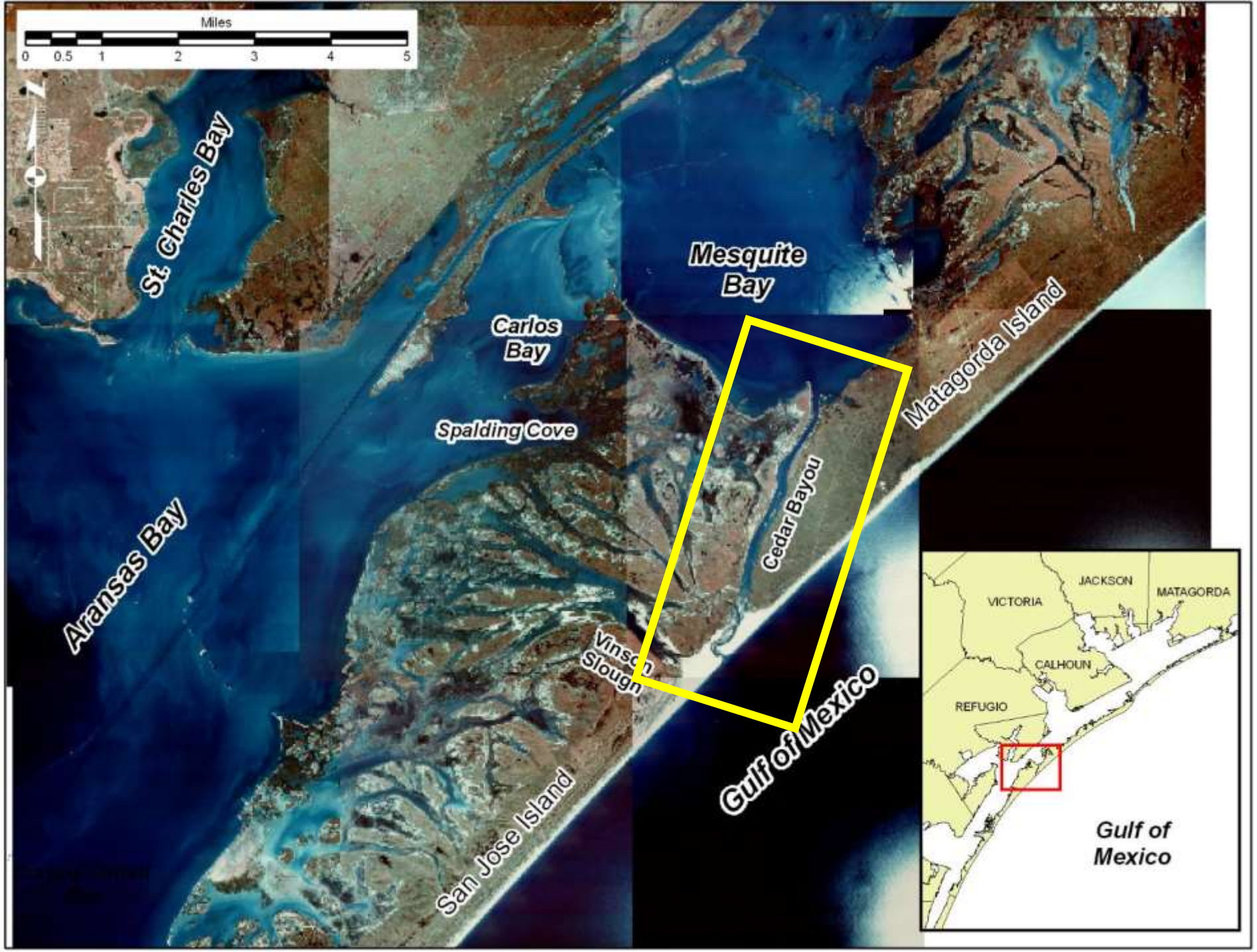
The Restoration of the Cedar Bayou and Vinson Slough Inlet

Thomas Everett, PE


Miles
0 0.5 1 2 3 4 5
St. Charles Bay
Mesquite Bay
Carlos Bay
Matagorda Island
Spalding Cove
Cedar Bayou
Aransas Bay
Vinson Slough
Gulf of Mexico
San Jose Island
VICTORIA
JACKSON
MATAGORDA
CALHOUN
REFUGIO
Gulf of Mexico

Importance

Red Drum

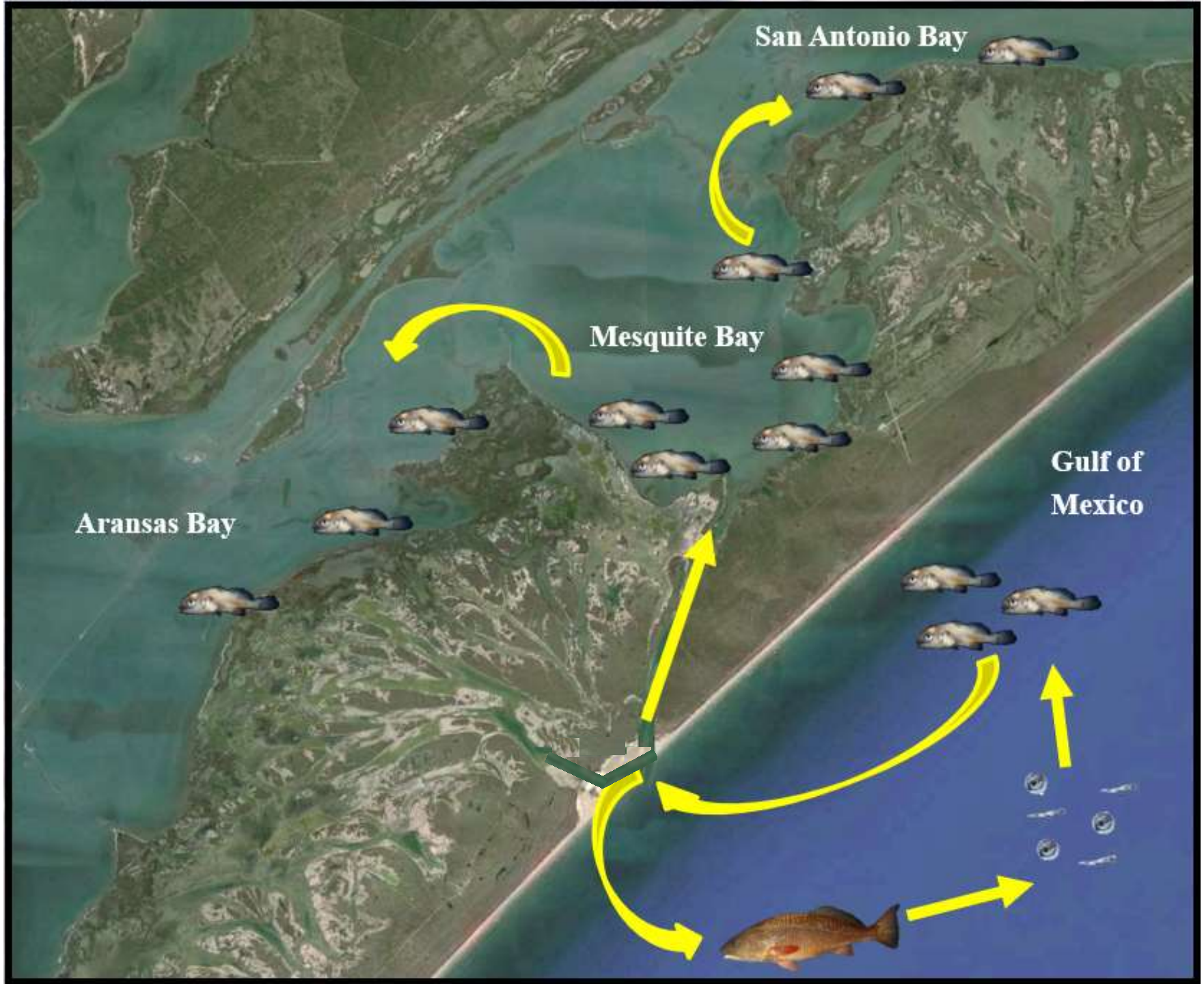
- Ecology
- TX Economics
  - 15,000+ jobs
  - $952 million/yr
    (NMFS, 2011)

Blue Crab

- Primary food source of Whooping Cranes
- Commercial & recreational fishery
- Numbers declining

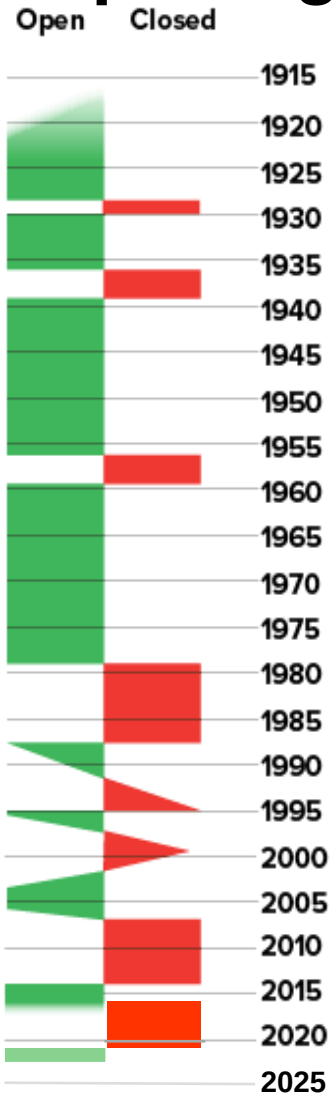
Whooping Crane

- Critically endangered
- Eat Blue Crabs
- Large eco-tourist industry


San Antonio Bay
Mesquite Bay
Aransas Bay
Gulf of
Mexico

Oil from Ixtoc I Oil spill → Matagorda Island in 1979.

Morphology



Cedar Bayou State

- Open
- Closed

1929: Unnamed Hurricane

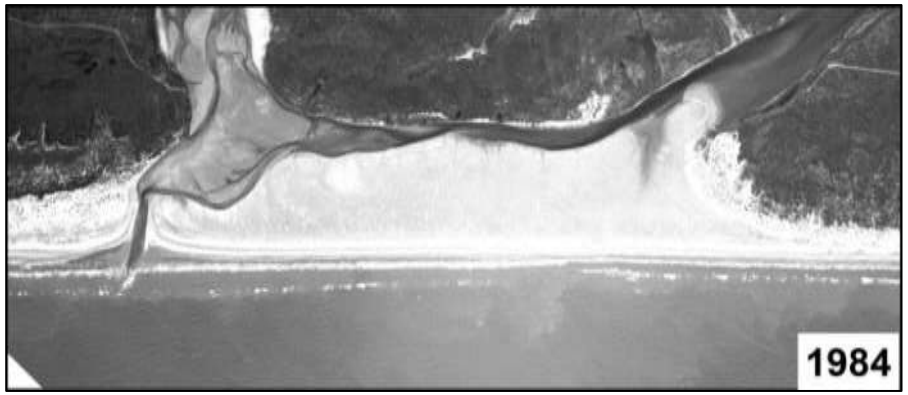
1936: Unnamed Hurricane
1939: Cedar Bayou Dredging

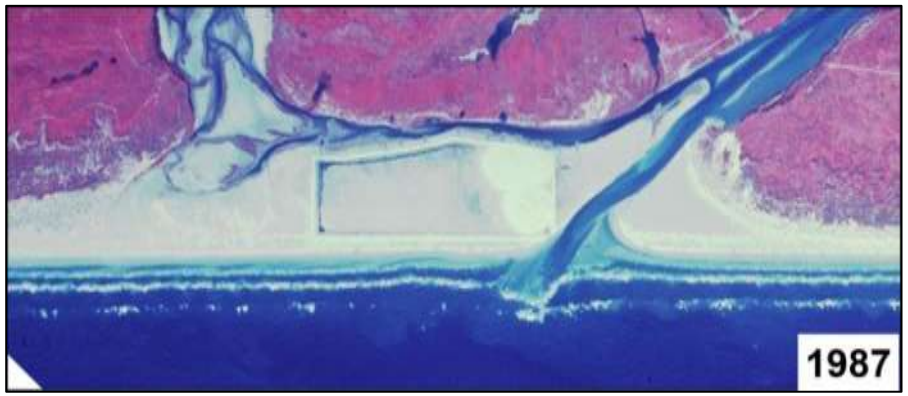
1959: Cedar Bayou Dredging
1961: Hurricane Carla

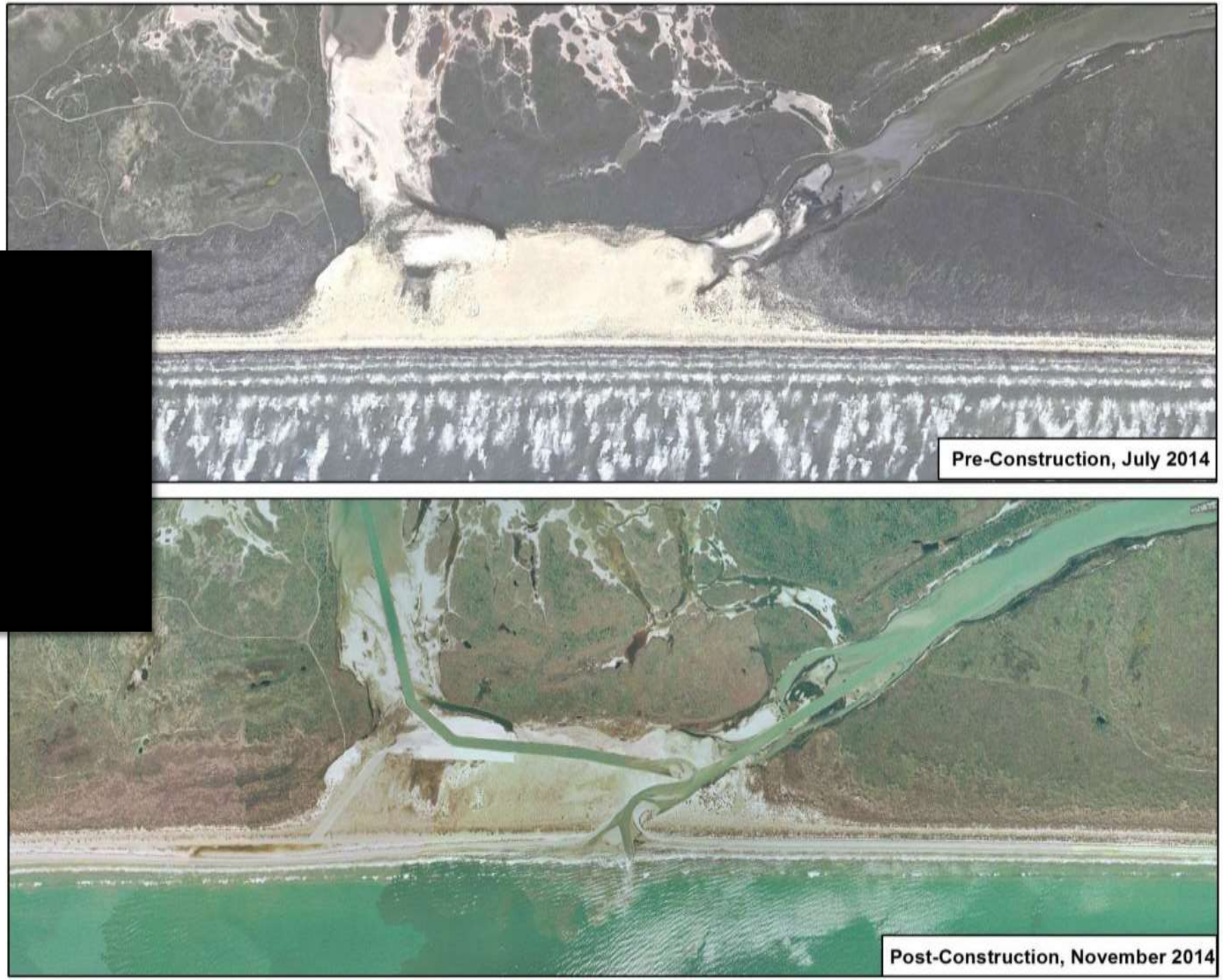
1970: Hurricane Celia
1971: Tropical Storm Fran
1979: Emergency Closure due to Ixtoc I Oil Spill
1987: Cedar Bayou Dredging

1995: Cedar Bayou Dredging

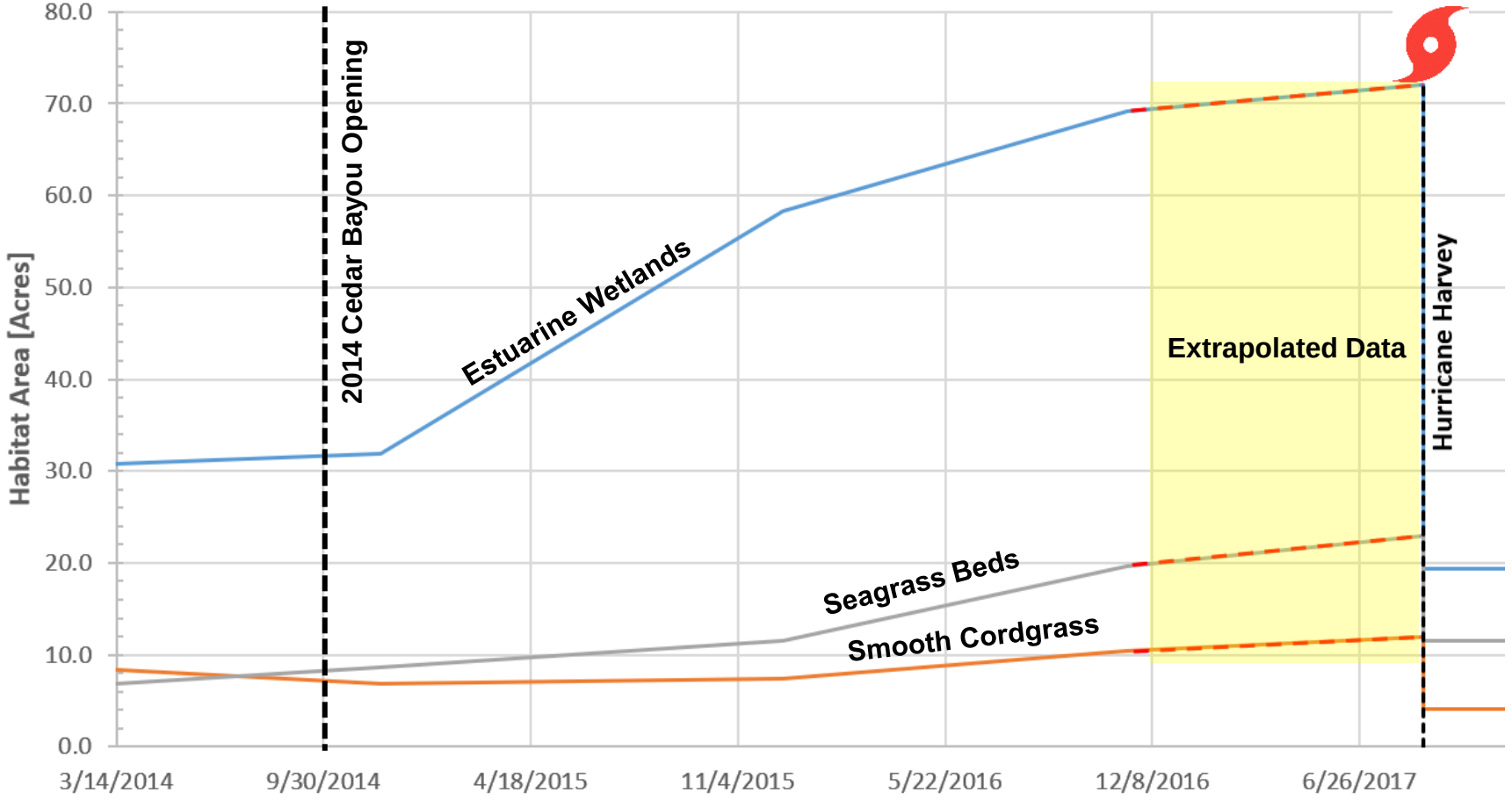
2003: Hurricane Claudette
2007: Tropical Depression Erin
2014: Cedar Bayou/Vinson Slough Restoration Project
2017: Hurricane Harvey
2021: Cedar Bayou/Vinson Slough Restoration Project

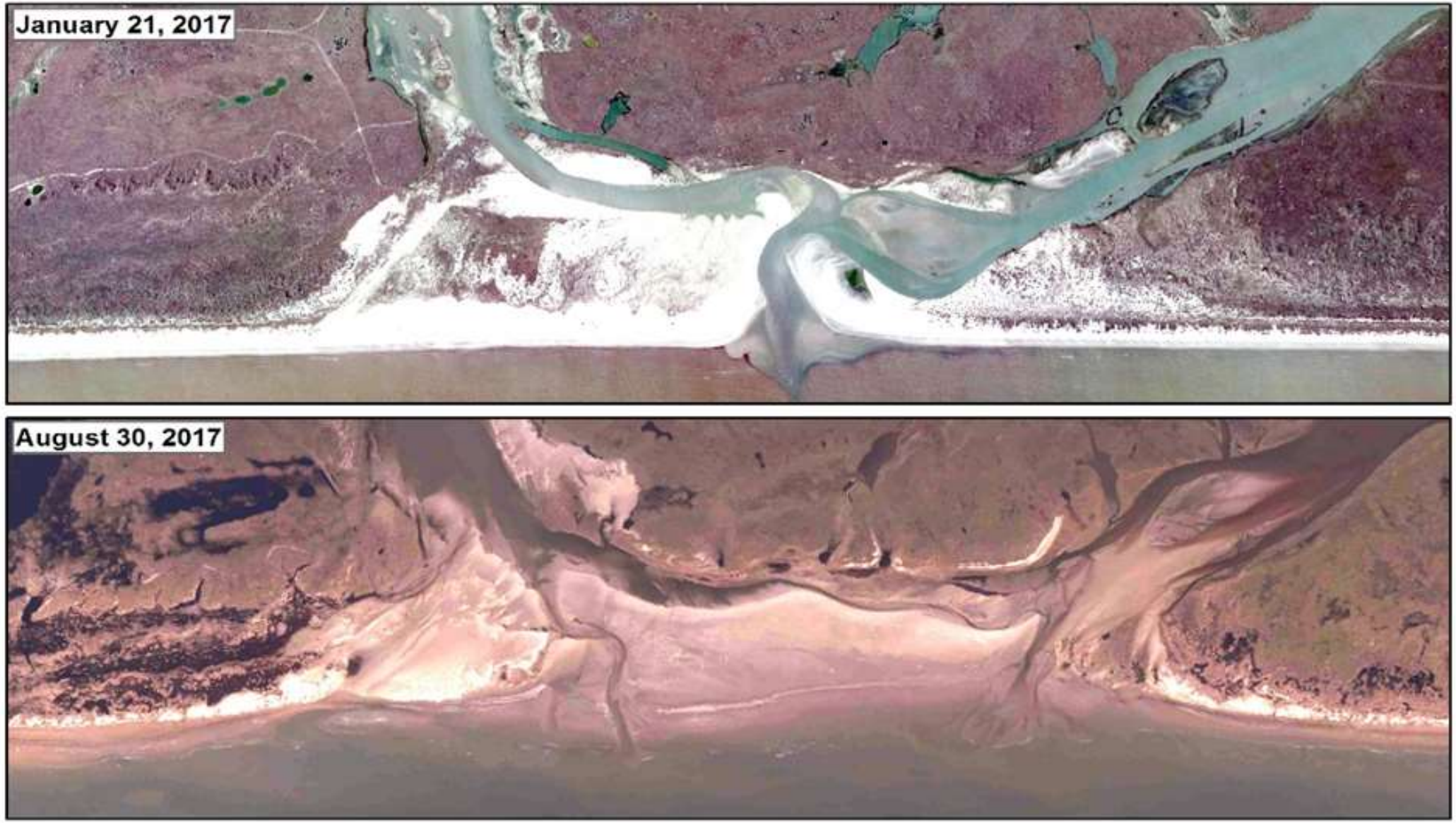




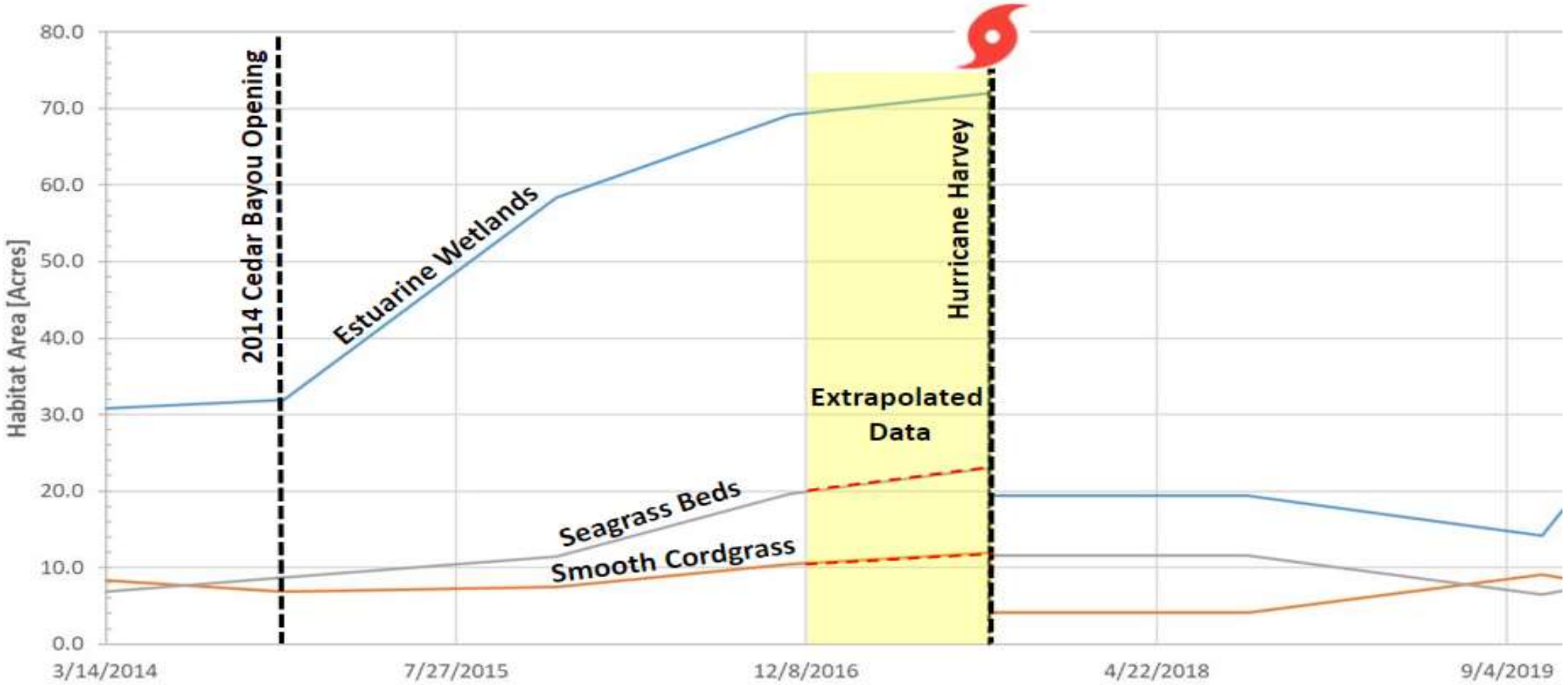

Pre-Construction, July 2014
Post-Construction, November 2014

Hurricane Harvey impacts on Habitat



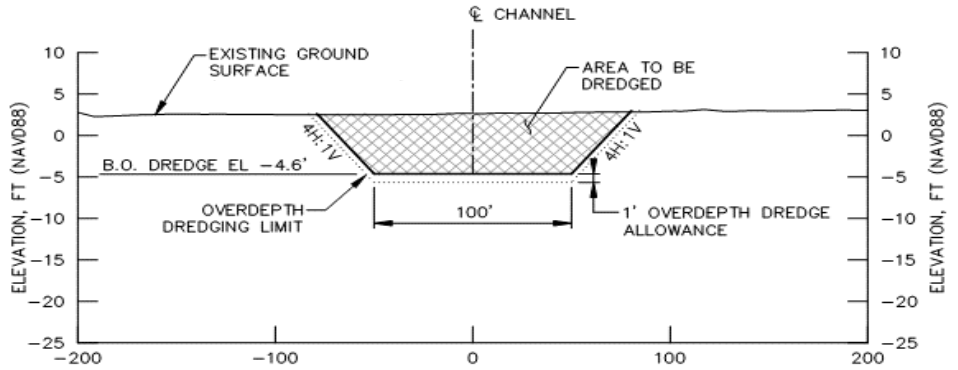

January 21, 2017
August 30, 2017

Habitat Timeline 2014 - 2022



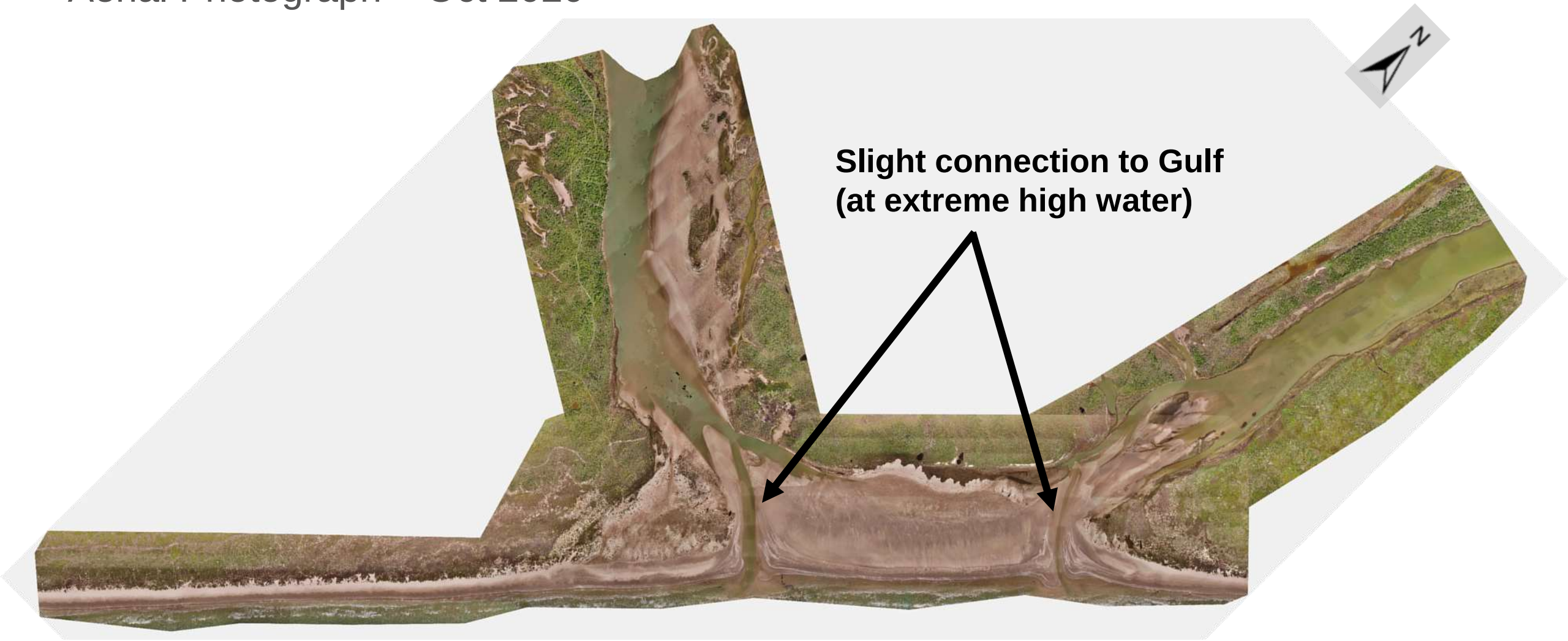
Adaptive Management Approach

- Cross section matches the previous design.
- Template adjusted to minimize dredge volume and avoid sensitive habitats.
- Will achieve a more natural channel, matching historical channel alignments.
- Maximize flow through Cedar Bayou and Vinson Slough.
- Maintenance Permit to allow for adjustment of the template within the Cedar Bayou Migration Zone.



Data Collection

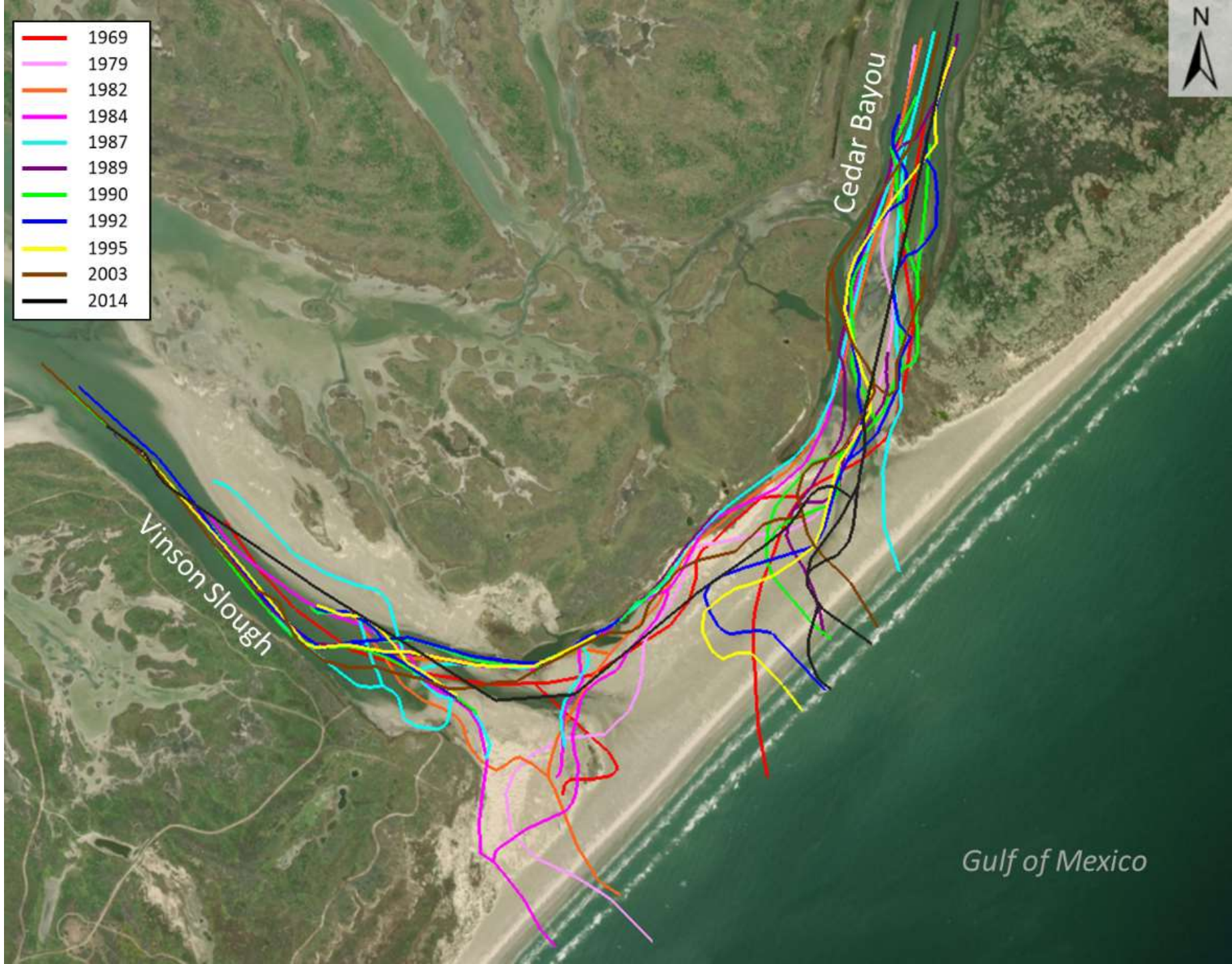
Aerial Photograph – Oct 2020



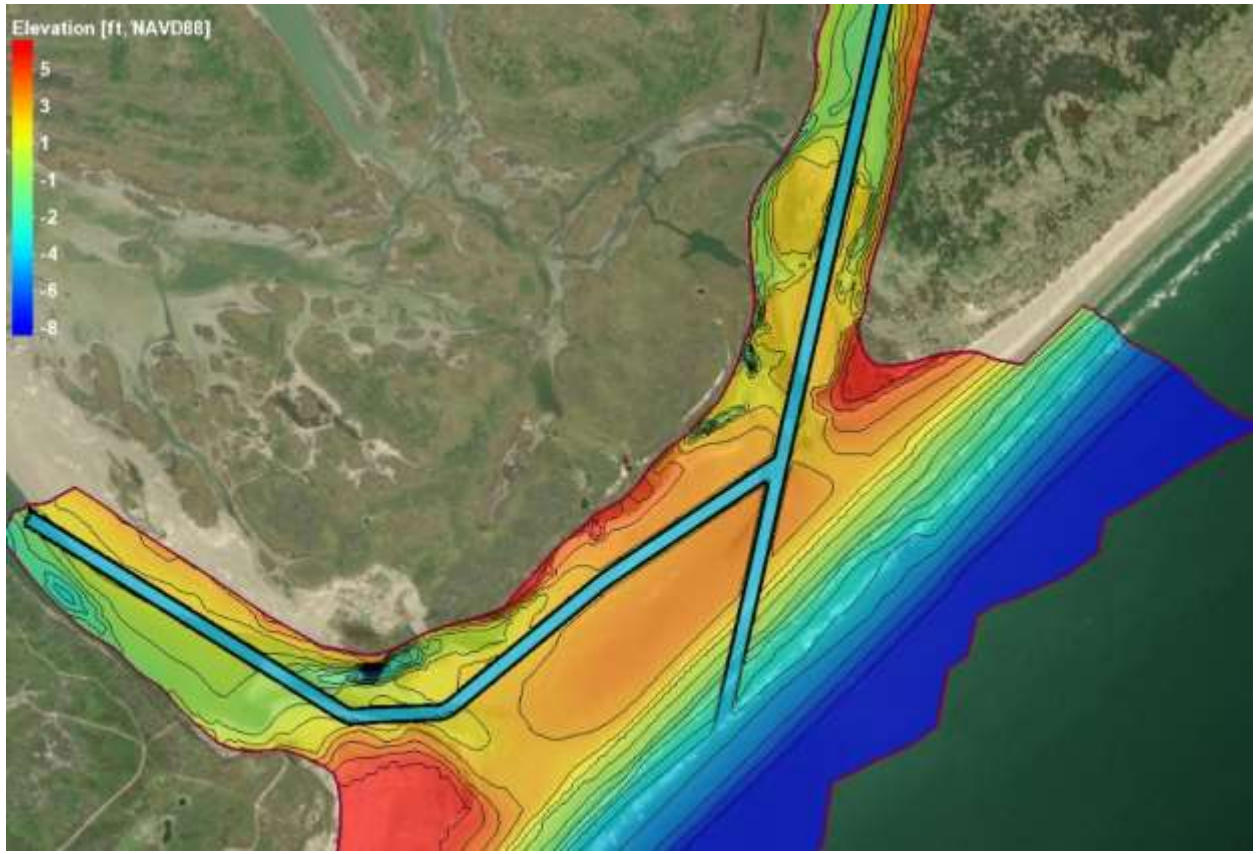
Data Collection

Historical Thalwegs

- Channel thalwegs dating back to 1969
- Natural flow paths and trends are used to help guide the design



Previous and Proposed Template



PREVIOUS
2014

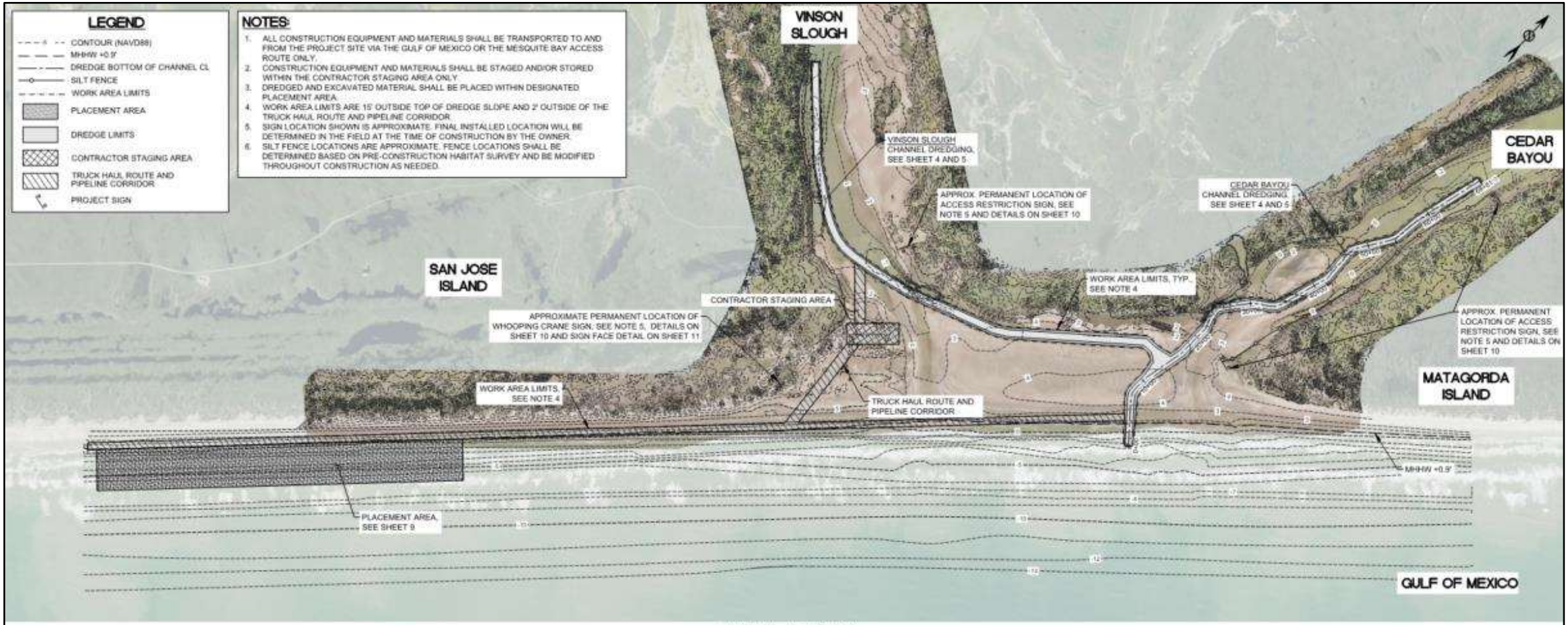
PROPOSED
2021

LEGEND

- CONTOUR (NAVD88)
- MHHW +0.9'
- DREDGE BOTTOM OF CHANNEL CL
- SILT FENCE
- WORK AREA LIMITS
- PLACEMENT AREA
- DREDGE LIMITS
- CONTRACTOR STAGING AREA
- TRUCK HAUL ROUTE AND PIPELINE CORRIDOR
- PROJECT SIGN

NOTES:

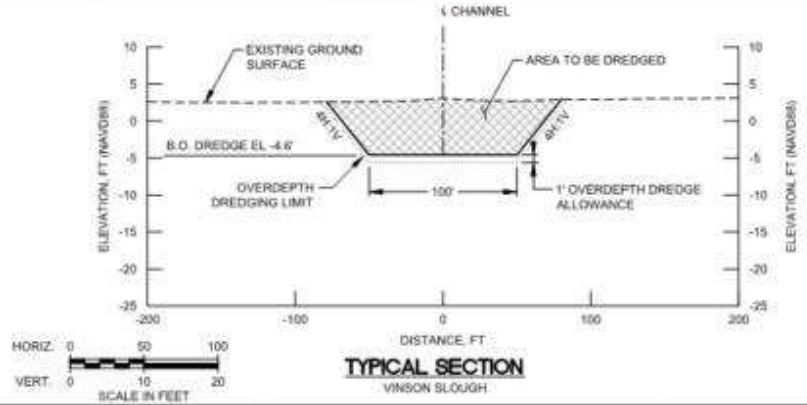
1. ALL CONSTRUCTION EQUIPMENT AND MATERIALS SHALL BE TRANSPORTED TO AND FROM THE PROJECT SITE VIA THE GULF OF MEXICO OR THE MESQUITE BAY ACCESS ROUTE ONLY.
2. CONSTRUCTION EQUIPMENT AND MATERIALS SHALL BE STAGED AND/OR STORED WITHIN THE CONTRACTOR STAGING AREA ONLY.
3. DREDGED AND EXCAVATED MATERIAL SHALL BE PLACED WITHIN DESIGNATED PLACEMENT AREA.
4. WORK AREA LIMITS ARE 15' OUTSIDE TOP OF DREDGE SLOPE AND 2' OUTSIDE OF THE TRUCK HAUL ROUTE AND PIPELINE CORRIDOR.
5. SIGN LOCATION SHOWN IS APPROXIMATE. FINAL INSTALLED LOCATION WILL BE DETERMINED IN THE FIELD AT THE TIME OF CONSTRUCTION BY THE OWNER.
6. SILT FENCE LOCATIONS ARE APPROXIMATE. FENCE LOCATIONS SHALL BE DETERMINED BASED ON PRE-CONSTRUCTION HABITAT SURVEY AND BE MODIFIED THROUGHOUT CONSTRUCTION AS NEEDED.



OVERALL SITE PLAN

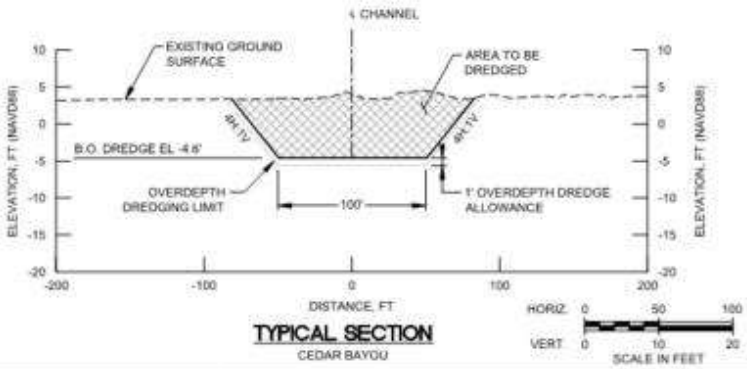
0 700 1400

SCALE IN FEET



TYPICAL SECTION

VINSON SLOUGH



TYPICAL SECTION

CEDAR BAYOU

100% DESIGN

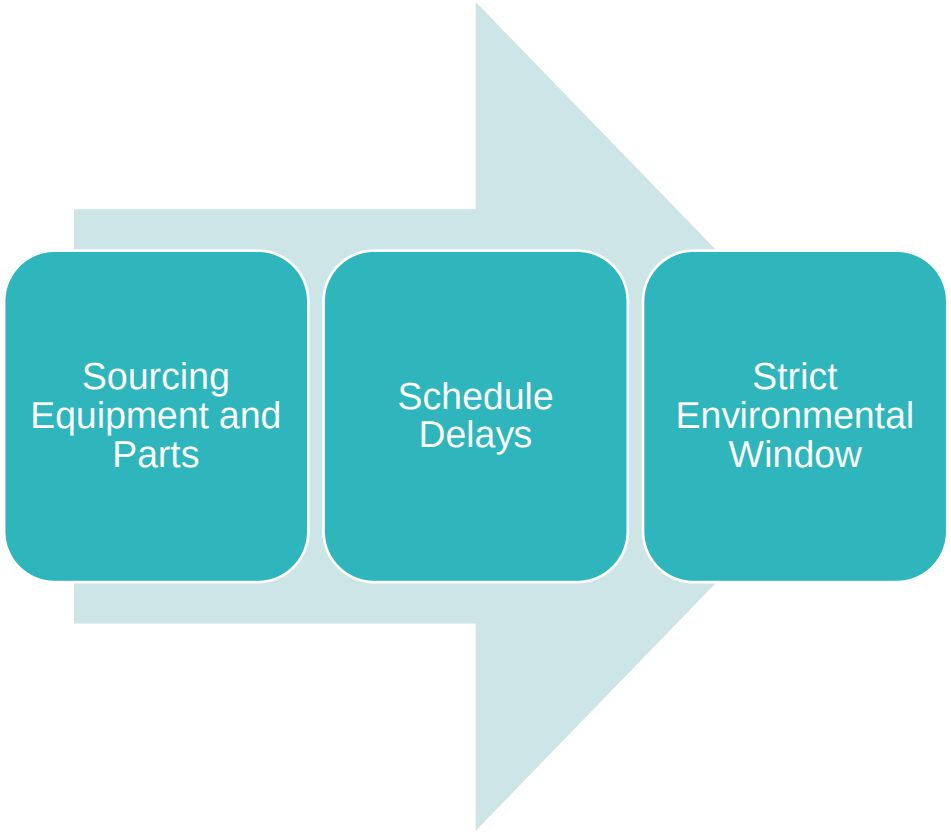
Bidding and Construction

Timeline

Activity	Target Date
100% Design Submittal	11/16/2020
Bid Advertisement	11/28/2020
Bid Opening	12/28/2020
Construction Contract Award	12/29/2020
Pre-Construction Conference	03/04/2021
Notice to Proceed	03/04/2021
Mobilization to Site	04/30/2021
Start of Dredging	06/05/2021
Demobilization	12/01/2021

Supply Chain Issues in the Industry

- Ongoing supply chain issues resulting from COVID-19
- Sourcing equipment and scheduling surveyors/other personnel
- Important to take into consideration when planning construction schedule



Equipment

Mechanical Dredging Operations

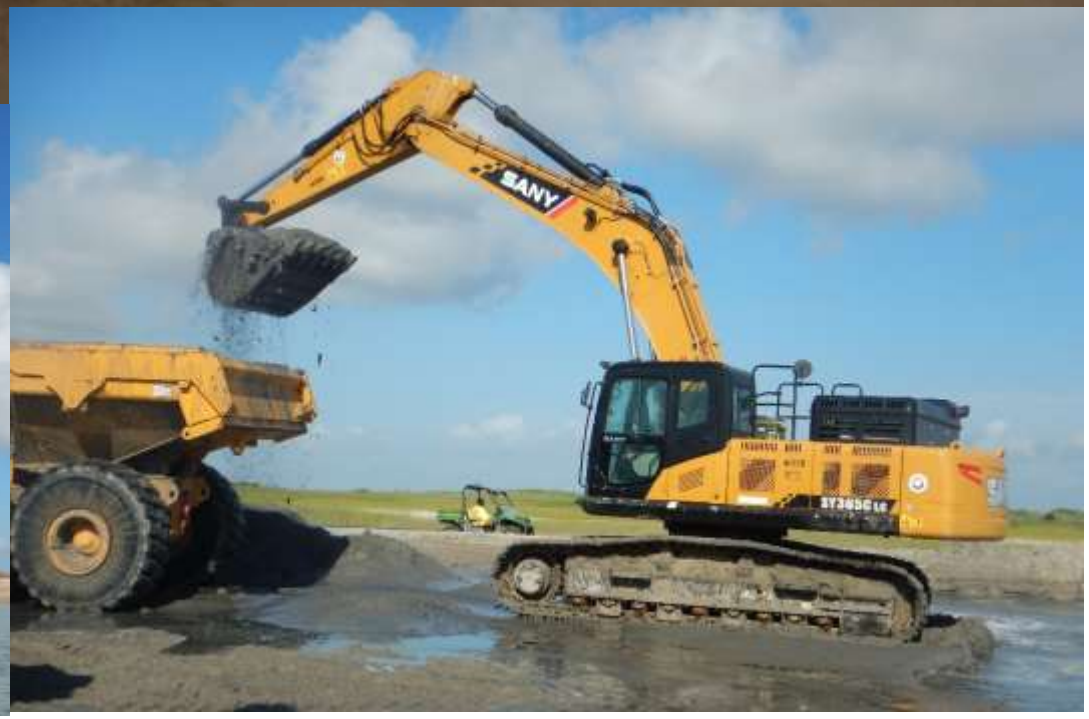
- 2 x Excavators and 8 - 10 x trucks on average

Hydraulic Dredging Operations

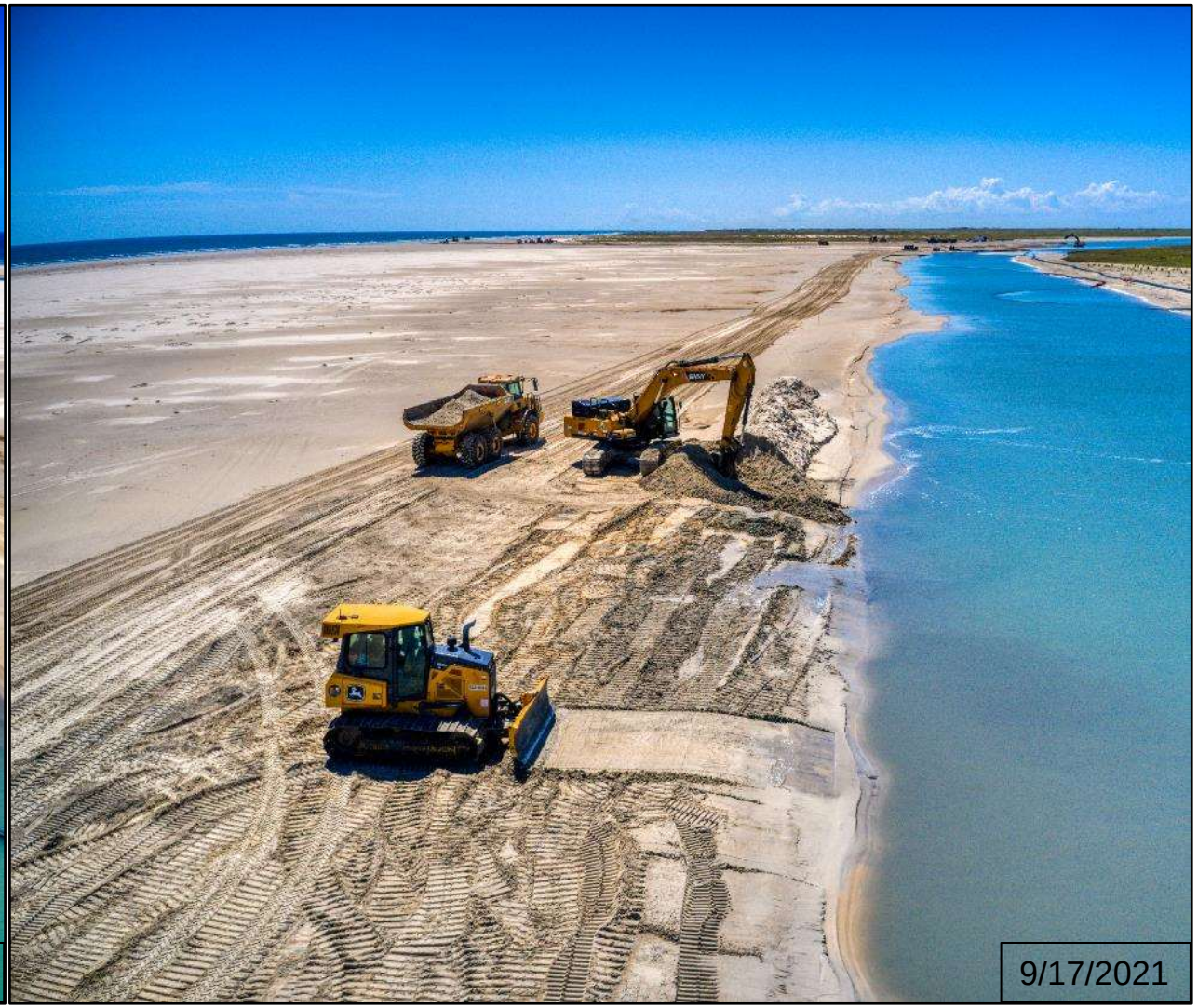
- 2 x hydraulic dredges 14” and 12” cutterhead
- 4 booster pump stations. 2 for each line

Other Equipment

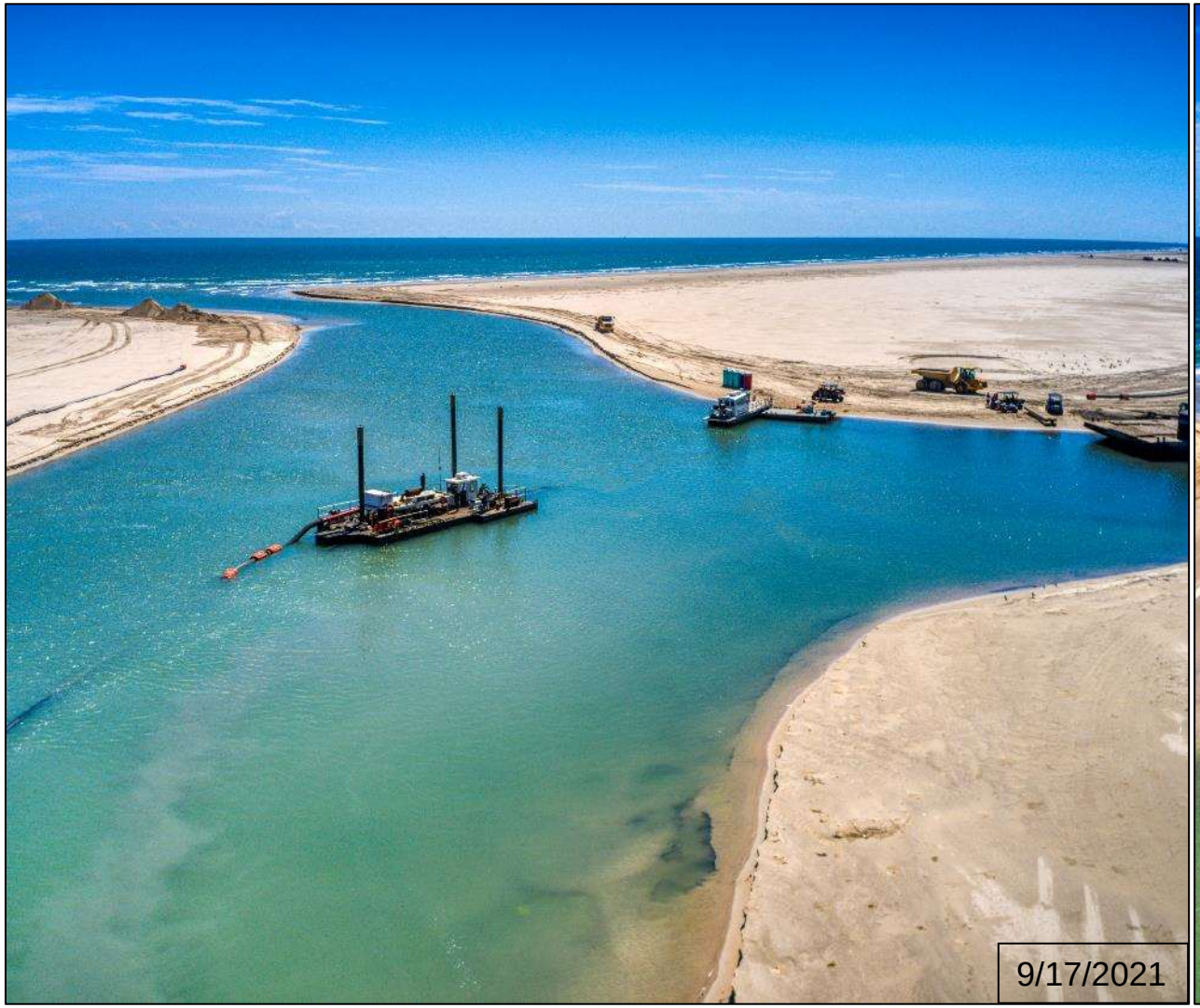
- Marsh buggy, fuel buggies, equipment barges, and bulldozers



Pipeline transporting dredged material from cutter head dredges to disposal area.



Contractor boosting production through mechanical excavation, digging ahead of hydraulic dredges, and transporting material via off-road trucks.



Cutter suction dredge deepening the Cedar Bayou Dredge template.

Inlet opening after hydraulic connection to the Gulf of Mexico prematurely re-established by the passing of Hurricane Nicholas.

Channel Migration Comparison

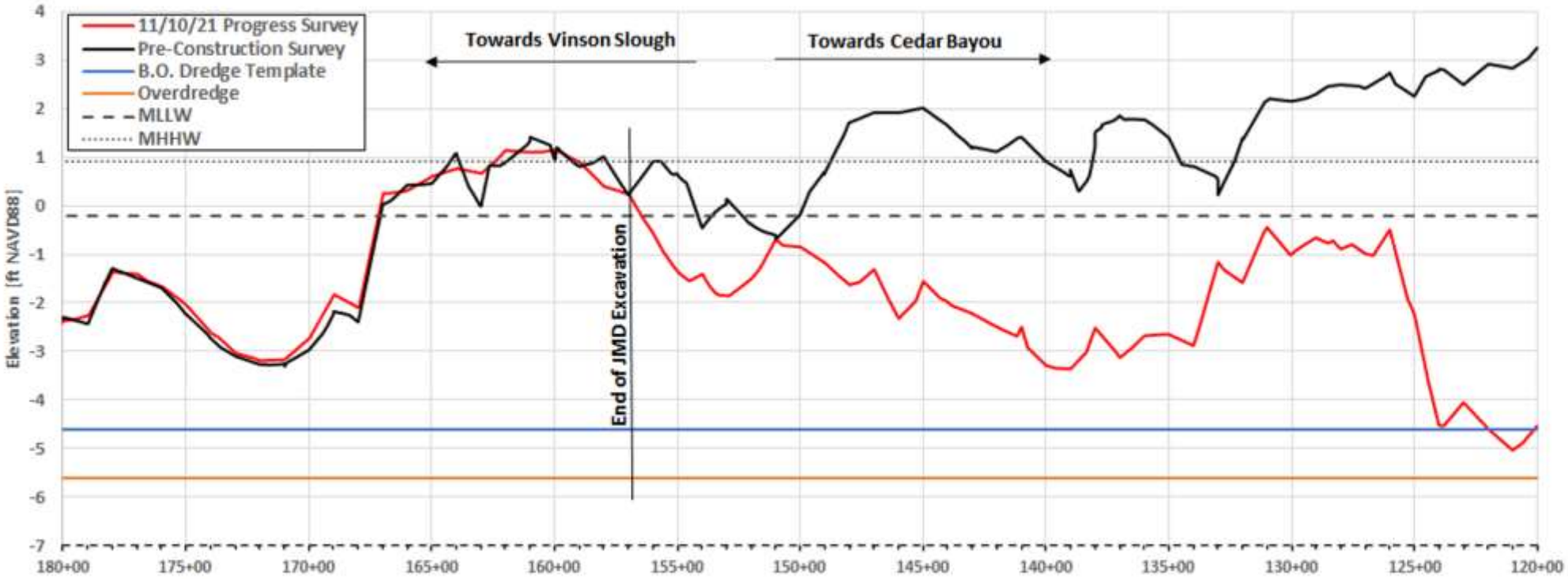
2015 (after opening)

2022 (after opening)

- Historical Migration rate = ~266 ft/yr
- Migration typically stabilizes over time

2021 Construction Summary

1. Cedar Bayou and part of Vinson Slough were dredged. Vinson Slough had a partial hydraulic connection
2. The mouth of Cedar Bayou was open to the Gulf of Mexico
3. Due to construction delays and tight environmental window, the full design template in Vinson Slough was unfinished
4. To ensure the longevity of the system, the decision was made to finish Vinson Slough template in 2022




N
Section of Vinson Slough currently being dredged
Cedar Bayou
Gulf of Mexico
Vinson Slough

2022 Dredge Operations

- Bell 250 pump with Suction Head mounted on a CAT swamp buggy
- 12” pipeline from pump runs to placement area
- Equipment setup rated for ~2000 yd/day

Summary

- Adaptive management approach has worked well for Cedar Bayou. We have observed a stable channel after opening which contributes to the longevity of the project.
- Challenges from COVID-19 caused contractor to not finish on time in 2021
- However, the delay allows us to continue to make minor improvements to the template alignment
- Once the remaining portion of the Vinson Slough template is dredged, a complete hydraulic connection will be established throughout the system.
- Monitoring will continue 2 years post construction completion (2024)

MOTT MACDONALD

Questions?

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