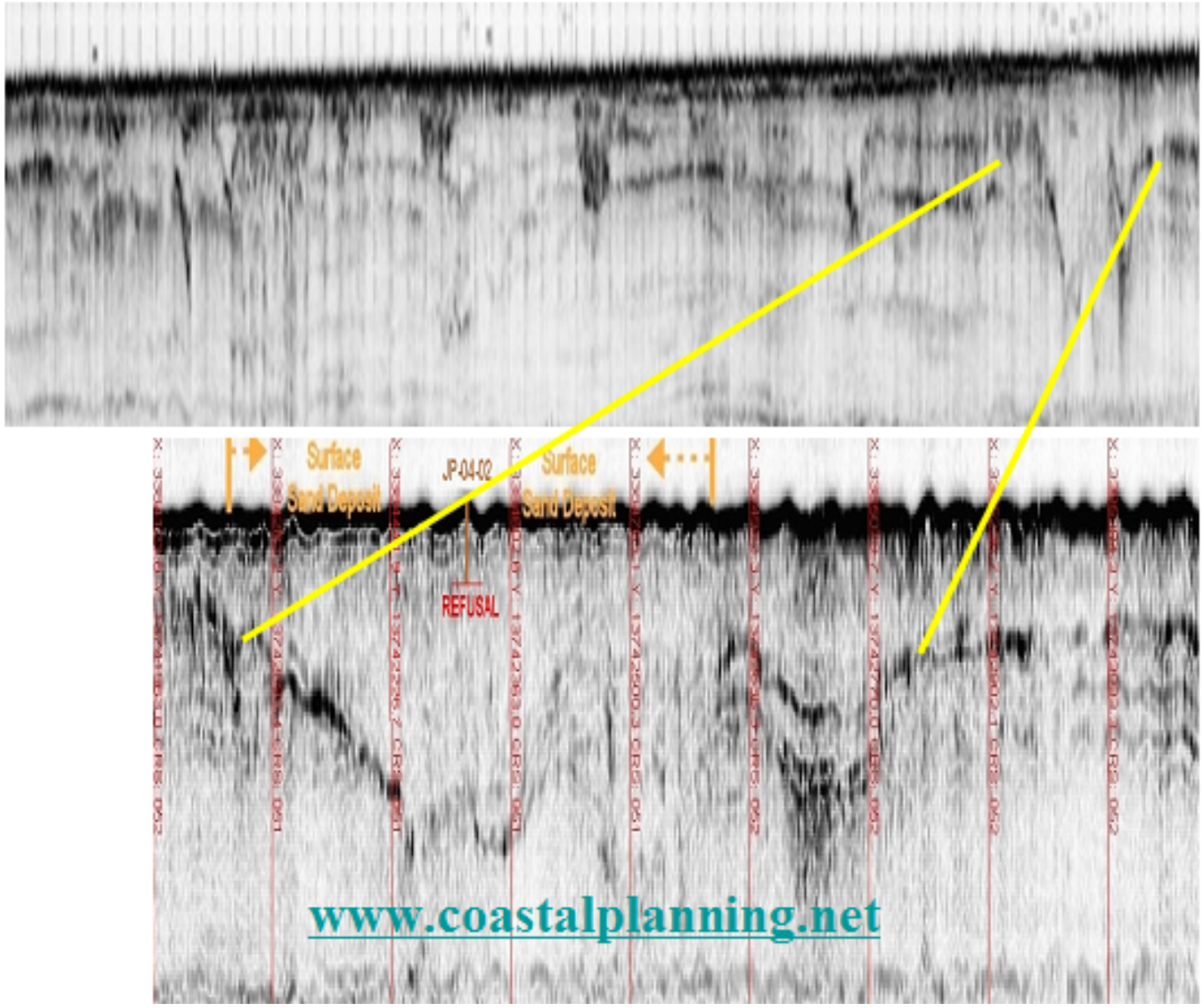
Scale Bars



3,000,000 cy of sand


95°00'
94°50'
94°40'
94°30'
94°20'
94°10'
94°00'
93°50'
93°40'
29°40'
29°30'
29°20'
29°10'
29°00'
28°50'
28°40'
Trinity River
Sabine River
Galveston Bay
East Bay
Bolivar Peninsula
West Bay
Galveston Island
Sabine Bank
Heald Bank
Shepard Bank
Thomas Bank
30
40
35
45
50
60
90
Paleo Barrier Islands & Buried or Incised River Channels
http://gulf.rice.edu
Rice University
East Texas Sediment Core Database
Bathymetric contour interval in feet
Core locations for this study
Trinity/Sabine incised valley
RICE

Pleistocene Offshore Incised Fluvial Channels



Sediments Needed after Hurricane Ike

July 2007

September 2008

The Challenge:

After Ike, it is estimated that about >15,000,000 cy of sand are required to return to pre-Ike conditions in the developed areas.

GLO had identified already >4,000,000 cy of sand for Galveston Island and Bolivar Peninsula.

>11,000,000 cy of sand are needed to return to pre-Ike conditions.

Ike Impacts:

- Barrier island breaching
- Loss of vertical elevation
- Loss of dune system
- Loss of wetland and marsh system
- Loss of infrastructure

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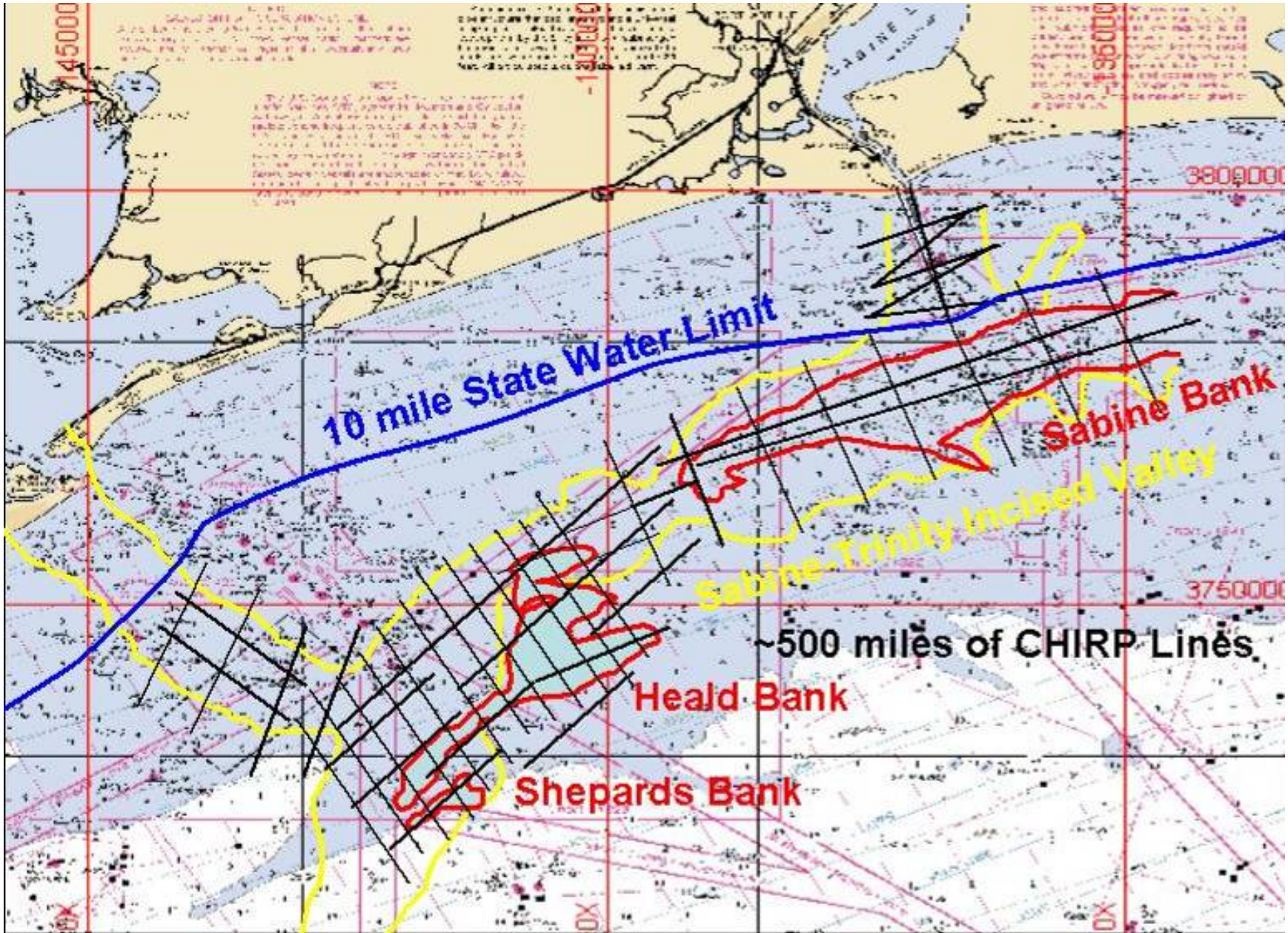
New Offshore Sediment Surveys



CENTER FOR SPACE RESEARCH
THE UNIVERSITY OF TEXAS AT AUSTIN

Galveston Bay Potential Breaching

Horizontal Scale in meters
0 50 100

12 11 10 9 8 7 6 5 4 3 2 1 0

Approximate Elevation in meters (NAVD88)

New Offshore Sediment Surveys

- >500 miles of seismic lines
- About 25 vibro-cores
- >50 grab samples
- >500 miles of side scan sonar

To be concluded by November 2009

GLO-MMS Sand Sources Investigations

Contact Information

- GLO on the Web
  www.glo.state.tx.us/coastal

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  john.gillen@glo.state.tx.us

References

Dellapenna, T., J. Moya, L. Council, C. Perry, G. Hauske, M. Allison, P. Gayes, N. Joiner, and J. Pitkewicz. 2006. The Texas General Land Office Sand Source Investigations off of Galveston Island–2005–Project Overview and Results. Texas General Land Office Internal Report for the Coastal Erosion Planning and Response Act. 35 pp.

Morang, A. 2006. North Texas Sediment Budget: Sabine Pass to San Luis Pass. Vicksburg, MS: Coastal and Hydraulics Laboratory, U.S. Army Engineer Research and Development Center. 78 pp.

Morton, R.A. 1993. Shoreline movement along developed beaches of the Texas Gulf coast: A user's guide to analyzing and predicting shoreline changes. Open File Report 93-1. The University of Texas at Austin, Bureau of Economic Geology. 79 pp., 1 map.

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Siringan, F.P. and J.B. Anderson. 1994. Modern shoreface and inner-shelf storm deposits off the East Texas coast, Gulf of Mexico. Journal of Sedimentary Research B64(2):99–110.