Technical Tour: The Brazos River Delta Shorelines: A Complex Deltaic-Barrier Island System. (Duration ~5 hours) | Lochner-Texas General Land Office.

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Itinerary:

1:00 PM – Assemble to load bus at the Galveston Island Convention Center, **5600 Seawall Blvd, Galveston, TX 77551**.

1:20 PM – Depart the Galveston Island Convention Center and drive west on County Road 3005 (**Seawall Blvd)** to San Luis Pass County Park, (Distance 23 miles | 30 minutes). The Bus will cross Galveston Barrier Island east to west.

1:50 PM – Arrive at San Luis Pass County Park. Stage buses on asphalt parking area.

STOP 1. 1:55 PM – 2:15 PM – **San Luis Pass.** Brief discussion on the flood delta sediment management issues, habitat losses, sediment sink, the former Brazos River Channel path, the Deltaic system, transition between barrier island and river delta front, and the dynamics of the only natural inlet left in Texas.

Holocene Evolution and Sedimentation of San Luis Pass. The West Galveston Bay estuary includes the San Luis Pass as the main inlet. While Bolivar Roads (Houston Ship Channel) is influenced by the former Trinity Paleo River, San Luis Pass was influenced by the path of the former Brazos River (Figure 1- Taha and Anderson, 2008). The San Luis Pass County Park sits on the side of the former Brazos River channel, today known as the San Luis Pass Inlet.

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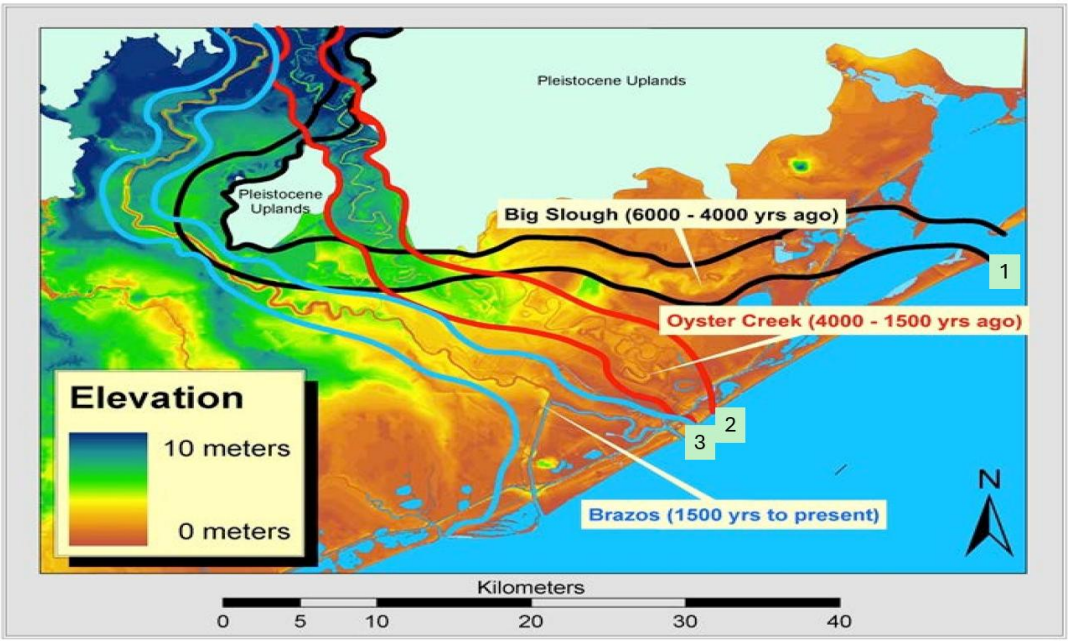

Figure 1. Holocene evolution of the Brazos River Delta through channel migration by time (Taha and Anderson, 2008). The numbers represent the location of the site visits.

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San Luis Pass is a flood-tidal delta (Figure 2), which is characterized by rapid evolution driven by sea-level rise and high sedimentation patterns coming mainly from the shoreline erosion of Galveston Island. It is also the only large inlet in Texas that has not been modified by navigation infrastructure and is considered a regional sediment sink: both West Galveston Bay and San Luis Pass are sediment sinks (Moya et al. 2012) .

The San Luis Pass County Boat Ramp (Figure 3) is at the tip of the delta front connected to the modern inlet. The former Brazos River path (Cold Pass today) fills the boat ramp entrance during the ebb flows, shoaling the access channel and leaving the ramp without access to the bays and Gulf. The estimated average sedimentation rate for the flow delta growth has been estimated at a rate of ~100,000 cubic yards per year (95% sand), plus a few thousand cubic yards in the micro deltas. The bays bathymetry shows big differences between the Brazos River Delta bays (3ft), and West Galveston Bay (~6 ft.). Both systems are examples of two different coastal systems with different geomorphological evolutions. The marshes in the deltaic system show evidence of land subsidence where marshes decay due to the land subsidence and the shoreline erosion processes (Moya et al. 2012). A historic evolution of the inlets is presented in Figure 4. The former Brazos River Delta shoreline erosion rates are presented in Figure 5.

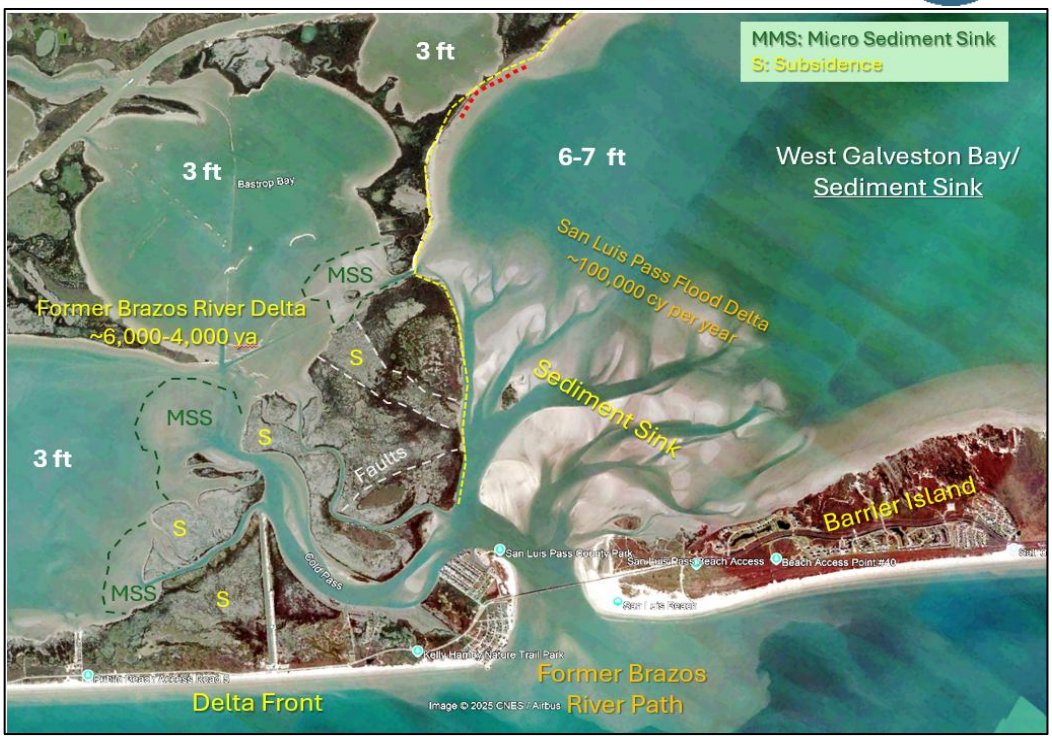

Figure 2. Dynamic geomorphic features and sedimentary processes of the San Luis Pass (Taha and Anderson, 2008; Moya et al. 2012). On the right, West Galveston Bay represents a typical Texas barrier island-bay morphological environment. To the left, the marsh corresponds to the former Brazos River Delta deposits dated between 6,000 and 4,000 years ago (Figure 1).

Figure 3. Location of the San Luis Pass County Boat Ramp.

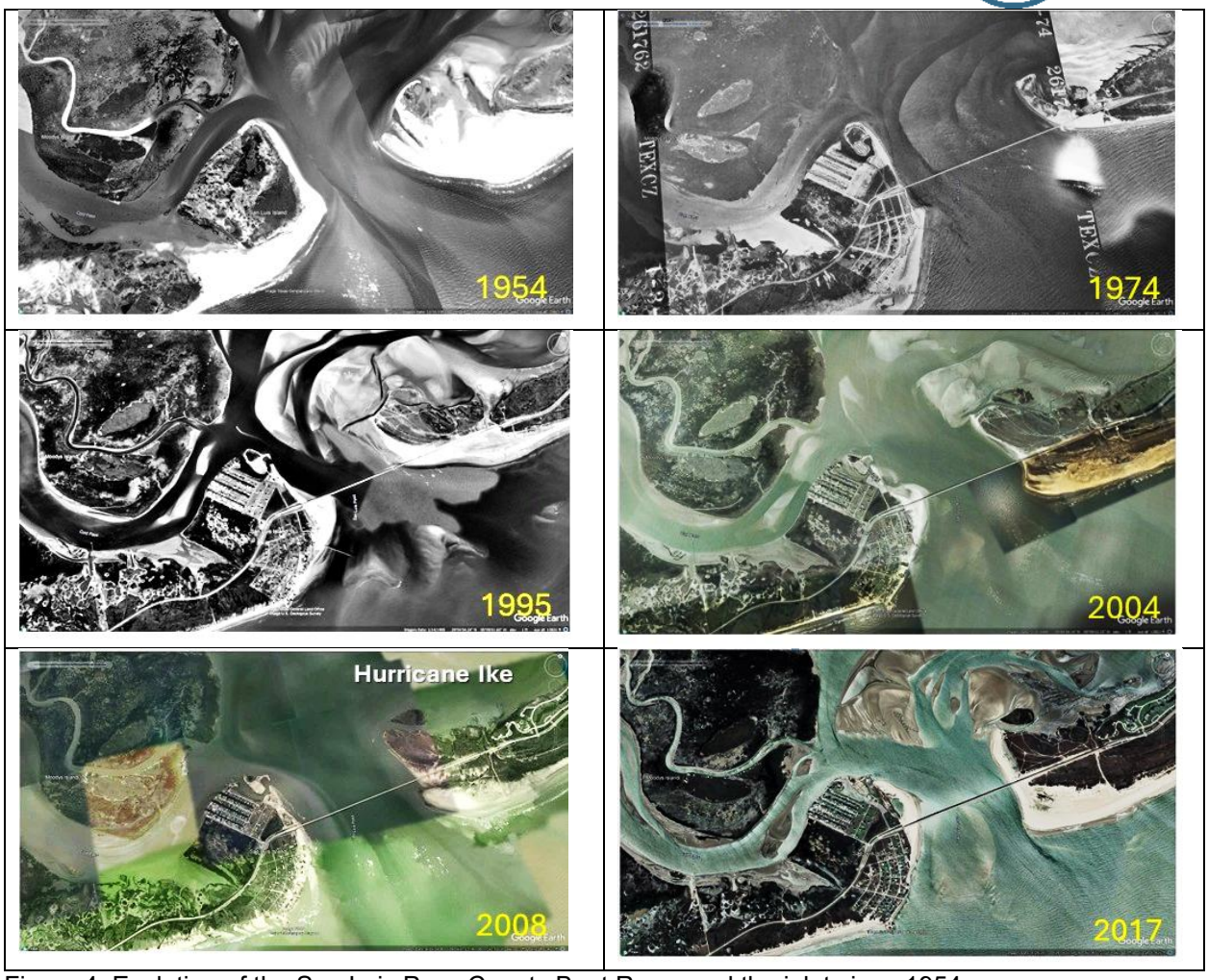

Figure 4. Evolution of the San Luis Pass County Boat Ramp and the inlet since 1954.

Figure 5. Erosion rates along the former Brazos River Delta Front. Source: (https://coastal.beg.utexas.edu/shorelinechange2024/)

2:20 PM – Attendees reboard the buses for brief drive and transit to Surfside Beach Park (Distance 13 miles | 20 minutes).

2:30 PM – **3:20 PM** – Travel through the former Brazos River Delta front. Attendees will see delta bays and marshes on the right and beaches and dunes on the left, showing the effects of the fast erosion rates on the Gulf. Arrive at Surfside Public Beach. Parking in a sand Lot.

Stop 2. 3:30- 3:50 PM -- Surfside Beach Park. Walk on the beach and next to the dunes to see the fast erosion rates on the former shorelines of the Brazos River Delta(Distance 1 minute walk).

The CEPRA Program was enacted by the Texas Legislature in 1999 to plan, educate, and remediate coastal erosion on the Gulf-facing and bay shorelines of the state of Texas. Through coordination with state, federal, and local coastal communities the program has implemented various types of coastal erosion response and restoration projects including beach nourishment, shoreline protection, habitat restoration, and structure removal. The impacts of shoreline erosion are very evident at this stop. The GLO has executed various shoreline protection measures, beach nourishments, and structure removal projects. The GLO's Beach Dune Program helps coastal counties and designated municipalities to define their Coastal Erosion Response Plan and building setback lines while adhering to the Open Beaches Act (OBA) and Dune Protection Act (DPA).

The Brazoria County-Surfside Beach Park and Beach Drive St. show the impacts of shoreline erosion on the front of the former Brazos River. Erosion rates are about 3.5 ft/year (BEG, 2024). Beach is narrow and dunes are thin. No sediment supply exists naturally in this area. Figure 6 shows the evolution of the shorelines since 1974. To the south the strong erosion and the rock revetment protection can be seen along the shorelines. This GLO will describe the different programs that work with Surfside and private property owners regarding the severe erosion issue.

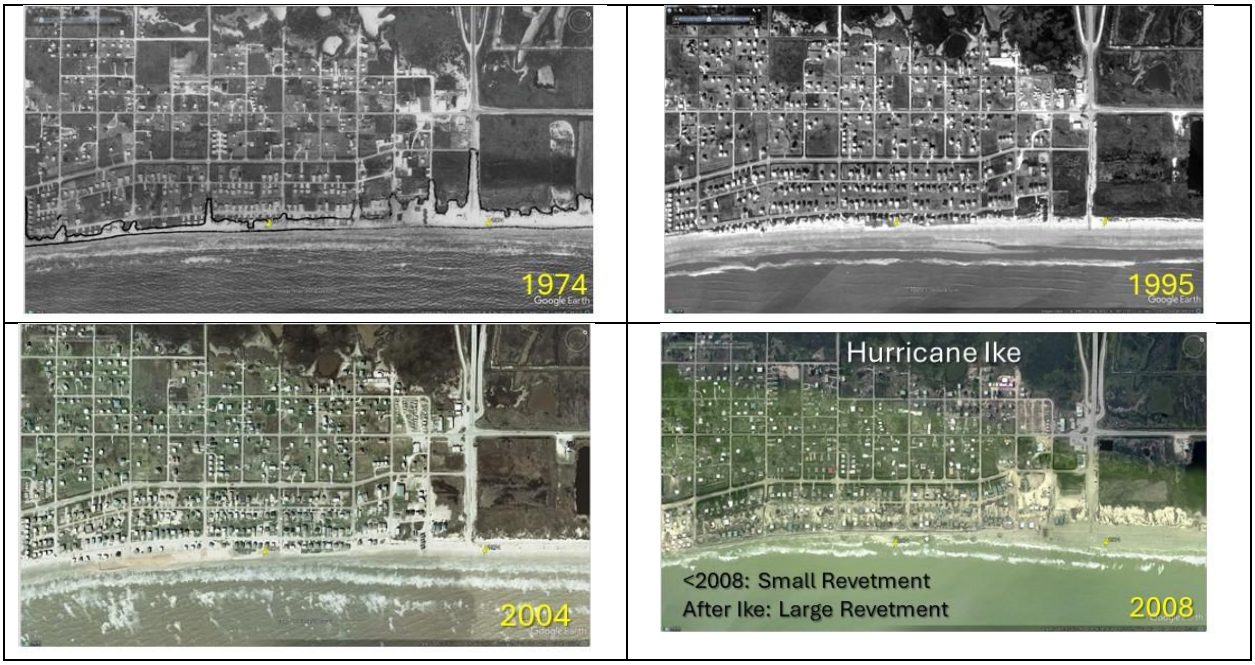

Figure 6. Historical evolution of the Gulf shorelines at the Village of Surfside Beach, Texas at the front of the former Brazos River Delta.

4:00 PM – 4**:10 PM** – Travel to the Surfside Shoreline Protection-Rock Revetment. (Distance 5 minutes).

4:15 — 4:35 PM -- **Surfside Beach revetment.** Visit one of the beach erosion hot spots on the Texas coast affecting the local community. GLO staff will explain the interaction of city development, tropical storms, and erosion response projects related to the protection and restoration of the Village of Surfside Beach (Figure 7, Distance 1 minute walk). Sediment resource studies, which are integral to the implementation of erosion response projects will also be discussed (Figure 8).


Figure 7. Beach Drive. Post Hurricane Rita 2005.

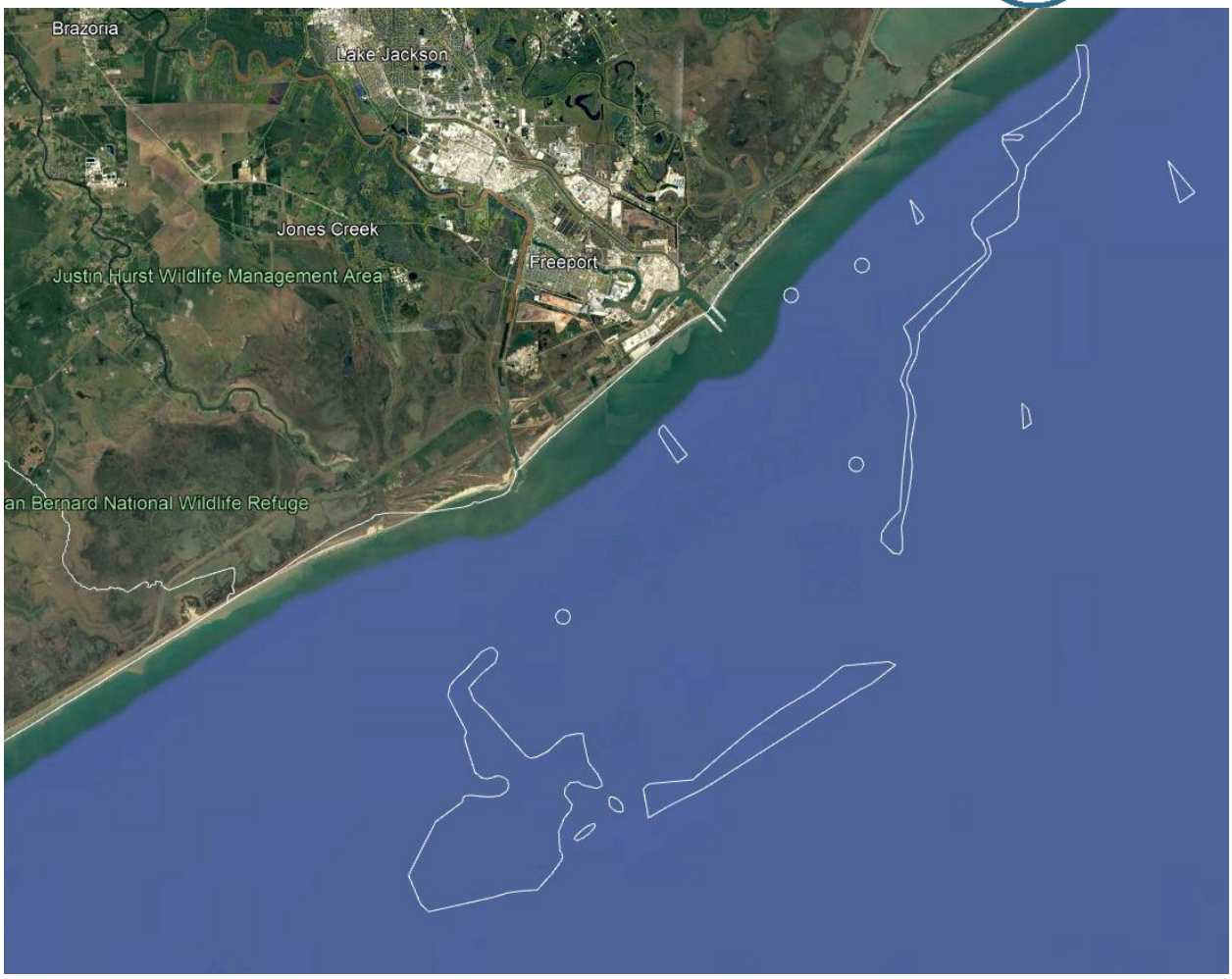

Figure 8. Google Earth imagery of offshore Surfside, Quintana/Bryan Beach, and Sargent Beach. White polygons delineate potential sediment resources that have been surveyed and cored to groundtruth geological features.

4:40 PM – Attendees reboard the buses for brief drive and transit to the Freeport Channel Jetty Park (Distance 5 minutes).

Figure 9. History of the Brazos River diversion in 1931 for the development of the Port Freeport. The image shows the delta processes connected to the El Niño rain cycles in Texas.

Stop 3. 4:50 – **5:20 PM** – **Freeport Ship Channel.** This stop corresponds to the Freeport Ship Channel and the maritime and petrochemical infrastructure developed on the former Brazos River Delta Channel. The Port was created for the regional economic benefits due to the Brazos River channel diversion, which allowed for the creation of the Freeport Navigation Channel and the Port space. Figures 9 and 10 show the maps of the Freeport Channel, the Brazos River Channel, and the short- and long-term processes connected to the dynamics of the Brazos River and its former and new delta. Port Freeport is one of the most important ports in Texas with the closest access to the Gulf.

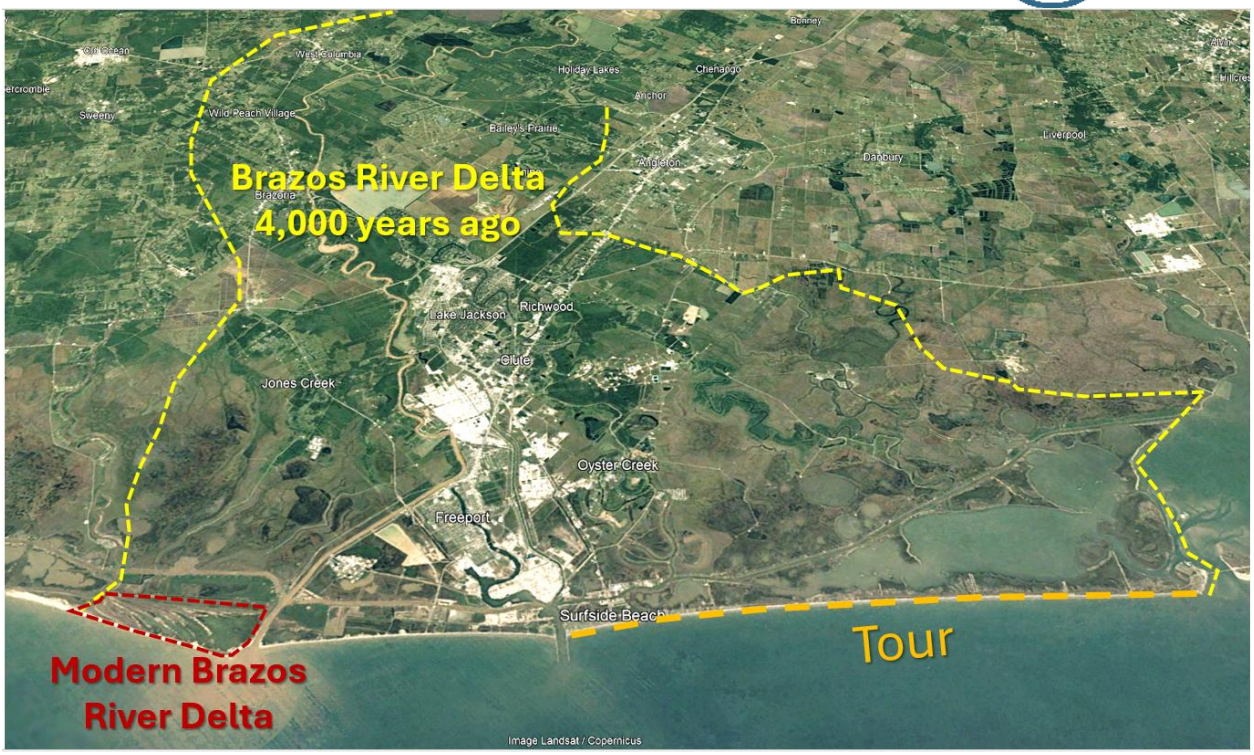

Figure 10. Evolution of the Brazos River delta in the last 6,000 years. The delta started as a fluvial dominated delta 6,000 years ago, and today consists of a tidal dominated delta, which represents only ~5% of the former delta area (Moya, 2018). This is an example of the challenges that the river deltas are facing in the world.

5:30 PM – Attendees reboard the buses to drive Back to Galveston Convention Center.

5:40 PM – 6:30 PM – Return to the Galveston Island Convention Center**,** the bus will cross Galveston Island from West to East, arriving at 5600 Seawall Blvd, Galveston, TX 77551.

Texas General Land Office (GLO) Coastal Programs Links:

GLO "Protecting the Coast" Overview website, this page contains narrative explaining the variety of programs in the Coastal Protection Department:

https://www.glo.texas.gov/coastal/protecting-coast

GLO Coastal Funding Opportunities website that contains details on the specifics of the CMP and CEPRA funding programs:

https://www.glo.texas.gov/coastal/protecting-coast/funding-opportunities

GLO CMP Grant and CEPRA Projects Dashboard that displays all ongoing and completed projects funded by these two funding sources:

https://www.arcgis.com/apps/dashboards/0f3bfefaf47b4cdeb7c4844ae37a2a18#search

GLO Coastal Planning Page that contains all information related to the state-led Texas Coastal Resiliency Master Plan and the federally partnered Coastal Texas Project and Sabine to Galveston Project:

https://www.glo.texas.gov/coastal/protecting-coast/coastal-planning

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