

Louisiana Shoreline Mapping and Change Assessment, 1880s to 2021: Impacts of Recent Storms and Barrier Island Restoration



Mark Byrnes

Jennifer Berlinghoff

Ben Beasley

Caroline Narron



Glen Curole

Louisiana Barrier Island Comprehensive Monitoring Program (BICM): Phase 2

FINAL REPORT

Louisiana Barrier Island Comprehensive Monitoring Program (BICM):
Phase 2 – Updated Shoreline Compilation and Change Assessment,
1880s to 2015

Prepared for:

Louisiana Coastal Protection and Restoration Authority



Prepared by:

Applied Coastal Research and Engineering
In Cooperation with CDM Smith

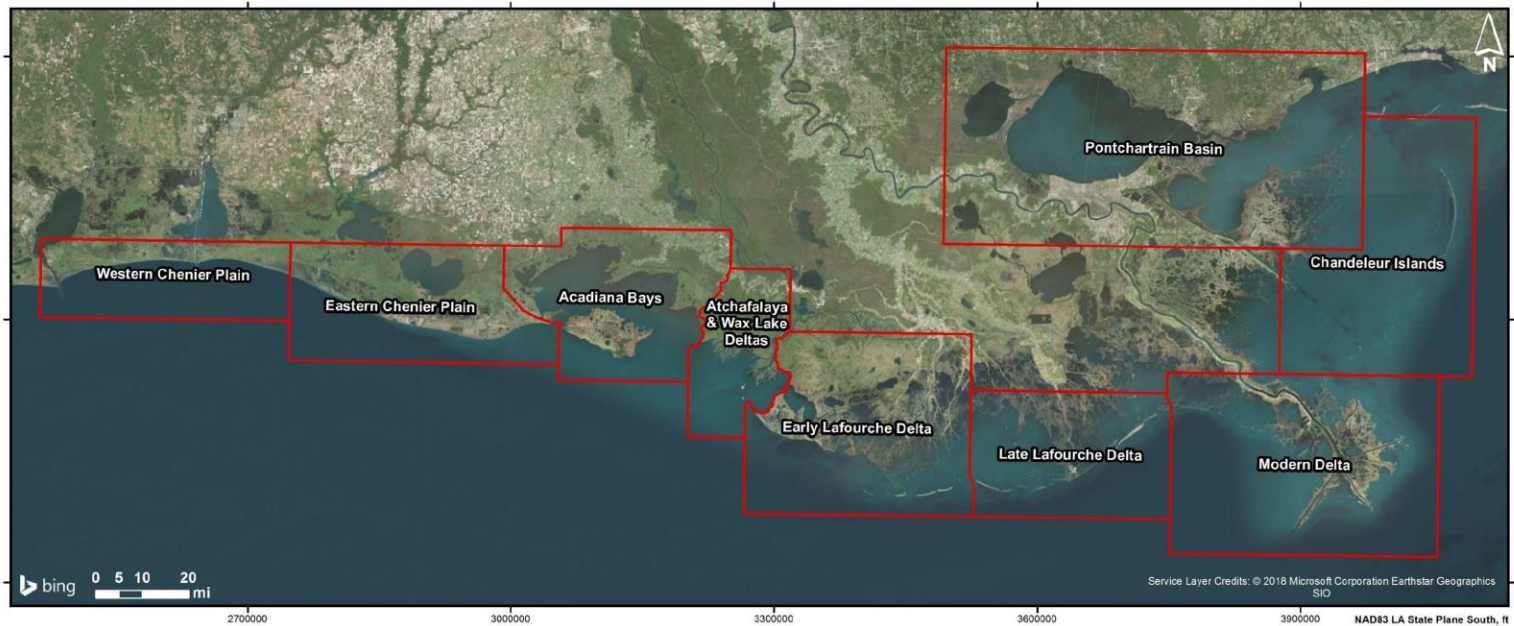


August 2018

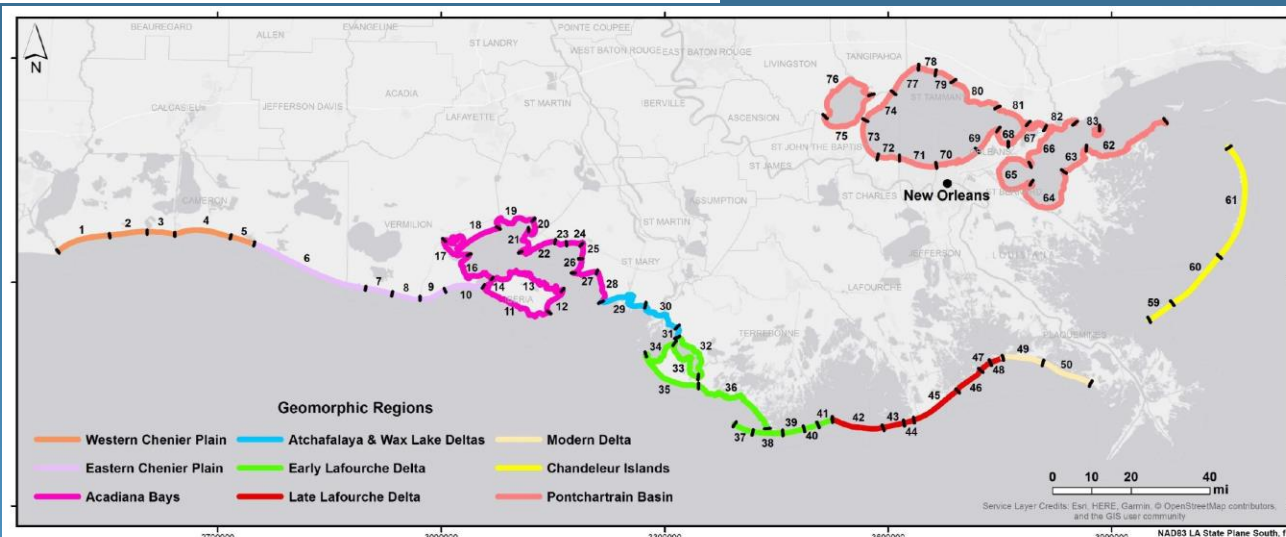
- Revised/updated Martinez et al. (2009)
- Compiled shorelines for entire coast of Louisiana for multiple time periods
 - ✓ 1850s/1880s, 1930s 1950s 1998, 2004, 2005, 2008, 2012, 2015
- Shoreline change rates for multiple epochs

Byrnes, M.R., J.L. Berlinghoff, S.F. Griffee, and D.M. Lee, 2018. *Louisiana Barrier Island Comprehensive Monitoring Program (BICM): Phase 2 – Updated Shoreline Compilation and Change Assessment, 1880s to 2015*. Prepared for Louisiana Coastal Protection and Restoration Authority (CPRA) by Applied Coastal Research and Engineering, Mashpee, MA and Metairie, LA, 46 p. plus appendices.

9 BICM Geomorphic Regions



74 Shoreline Analysis Reaches



No.	Reach Name	No.	Reach Name	No.	Reach Name	No.	Reach Name	No.	Reach Name	No.	Reach Name	No.	Reach Name
1	Johnson's Bayou	12	Marsh Island - South Point	24	The Jaws - West	35	Point Au Fer Island	46	Grand Isle	65	Bayou Bienvenue	76	Maurepas Northwest
2	Ocean View Beach	13	Marsh Island Bayside	25	The Jaws - East	36	Oyster Bayou to Caillou Boca	47	West Grand Terre	66	New Orleans Landbridge	77	Tangipahoa River
3	Holly Beach	14	SW Pass - Marsh Island	26	Point Marone	37	Raccoon Island	48	East Grand Terre	67	Lake Catherine	78	Madisonville
4	Hackberry Beach	15	Hell Hole Bayou	27	Point No Point	38	Whiskey Island	49	Chaland Headland	68	South Point	79	Mandeville
5	Mentemau River	16	Redfish Point	28	Bayou Sale	39	Trinity Island	50	Shell Island	69	Little Woods	80	Big Branch Marshes
6	Rockefeller Refuge	17	Vermilion Beach	29	Wax Lake Delta	40	East Island	51	Breton Island	70	New Orleans Lakefront	81	Slidell
7	Mulberry Island	18	Avery Island	30	Atchafalaya Delta	41	Wine Island	52	Grand Gosier and Curlew Islands	71	Jefferson Lakefront	82	Pearl River
8	Freshwater Bayou	19	Weeks Island	31	Plumb Bayou	42	Timbalier Island	53	North Chandeleur Islands	72	LaBranche Marshes	83	Grand Island Pass
9	Chenier Au Tigre	20	Cypremort Point - West	32	Four League Bay - East	43	East Timbalier Island	54	Isle Aux Pitre	73	Frenier Swamp		
10	Rainey Refuge	21	Cypremort Point - East	33	Four League Bay - West	44	West Belle Pass	55	Biloxi Marsh	74	Manchac Swamp		
11	Marsh Island	22	Cote Blanche Island	34	North Point	45	Caminada Headland	56	Shell Beach	75	Maurepas Southeast		

Project Report/Data Availability

<https://cims.coastal.louisiana.gov/>

The screenshot shows the CPRA website home page. The header includes the CPRA logo and navigation links: Home, Data, Library, Viewer, Outreach (highlighted with a red box), Protection, and Help. A [Log In] link is also present. The main banner features a large aerial image of a coastal wetland with the text "Adaptive Management Programs". Below this, a "Welcome to the Louisiana Coastal Protection and Restoration Authority's Coastal Information Management System (CIMS)" section provides a brief description of the system. At the bottom, three circular icons represent "Map Viewer", "Data Download", and "Document Library".

The screenshot shows the BICM program page. The header is identical to the home page. The main content area is titled "Barrier Island Comprehensive Monitoring (BICM)" and features a "Program Summary" dropdown menu (highlighted with a red box). Below this are tabs for "Overview", "Schedule/Status", and "Contacts". The "Overview" tab is active, displaying a map of the BICM region with labels for various coastal features: West Chenier, East Chenier, Atchafalaya & Wax Lake Deltas, Early Lafourche Delta, Late Lafourche Delta, Modern Delta, Pontchartrain Basin, and Chandeleur Islands. A legend indicates the "BICM region extent" and "Coastal zone". Below the map, two boxes describe data collection efforts: "Shoreline Assessment, Shoreline Position, Bathymetric Surveys, Topographic Surveys, Habitat Mapping, & Sediment Characterization" and "Shoreline Assessment". A large blue arrow points down from the "Shoreline Position" text. The right sidebar contains "Project Information" including Project Type (Other), Project ID (LA-0226), Basin (Coastwide), CPRA Program (State of Louisiana Wetland Conservation and Restoration Program Act (STATE)), CPRA Project Phase (Program), Parish (Coastwide), and Estimated Cost (TBD).

Outreach ➡ Adaptive Management ➡ BICM

Shoreline Position



Direct Access

<https://cims.coastal.louisiana.gov/outreach/Projects/Bicm>



Coastal Protection and Restoration Authority

Barrier Island Comprehensive Monitoring (BICM)

Shoreline Position

Overview

Reports

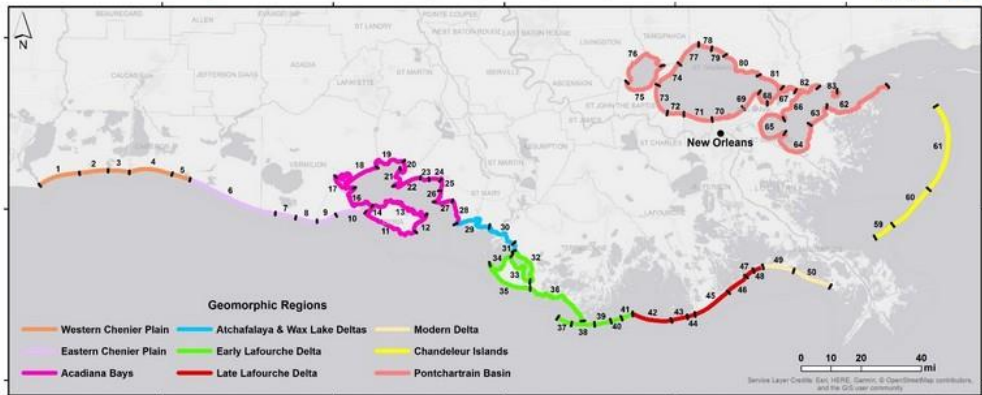
Infographics

Data

Overview

Louisiana Geomorphic Regions and Reaches

Barrier Island Comprehensive Monitoring Program (BICM) - Phase 2



No.	Reach Name	No.	Reach Name	No.	Reach Name	No.	Reach Name	No.	Reach Name	No.	Reach Name	No.	Reach Name
1	Johnson's Bayou	12	Marsh Island - South Point	24	The Jaws - West	35	Point Au Fer Island	46	Grand Isle	65	Bayou Bienvenue	76	Maurepas Northwest
2	Ocean View Beach	13	Marsh Island Bayside	25	The Jaws - East	36	Oyster Bayou to Calilou Boca	47	West Grand Terre	66	New Orleans Landbridge	77	Tangipahoa River
3	Holly Beach	14	SW Pass - Marsh Island	26	Point Marone	37	Raccoon Island	48	East Grand Terre	67	Lake Catherine	78	Madisonville
4	Hackberry Beach	15	Hell Hole Bayou	27	Point No Point	38	Whiskey Island	49	Chalard Headland	68	South Point	79	Mandeville
5	Memmentau River	16	Redfish Point	28	Bayou Sale	39	Trinity Island	50	Shell Island	69	Little Woods	80	Big Branch Marshes
6	Rockefeller Refuge	17	Vermilion Beach	29	Wax Lake Delta	40	East Island	59	Breton Island	70	New Orleans Lakefront	81	Slidell
7	Mulberry Island	18	Avery Island	30	Atchafalaya Delta	41	Wine Island	60	Grand Gosier and Curlew Islands	71	Jefferson Lakefront	82	Pearl River
8	Freshwater Bayou	19	Weeks Island	31	Plumb Bayou	42	Timbalier Island	61	North Chandeaur Islands	72	LaBranche Marshes	83	Grand Island Pass
9	Chenier Au Tigre	20	Cypremort Point - West	32	Four League Bay - East	43	East Timbalier Island	62	Isle Aux Pitre	73	Frenier Swamp		
10	Rainey Refuge	21	Cypremort Point - East	33	Four League Bay - West	44	West Belle Pass	63	Biloxi Marsh	74	Manchac Swamp		
11	Marsh Island	22	Cote Blanche Island	34	North Point	45	Caminada Headland	64	Shell Beach	75	Maurepas Southeast		



Project Information

Project Type(s):

Other

Project ID:

LA-0226

Basin(s):

Coastwide

CPRA Program:

**State of Louisiana Wetland
Conservation and Restoration
Program Act (STATE)**

CPRA Project Phase:

Program

Parish(es):

Coastwide

Estimated Cost:

TBD

- ✓ Project report
- ✓ Shoreline change maps
- ✓ Shoreline geodatabase
- ✓ Shoreline change geodatabases
- ✓ Symbology Layer Files
- ✓ Structure geodatabase

View and Download Shorelines

<https://cims.coastal.louisiana.gov/>

The screenshot shows the CPRA website homepage. At the top is the CPRA logo and navigation links: Home, Data, Library, Viewer, Outreach, Protection, Help. A large banner image shows a coastal landscape with the text "Adaptive Management Programs". Below the banner is a "Welcome to the Louisiana Coastal Protection and Restoration Authority's Coastal Information Management System (CIMS)" section. It includes a CIMS logo and a paragraph describing the system. At the bottom are three circular icons: a map of Louisiana (labeled "Map Viewer"), a document with a download arrow (labeled "Data Download"), and a folder icon (labeled "Document Library"). The "Map Viewer" icon is highlighted with a red box.

The screenshot shows the "Welcome to the Louisiana Coastal Protection and Restoration Authority's Spatial Viewer Portal." page. It features a header with the CPRA logo and navigation links. Below the header are three main sections, each with a thumbnail image and a description:

- Main Spatial Viewer:** Full-featured interactive map application to explore coastal protection and restoration projects, monitoring and geophysical (LASARD) data, and pertinent coastal Louisiana reference layers.
- 2023 Master Plan Data Viewer:** An interactive online companion to Louisiana's 2023 Coastal Master Plan. It presents Projections of coastal change over 50 years and the potential impacts of restoration and risk reduction projects to land loss and coastal flood risk.
- 2017 Master Plan Data Viewer:** Information for the public on land change, flood risk, and coastal vegetation change. Also includes updates on 2017 Coastal Master Plan projects and other resources for individuals to reduce their flood risk.

Below these are three more sections, each with a thumbnail image and a description:

- Fiscal Year 2026 Annual Plan:** Projected three-year revenues/expenditures and anticipated project activity and implementation schedules, providing a snapshot of yearly progress in implementing the state's \$50 billion coastal master plan.
- Coastal Projects Map:** Less-technical dynamic interactive map application to explore coastal protection and restoration projects utilizing project centroids for generalized display purposes.
- Oyster Suitability Viewer:** Interactive map application enabling users to view the relative suitability of LA coastal areas for the culture of Eastern oyster in response to simulated near-term environmental conditions.

Map Viewer ➡ Main Spatial Viewer ➡ Add Layers ➡ BICM ➡ BICM Shoreline Position

Louisiana Barrier Island Comprehensive Monitoring Program (BICM): Phase 3

FINAL REPORT

Louisiana Barrier Island Comprehensive Monitoring Program (BICM):
Phase 3 – Updated Shoreline Compilation and Change Assessment,
1880s to 2021

Prepared for:

Louisiana Coastal Protection and Restoration Authority



Prepared by:

Applied Coastal Research Associates
In Cooperation with GHD



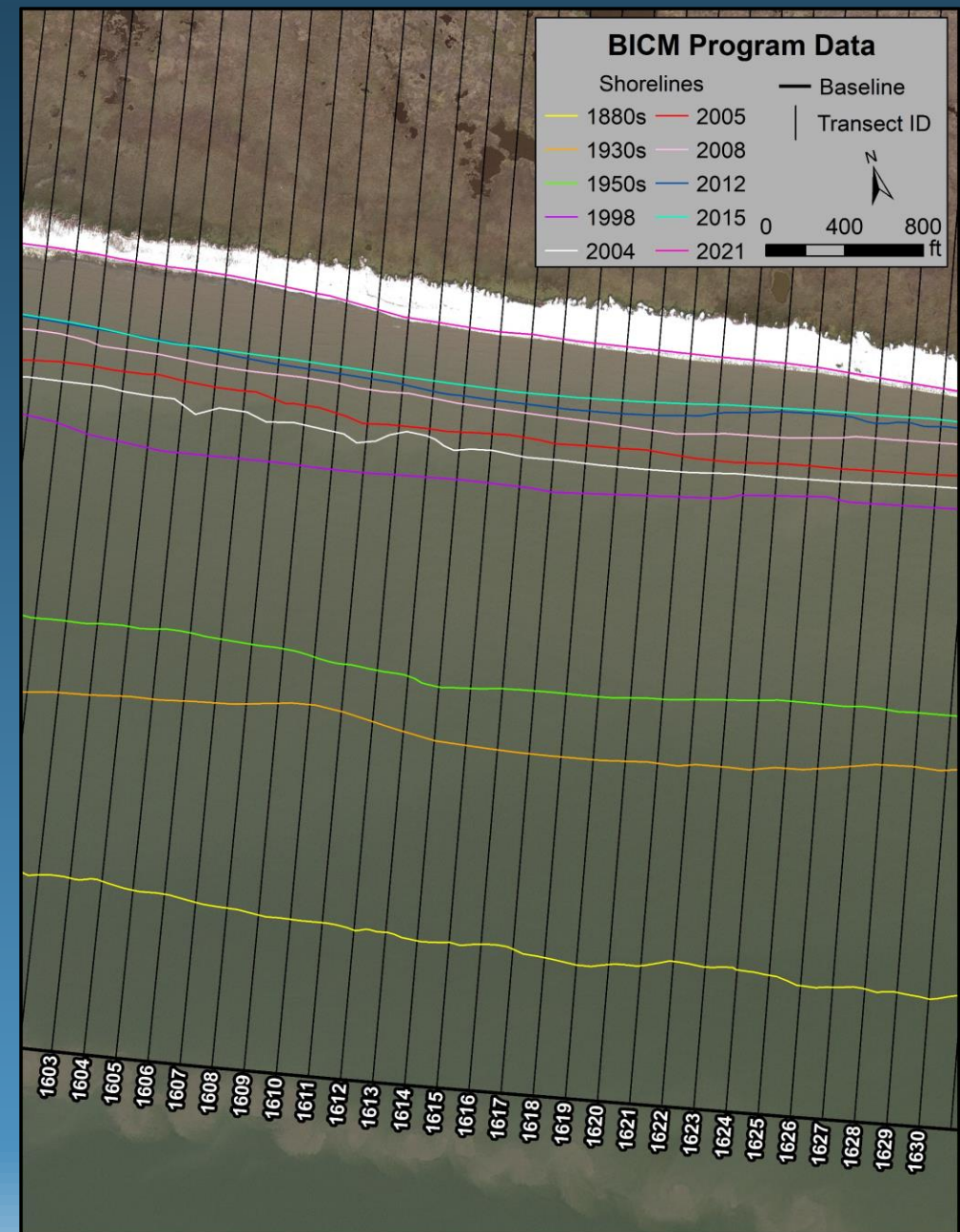
May 2025

Applied Coastal Update to Coastal Louisiana Shoreline Dataset

- Fall 2021 Shoreline (post Hurricane Ida)
- Three Shoreline Change Epochs
 - ✓ 1850s/80s to 2021 (long term)
 - ✓ 1998 to 2021 (era of restoration)
 - ✓ 2015 to 2021 (near term)

Data Compilation and Analysis

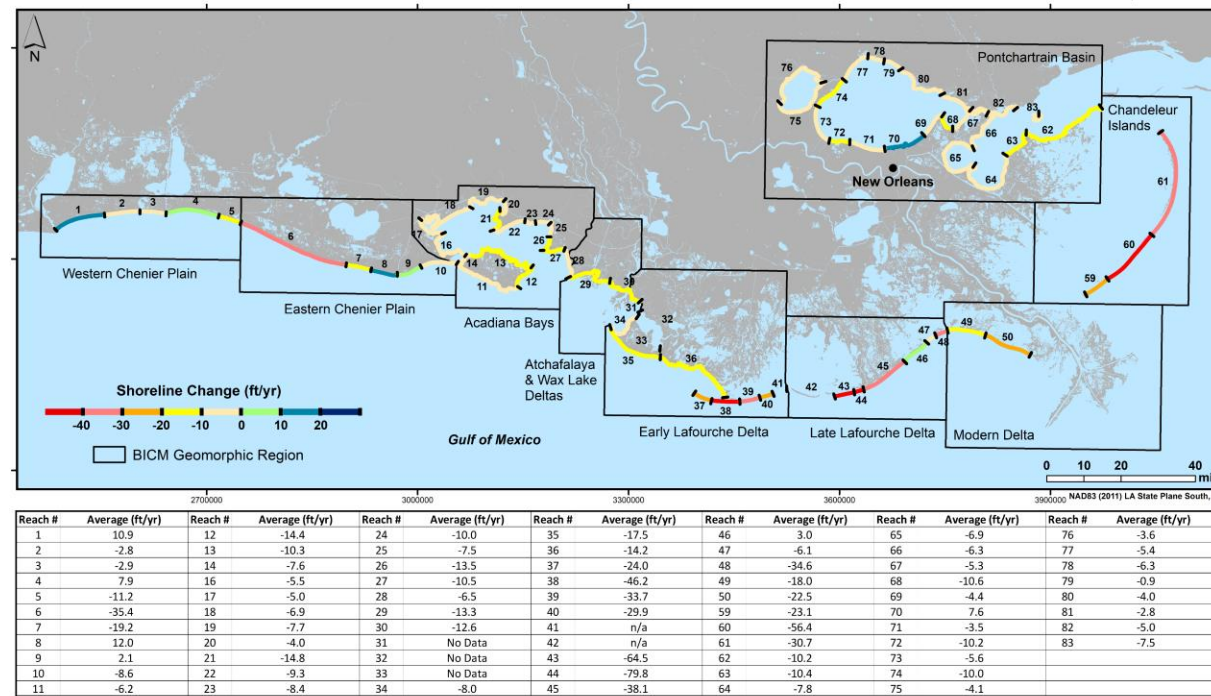
- T-Sheets and Aerial photography
- Shoreline mapping
- Digital Shoreline Analysis System (DSAS)
- Quality Control (check shoreline intersects)
- Over 20,000 Measurement Transects
- Barrier Island Length and Width Change



BICM 3 – Shoreline Change Maps

Louisiana Shoreline Change: 1850s/80s to 2021

Barrier Island Comprehensive Monitoring Program (BICM) - Phase 3



Average Change Rate by Reach

Change Rate Variability by Reach

Louisiana Shoreline Change: Early Lafourche Delta Region, 1880s to 2021

Barrier Island Comprehensive Monitoring Program (BICM) - Phase 3



Barrier Island Restoration/Protection Projects

Barrier Island Status Report: Fiscal Year 2025 Annual Plan



Coastal Protection and Restoration Authority of Louisiana

Suggested Citation:

Coastal Protection and Restoration Authority (CPRA), 2024. *Barrier Island Status Report: Draft Fiscal Year 2025 Annual Plan*. Coastal Protection and Restoration Authority of Louisiana (CPRA), Baton Rouge, LA, 54p.

January 2024

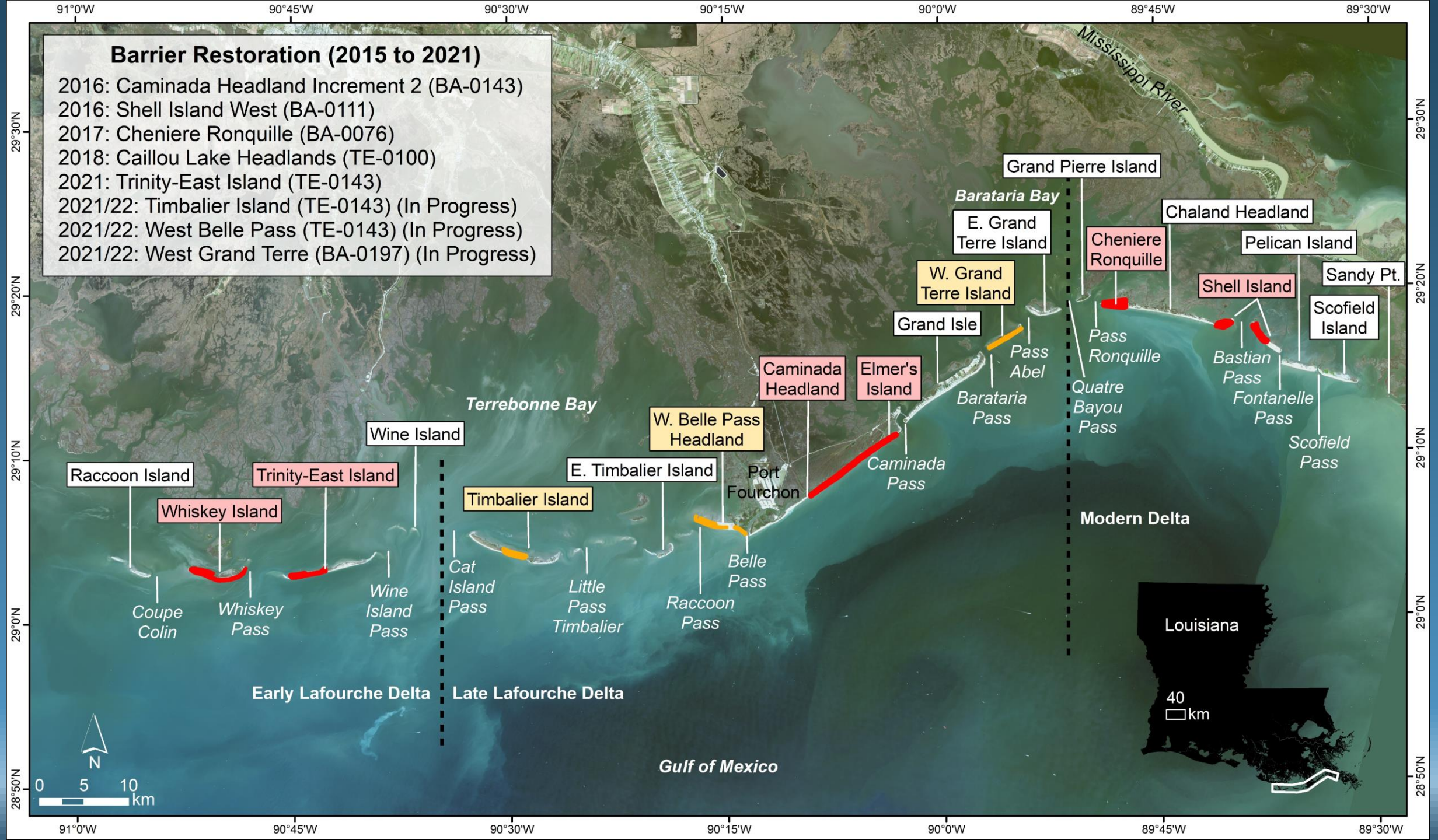
Table 1: List of Constructed, Funded for Construction, and Future Barrier Island Projects in Louisiana

Barrier Shoreline Restoration Projects	Funding Program	Construction Year
Early Lafourche Barrier System		
<i>Constructed Projects</i>		
1 Raccoon Island Repair (TE-0106)	Various	1994
2 Raccoon Island Breakwaters (TE-0029)	CWPPRA	1997
3 Raccoon Island Shoreline Protection/ Marsh Creation (TE-0048)	CWPPRA	2007, 2013
4 Whiskey Island Restoration (TE-0027)	CWPPRA	1999
5 Whiskey Island Back Barrier Marsh Creation (TE-0050)	CWPPRA	2009
6 NRDA Caillou Lake Headlands (TE-0100) (includes Whiskey West Flank Restoration (TE-0047))	NRDA	2018
7 Isles Dernieres Restoration Trinity Island (TE-0024)*	CWPPRA	1999
8 New Cut Dune and Marsh Restoration (TE-0037)*	CWPPRA	2007
9 Isles Dernieres Restoration East Island (TE-0020)*	CWPPRA	1999
10 Enhancement of Barrier Island and Salt Marsh Vegetation DEMO (TE-0053)	CWPPRA	2010
11 Wine Island	FEMA	1995
<i>Funded for Construction</i>		
None		
<i>Future Projects</i>		
Raccoon Island Restoration (TE-0163)	NRDA	TBD
Late Lafourche Barrier System		
<i>Constructed Projects</i>		
1 Timbalier Island Planting Demonstration (TE-0018)	CWPPRA	1996
2 East Timbalier Island Sediment Restoration, Phase 1 (TE-0025)	CWPPRA	2000
3 East Timbalier Island Sediment Restoration, Phase 2 (TE-0030)	CWPPRA	2000
4 Timbalier Island Dune and Marsh Creation (TE-0040)*	CWPPRA	2004
5 West Belle Pass Barrier Headland Restoration (TE-0052)	CWPPRA	2012
6 Caminada Headland Beach and Dune Restoration (BA-0045)	CIAP/ STATE	2015
7 Caminada Headland Beach and Dune Restoration, Increment 2 (BA-0143)	NFWF	2016
8 Grand Isle and Vicinity Hurricane Protection	WRDA	2010
9 Bayside Segmented Breakwaters at Grand Isle (BA-0050)	CIAP	2012
10 Grand Isle Bay Side Breakwaters (BA-0187)	STATE	2015
11 Grand Isle - Fifi Island Restoration (BA-0155)	CIAP	2015
12 Grand Isle - Fifi Island Breakwater (BA-0168)	State	2015
13 Grand Isle Bayside Segmented Rock Breakwater and Habitat Enhancements (BA-0233)	STATE	2020
14 Grand Isle & Vicinity: West End Beach Nourishment Project (BA-0210)	STATE	2021
15 Vegetative Planting of a Dredged Material Disposal Site on Grand Terre (BA-0028)	CWPPRA	2001
16 Restoration on West Grand Terre Island at Fort Livingston (BA-0186)	NOAA	2003
17 East Grand Terre Island Restoration (BA-0030)	CIAP	2010
18 Caminada Back Barrier Marsh Creation (BA-0171)	CWPPRA	2022
19 West Grand Terre Beach Nourishment and Stabilization Project (BA-0197)	RESTORE	2023
20 Terrebonne Basin Barrier Island and Beach Nourishment (TE-0143)	NFWF	2023

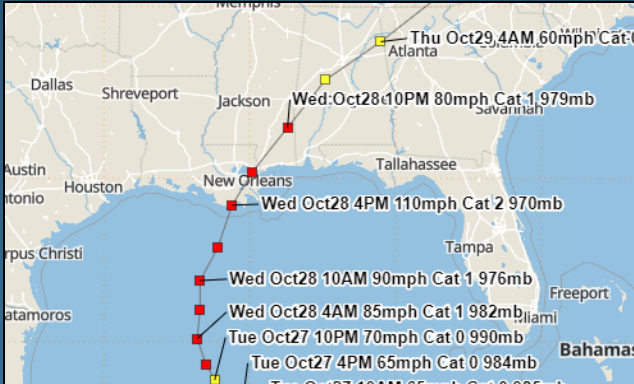
<https://coastal.la.gov/wp-content/uploads/2024/02/AP-2025-Barrier-Island-Status-Report.pdf>

Barrier Restoration (2015 to 2021)

2016: Caminada Headland Increment 2 (BA-0143)
2016: Shell Island West (BA-0111)
2017: Cheniere Ronquille (BA-0076)
2018: Caillou Lake Headlands (TE-0100)
2021: Trinity-East Island (TE-0143)
2021/22: Timbalier Island (TE-0143) (In Progress)
2021/22: West Belle Pass (TE-0143) (In Progress)
2021/22: West Grand Terre (BA-0197) (In Progress)

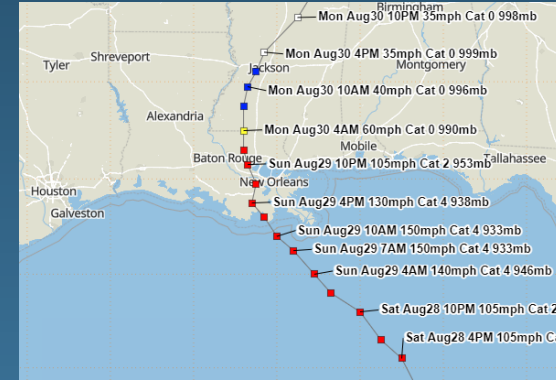
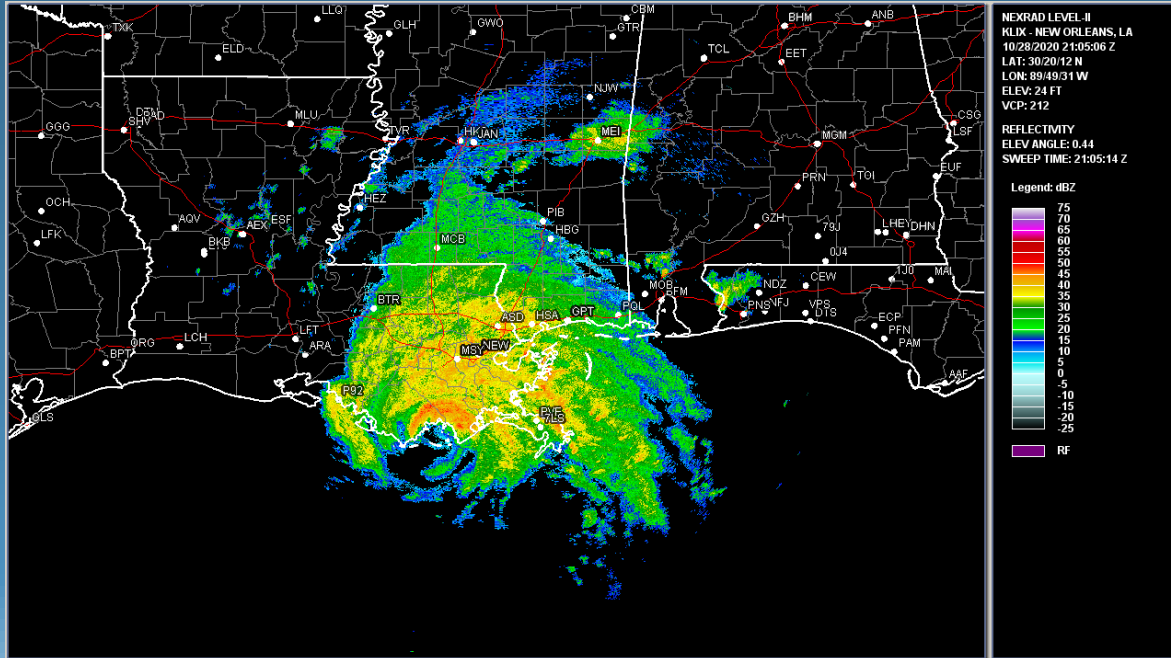


Recent Central Coast Storms



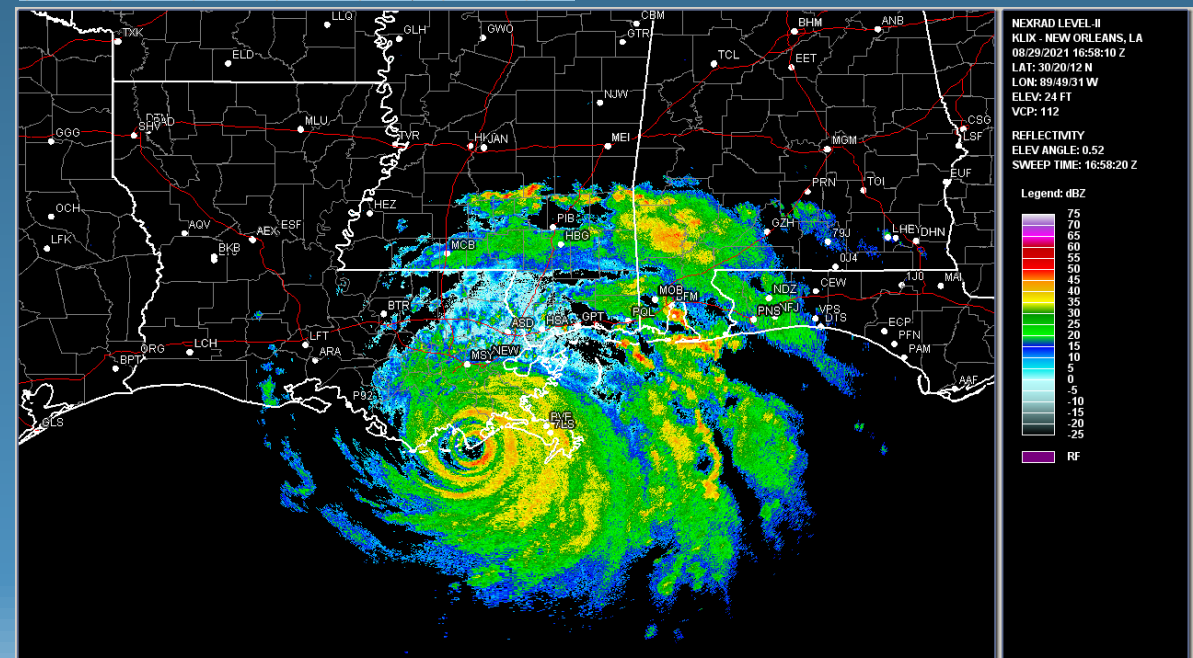
Hurricane Zeta:

- Cat 3 Storm
- Oct 29, 2020



Hurricane Ida:

- Cat 4 Storm
- Aug 29, 2021

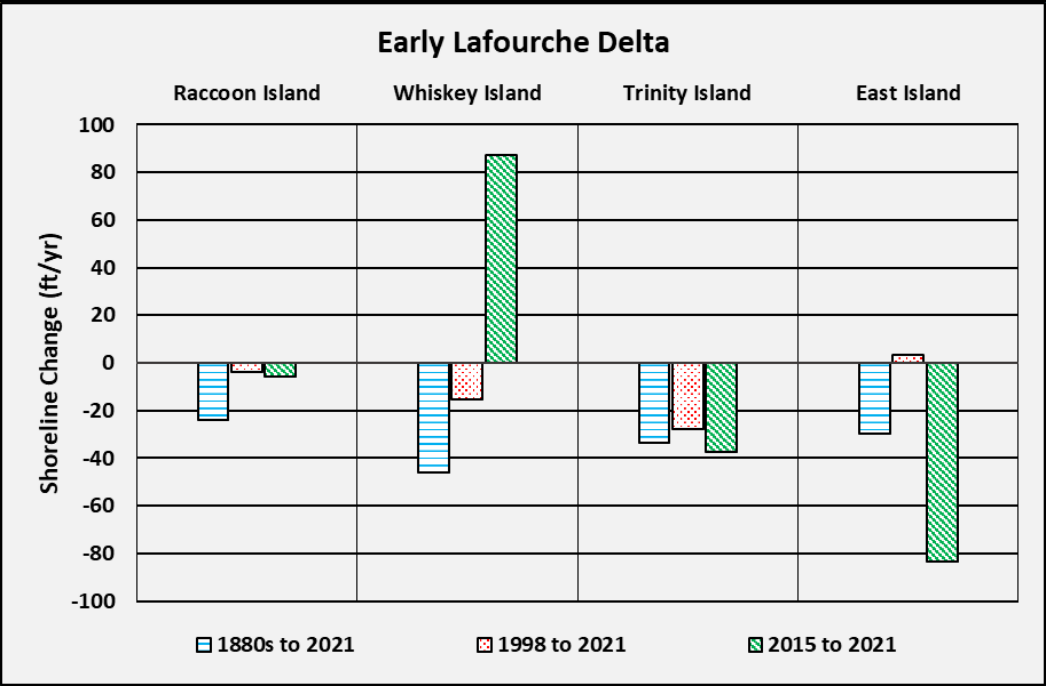
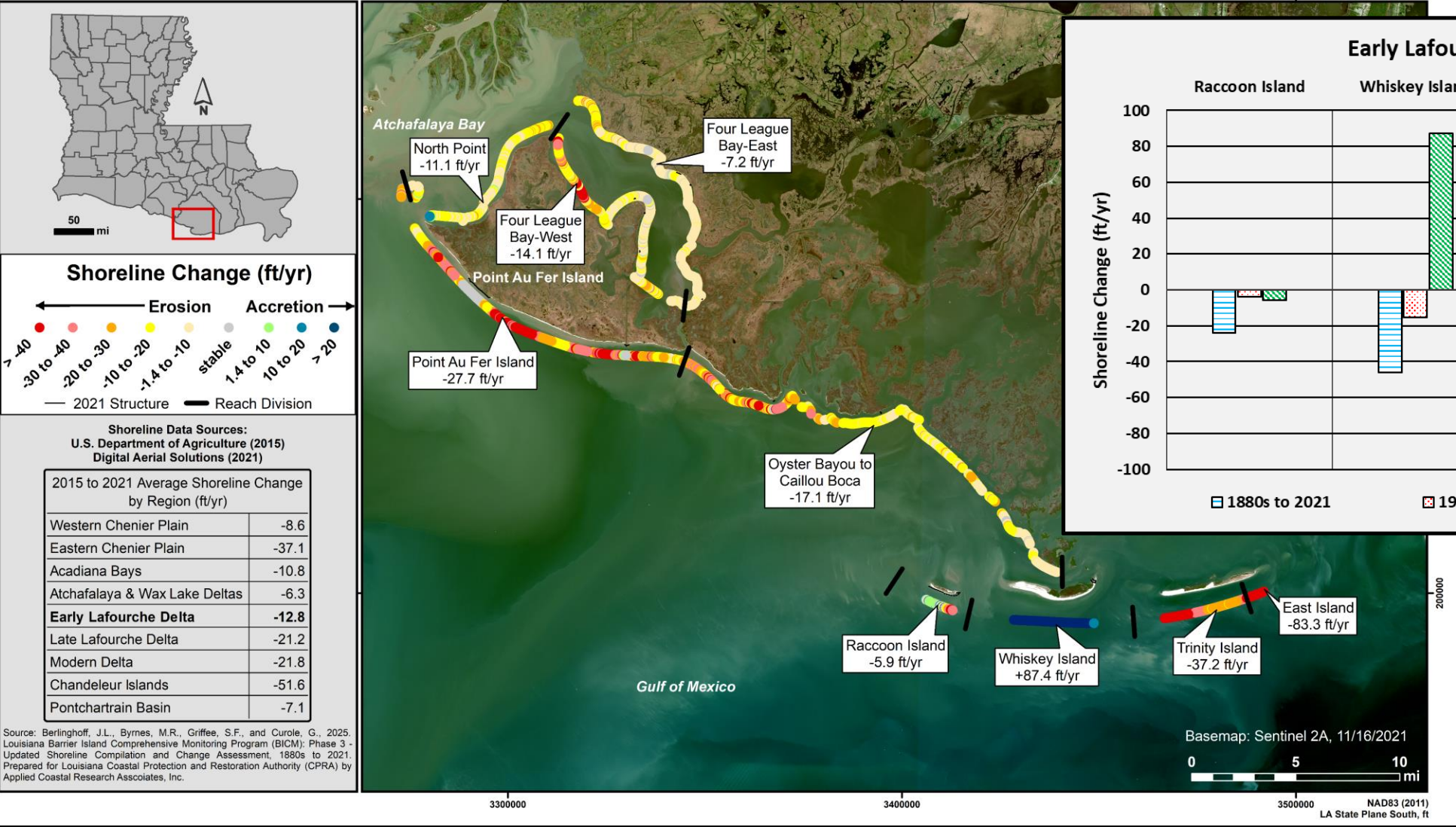


Louisiana Shoreline Change: Early Lafourche Delta Region, 2015 to 2021

Barrier Island Comprehensive Monitoring Program (BICM) - Phase 3



Results

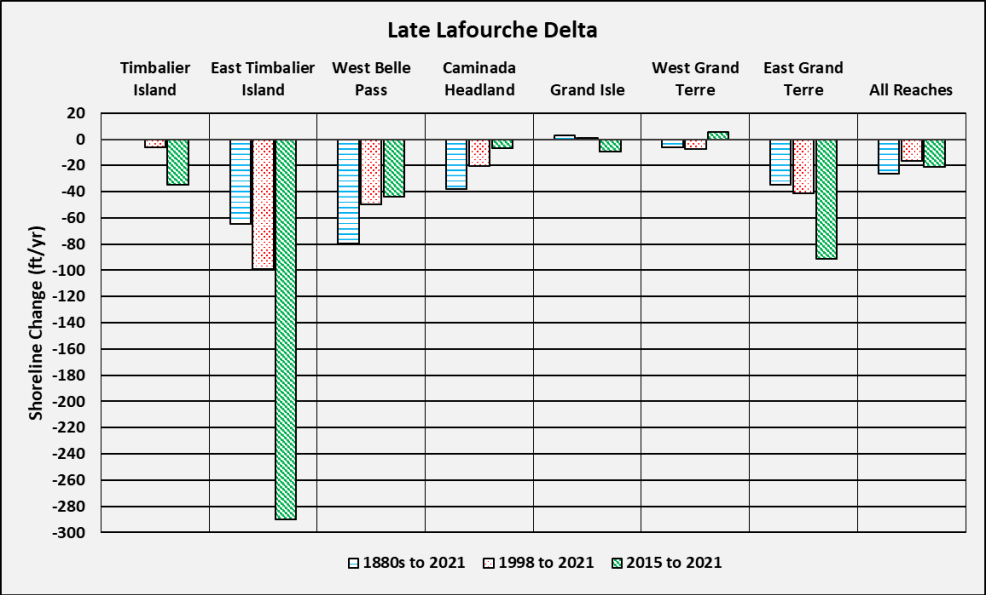
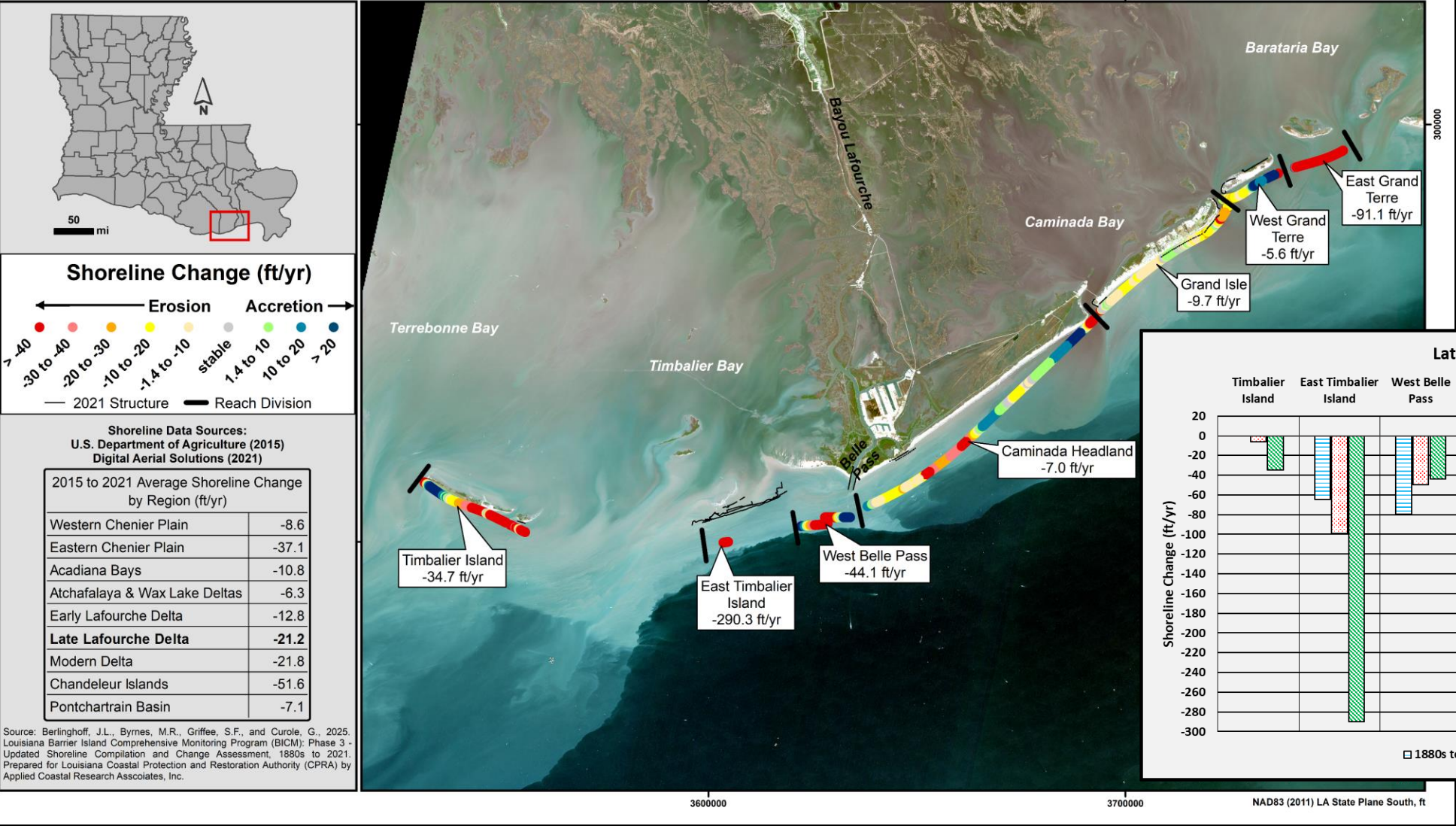


Louisiana Shoreline Change: Late Lafourche Delta Region, 2015 to 2021

Barrier Island Comprehensive Monitoring Program (BICM) - Phase 3



Results

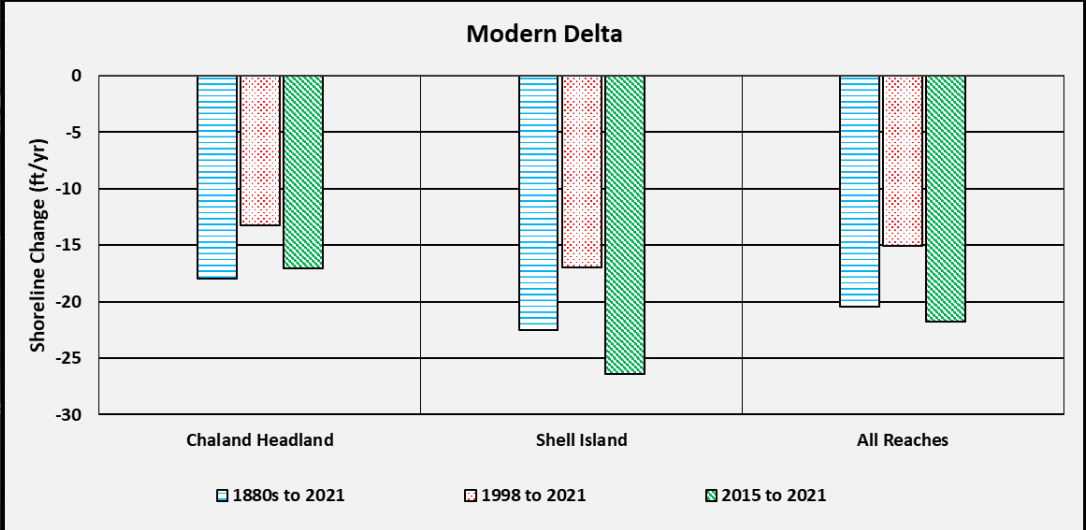
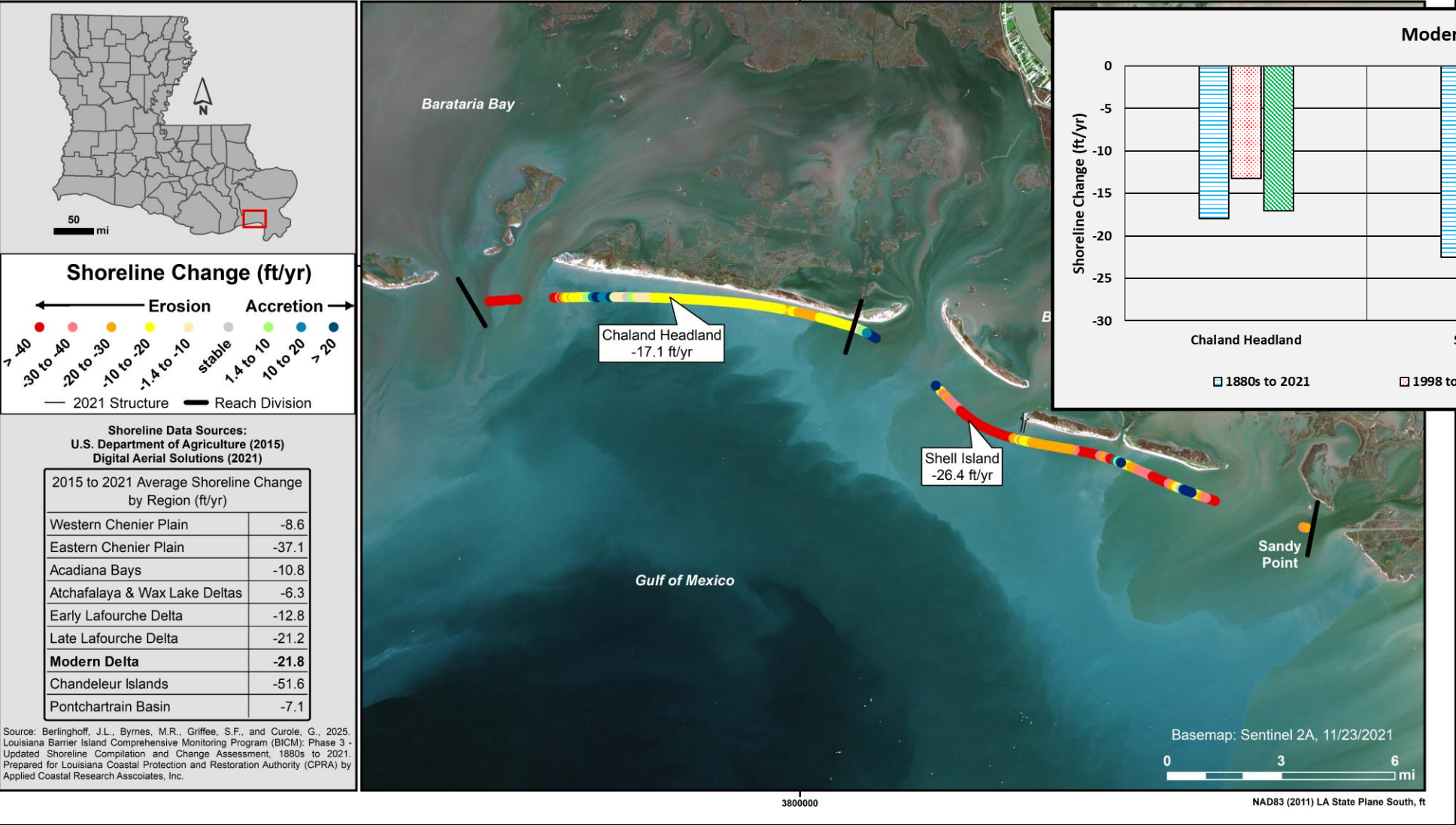


Louisiana Shoreline Change: Modern Delta Region, 2015 to 2021

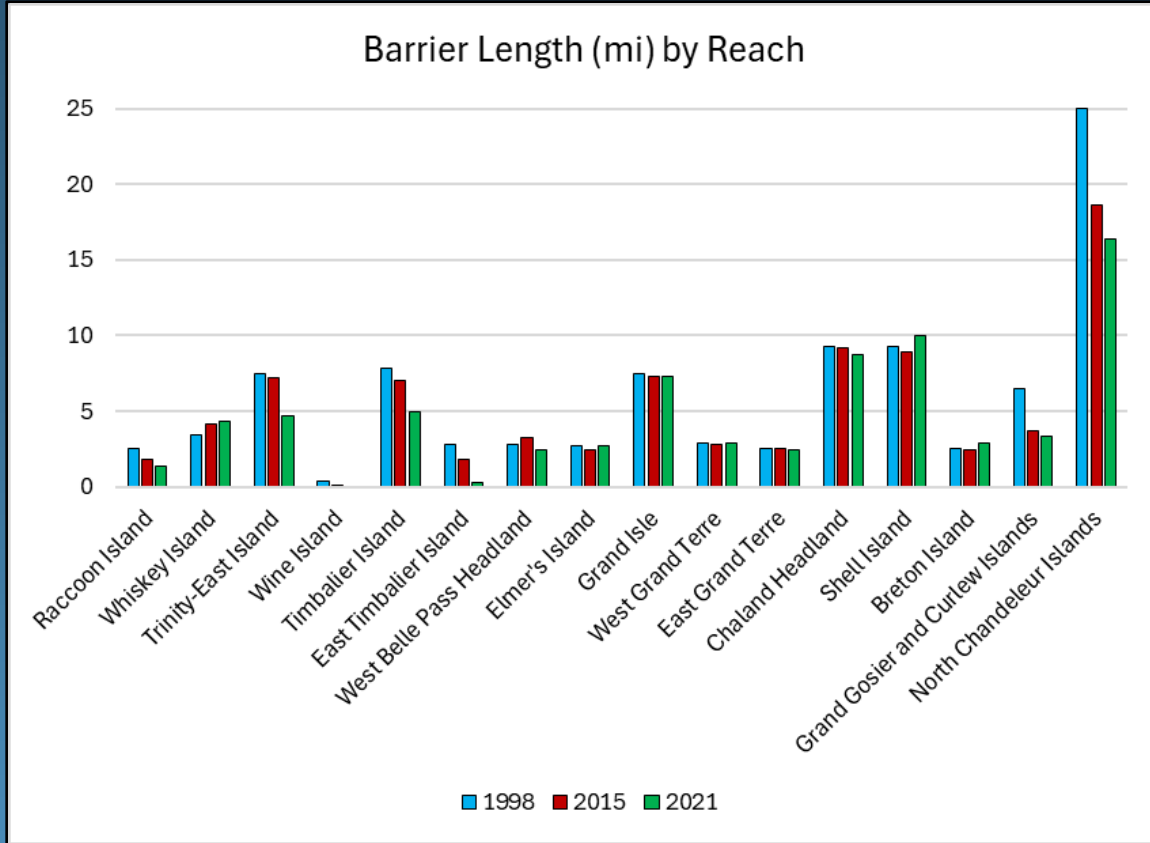
Barrier Island Comprehensive Monitoring Program (BICM) - Phase 3



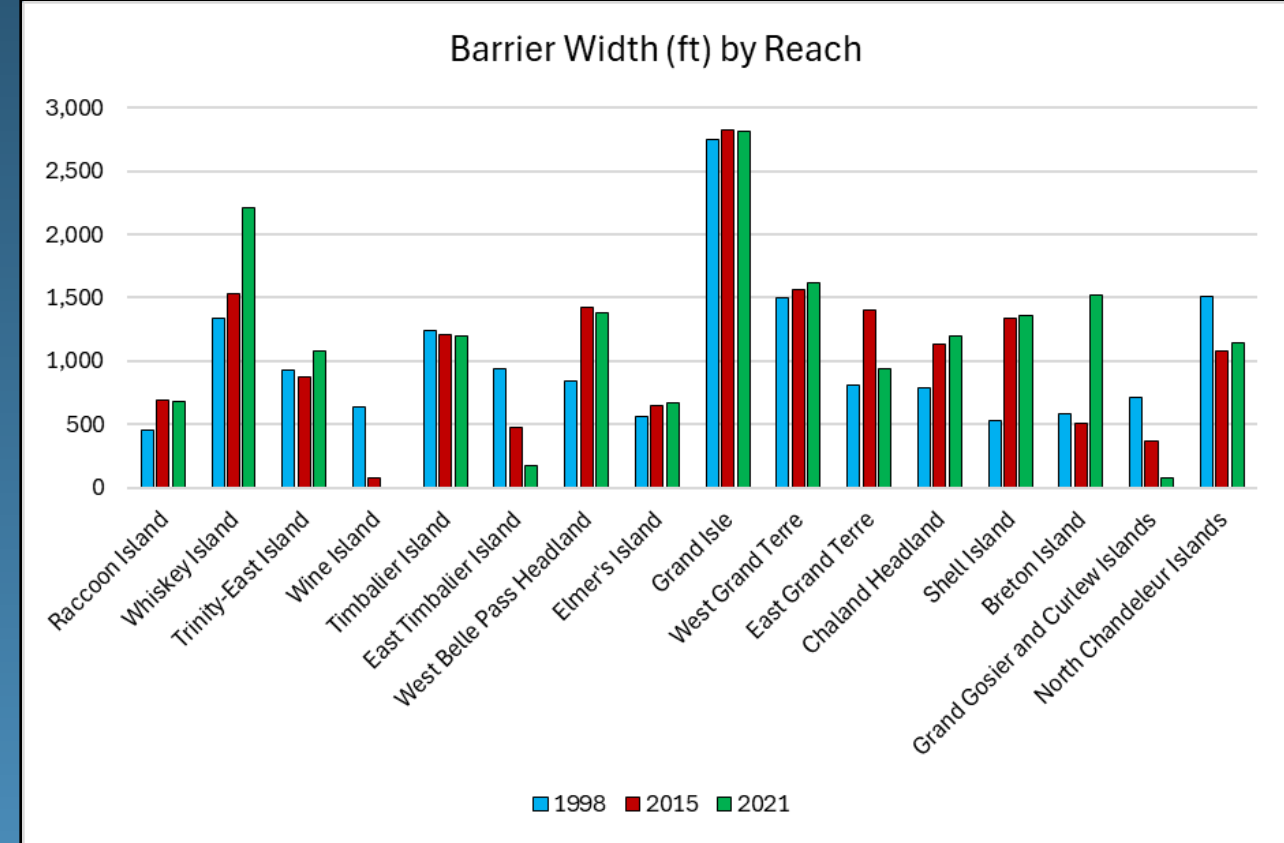
Results



Barrier Island Length and Width Analysis



Island length was mostly unchanged, although some island lengths decreased since 1998



Island width generally increased or was unchanged since 1998

Project support provided by CPRA
through the BICM Program



Questions?