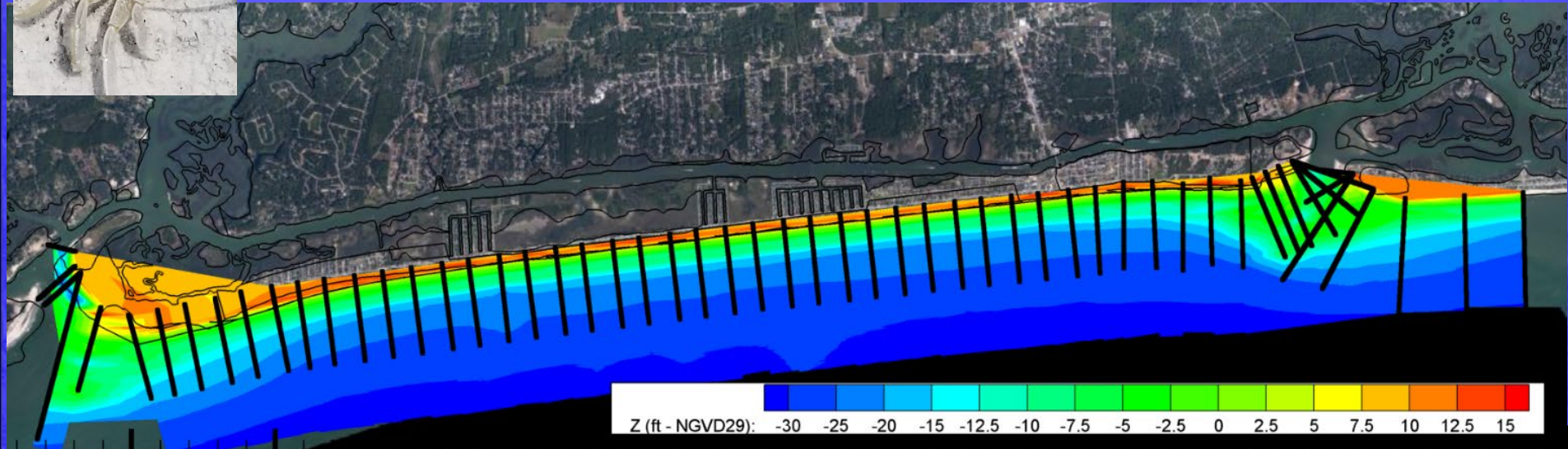


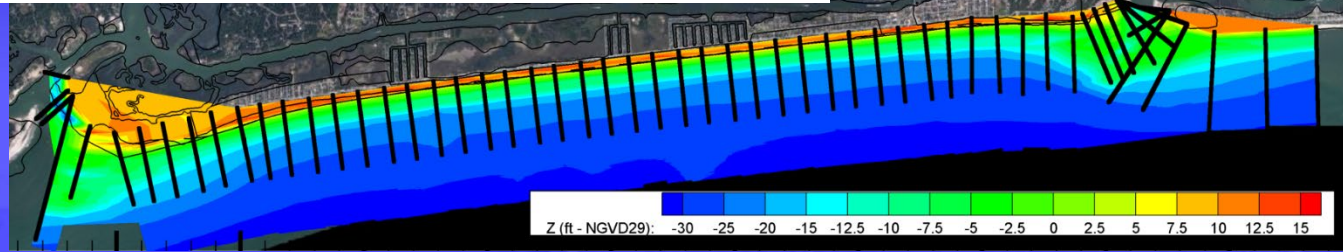
HOLDEN BEACH ANNUAL MONITORING

November 18, 2025



*Marina, Coastal, Environmental
& Water Resources Engineers*

Annual Monitoring Analysis



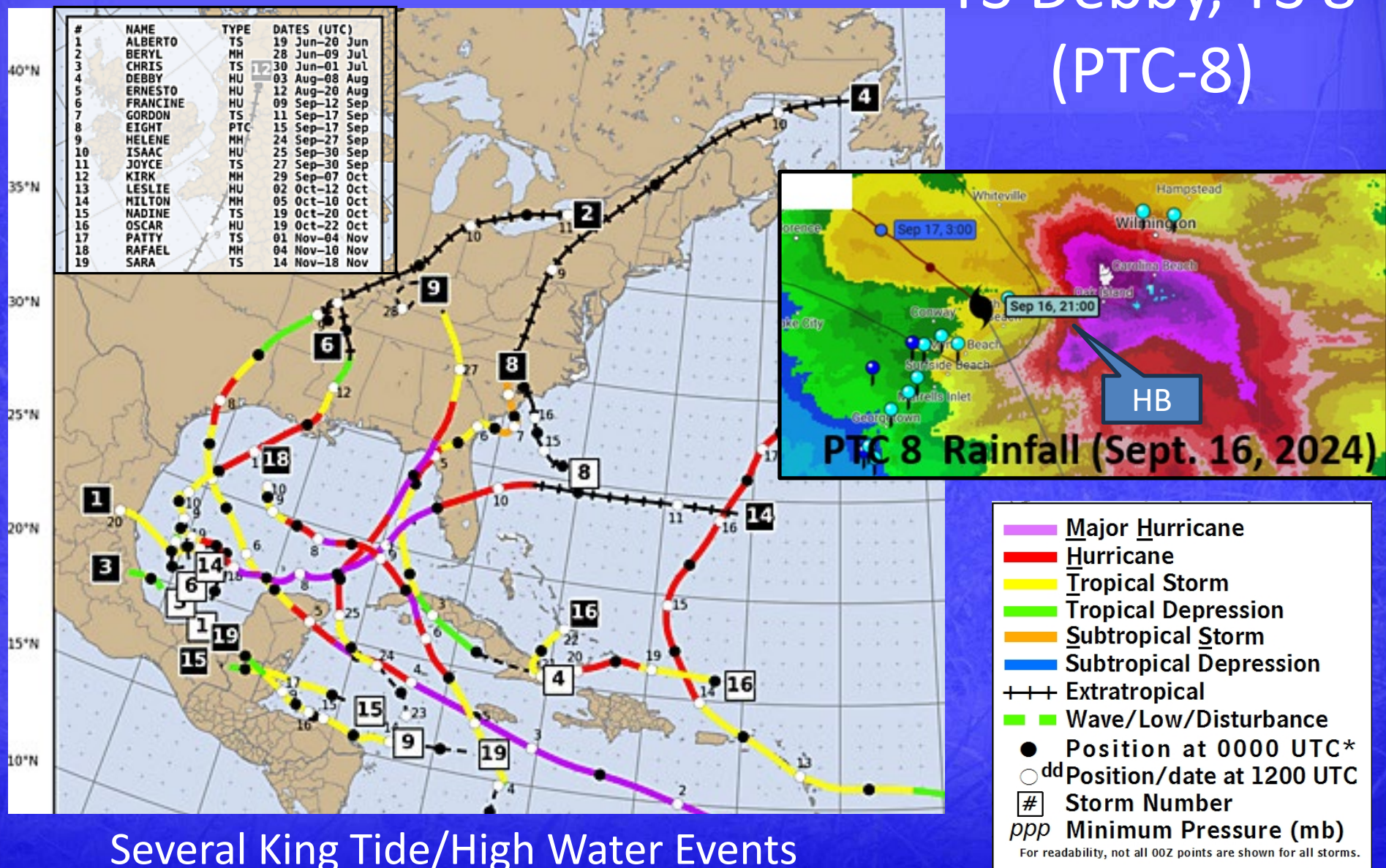
- Volume Change
- Shoreline Change
- Has occurred annually since 2001
- Nourishment Planning & FEMA Eligibility



Figure 39. Photographs of the eastern portion of Holden Beach. A. West view (3/86) of eroding shoreline and houses stranded on recreational beach. Note bulkheads, timber groins and vestiges of seawalls that litter the beach. The eastern portion of Holden Beach shoreline near the inlet has been a chronic erosion zone since the late 1970s. B. West view (11/7/97) of same area in "A" retreat of the shoreline, removal of all but one home and a refurbished dune/dike composed of truck hauled sand. C. Aerial photograph of house on beach and peat exposure. Insert depict dike along road. D. Aerial photograph depicting shoreline and chronic erosion zone. Note the homes fronted by bulkheads and remnants of those destroyed.

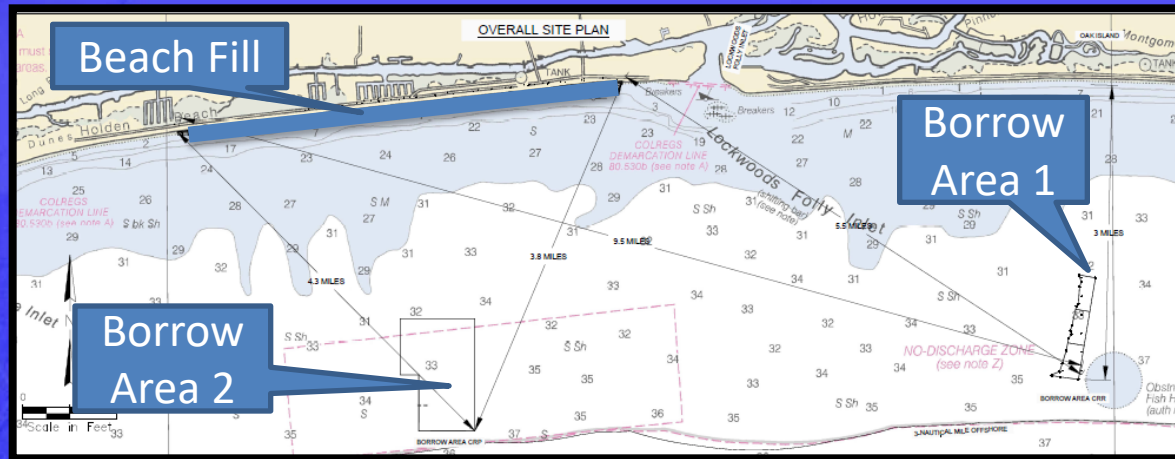
2024 Hurricane Season

TS Debby, TS 8
(PTC-8)



Several King Tide/High Water Events

2022 Nourishment (Jan 7 to April 12)



R.N. Weeks

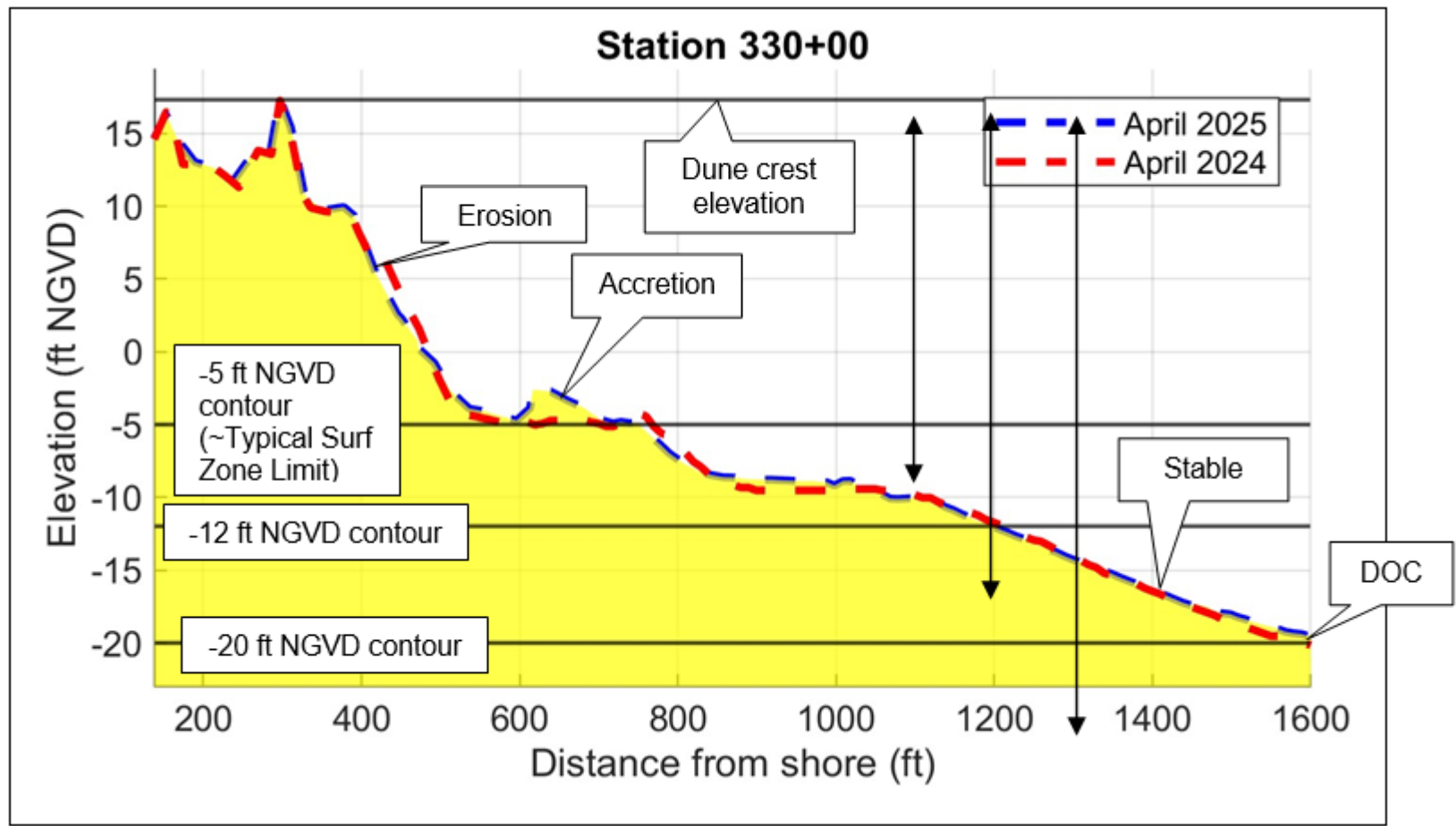


B.E. Lindholm



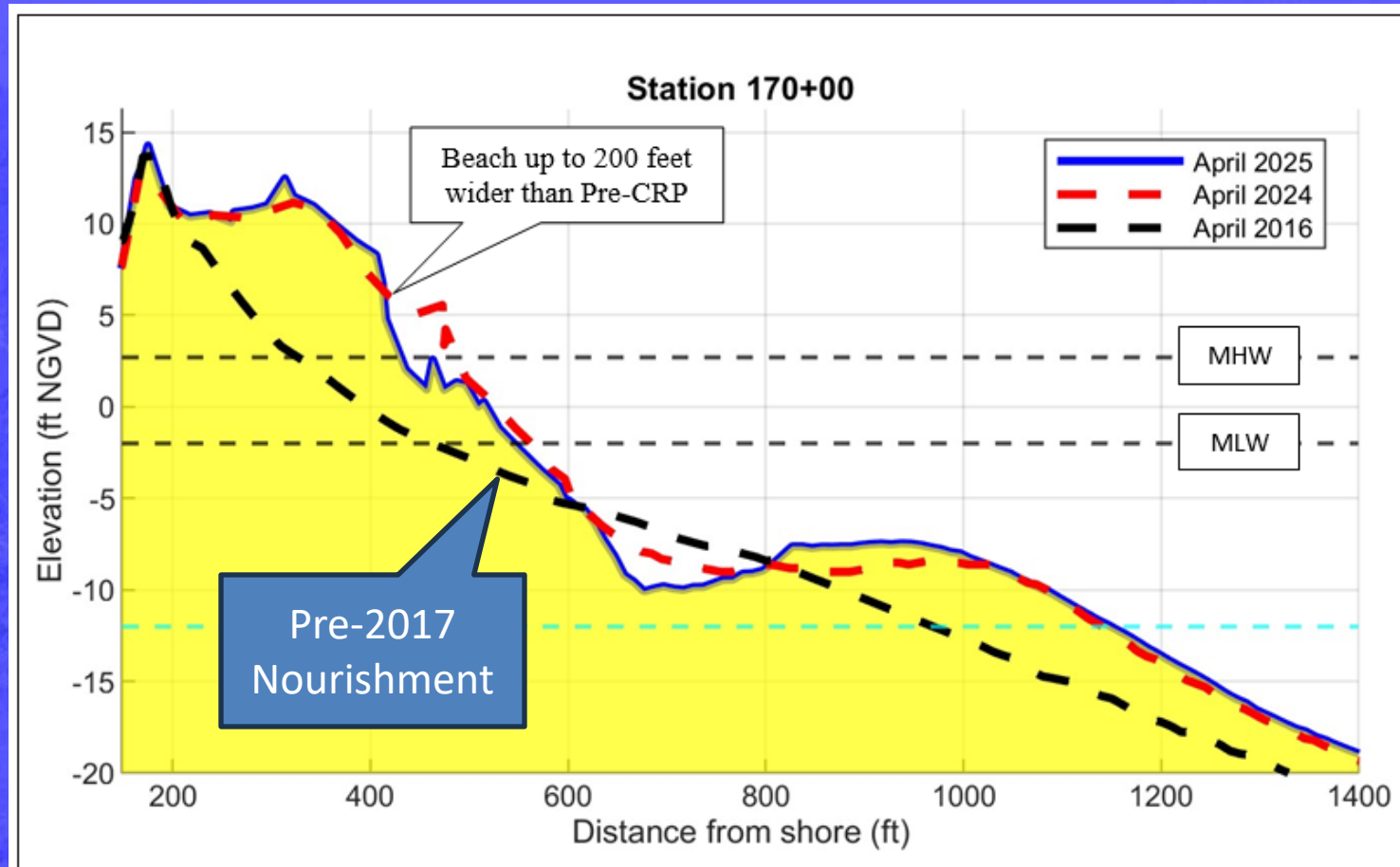
Now ~3.5 Yrs Post Project

Volume Analysis



Three Volume Calcs. From Dune to
-5 ft, -12 ft and -20 ft

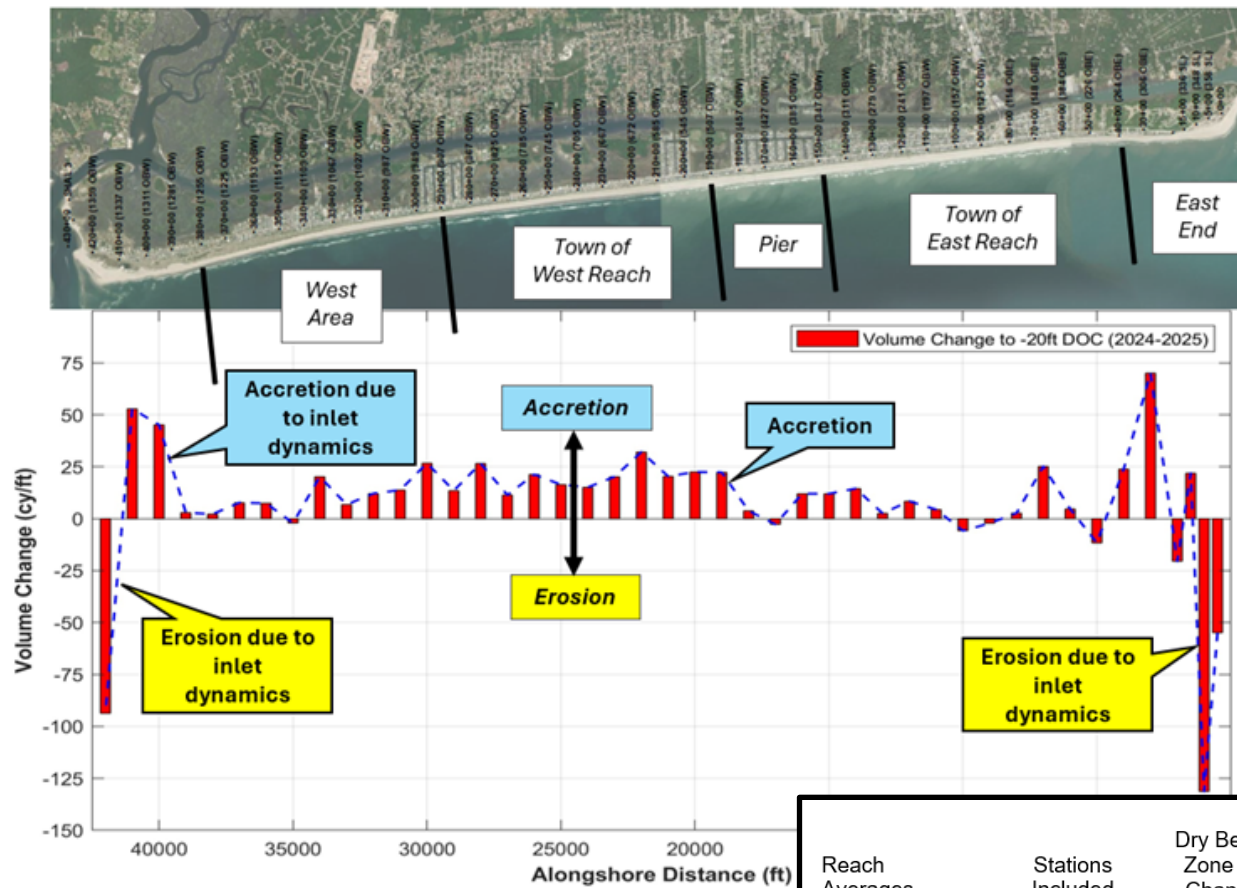
Cumulative Effect of 2017 (1.35 Million CY) and 2022 (1.55 Million CY) Nourishments



Still ~2.0 Million CY in Central Reach compared with Pre-2017 (Hurricane Matthew Conditions)

Volume Change (to -20 ft)

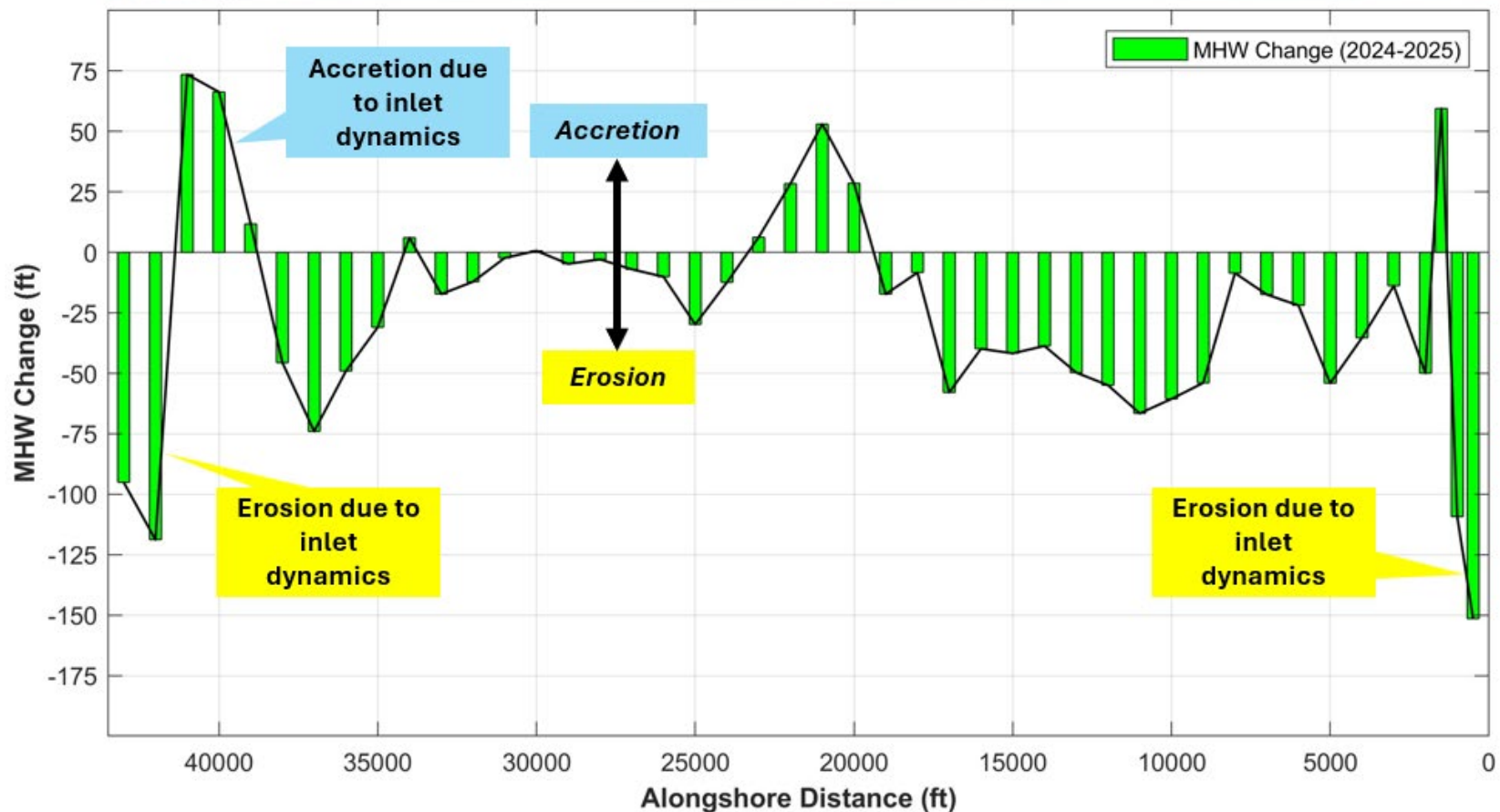
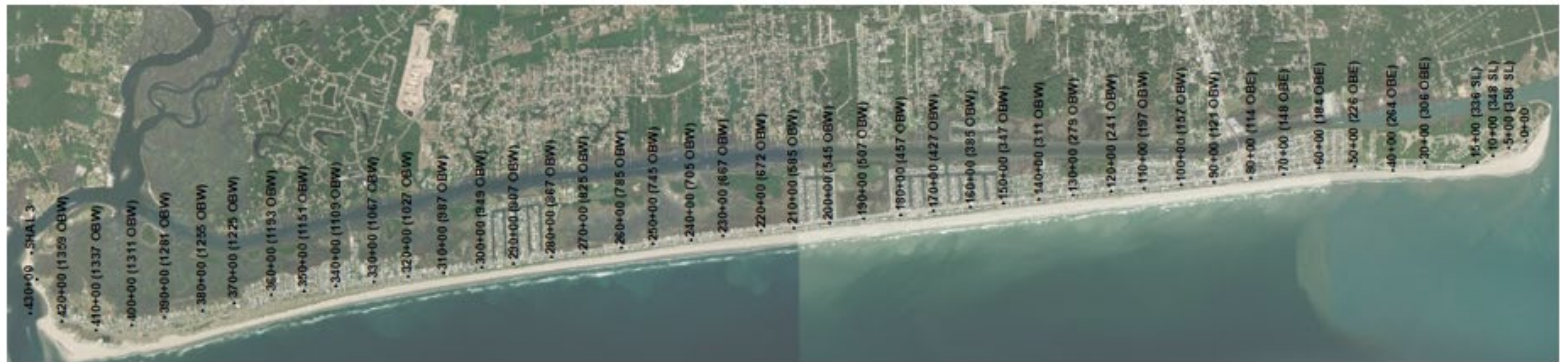
- ~ 3.5 Years Post Nourishment
- Fill Moving to Nearshore (5-20 ft Depths)



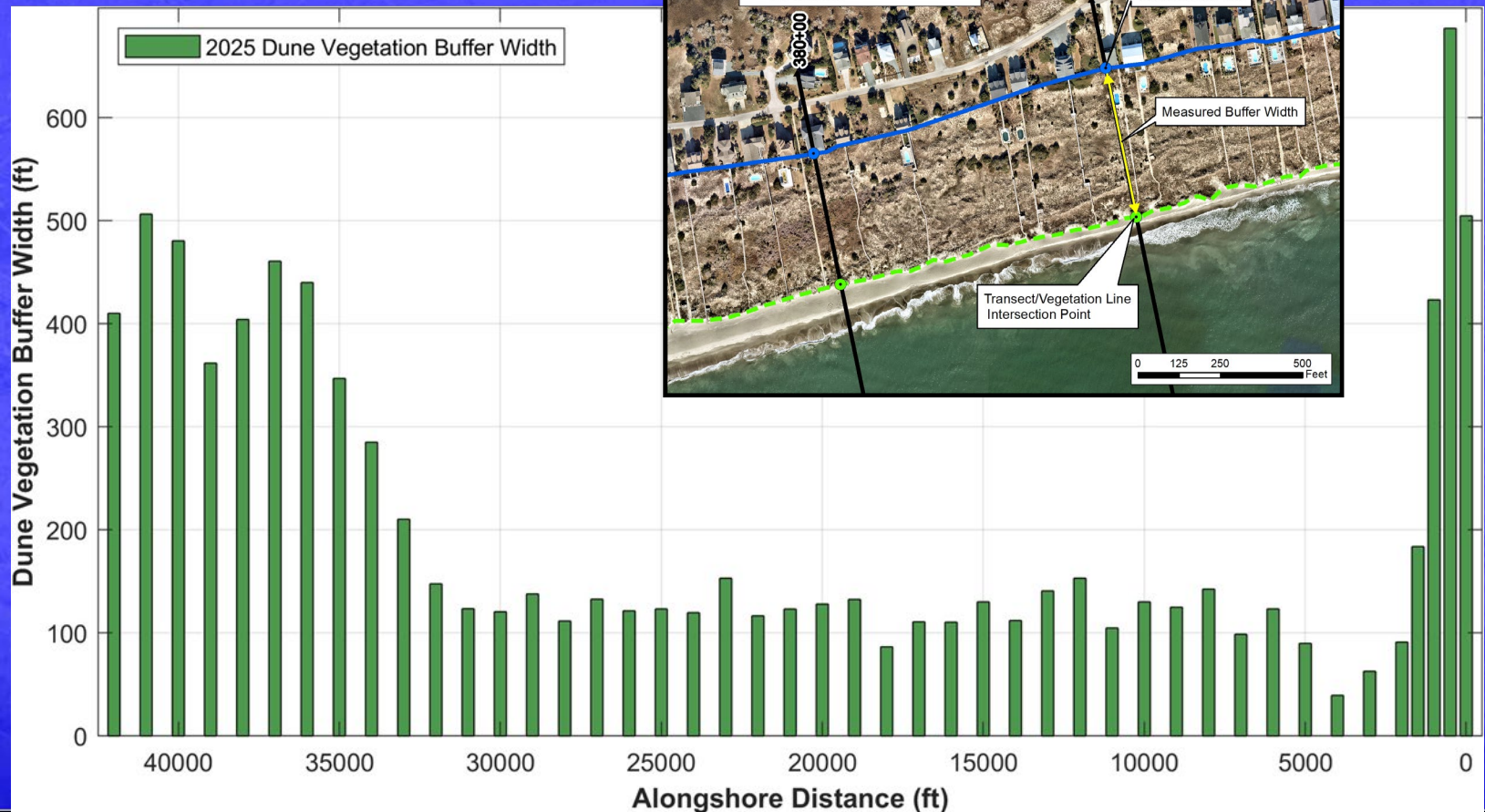
Reach Averages	Stations Included	Dry Beach/Surf Zone Volume Change (CY) (Dune to -5 ft)	Total Volume Change (CY) (Dune to -20 ft NGVD)	Surf Zone/DOC Volume Change (CY) (-5 ft to -20 ft NGVD)*	Offshore DOC Volume Change (CY) (-12 ft to -20 ft NGVD)
LWF Inlet	5 to 15	-45,000	-74,000	-29,000	-8,000
USACE East	15 to 40	2,000	72,000	70,000	14,000
Town East	40 to 150	-70,000	61,000	131,000	46,000
Pier	150 to 190	-5,000	30,000	35,000	10,000
Town West	190 to 290	69,000	204,000	135,000	22,000
West Area	290 to 380	9,000	100,000	91,000	30,000
Shallotte Inlet	380 to 420	67,000	55,000	-12,000	29,000
TOTAL		27,000	448,000	421,000	143,000

*Positive values represent accretion/gains and negative values indicate erosion/losses

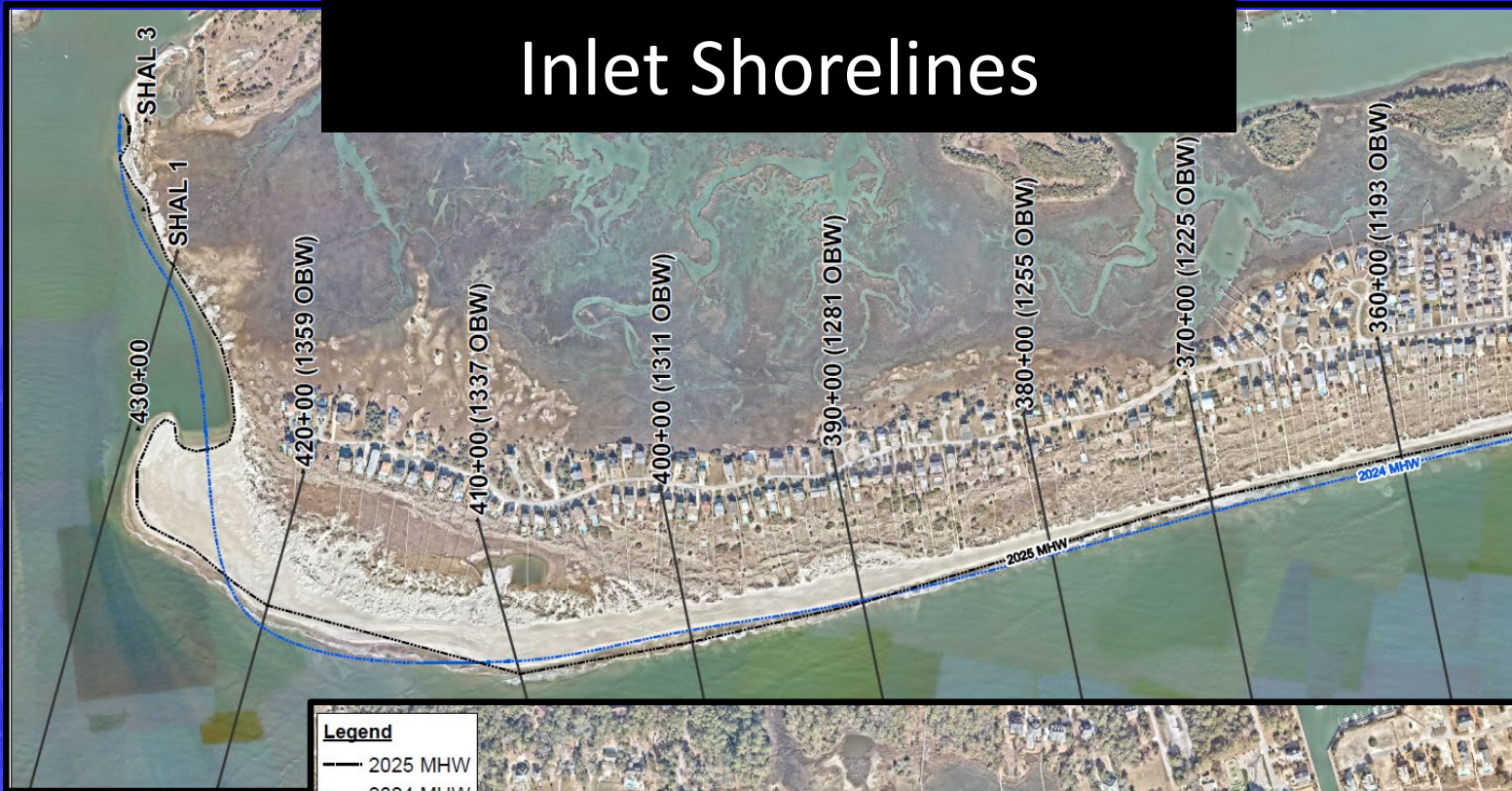
Mean High Water (MHW) Shoreline Change



DUNE VEGETATION WIDTH



Inlet Shorelines



Ocean Isle Terminal Groin Monitoring (April 2025)



Figure 11. Historical Inlet Shorelines - March 1999 vs. April 2025.

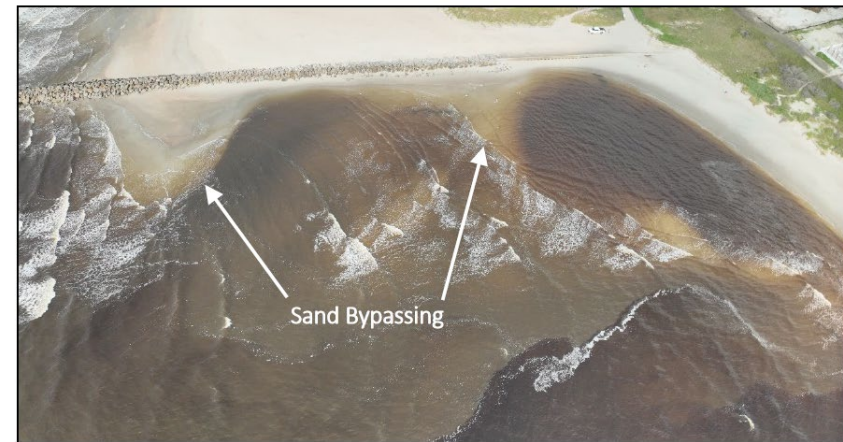


Figure 23. Sediment Bypassing the Terminal Groin (August 12th, 2024).

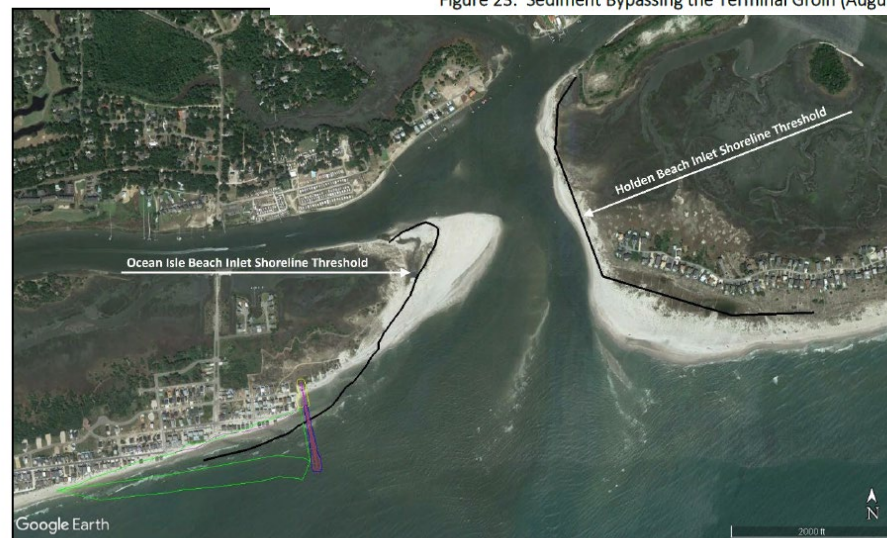


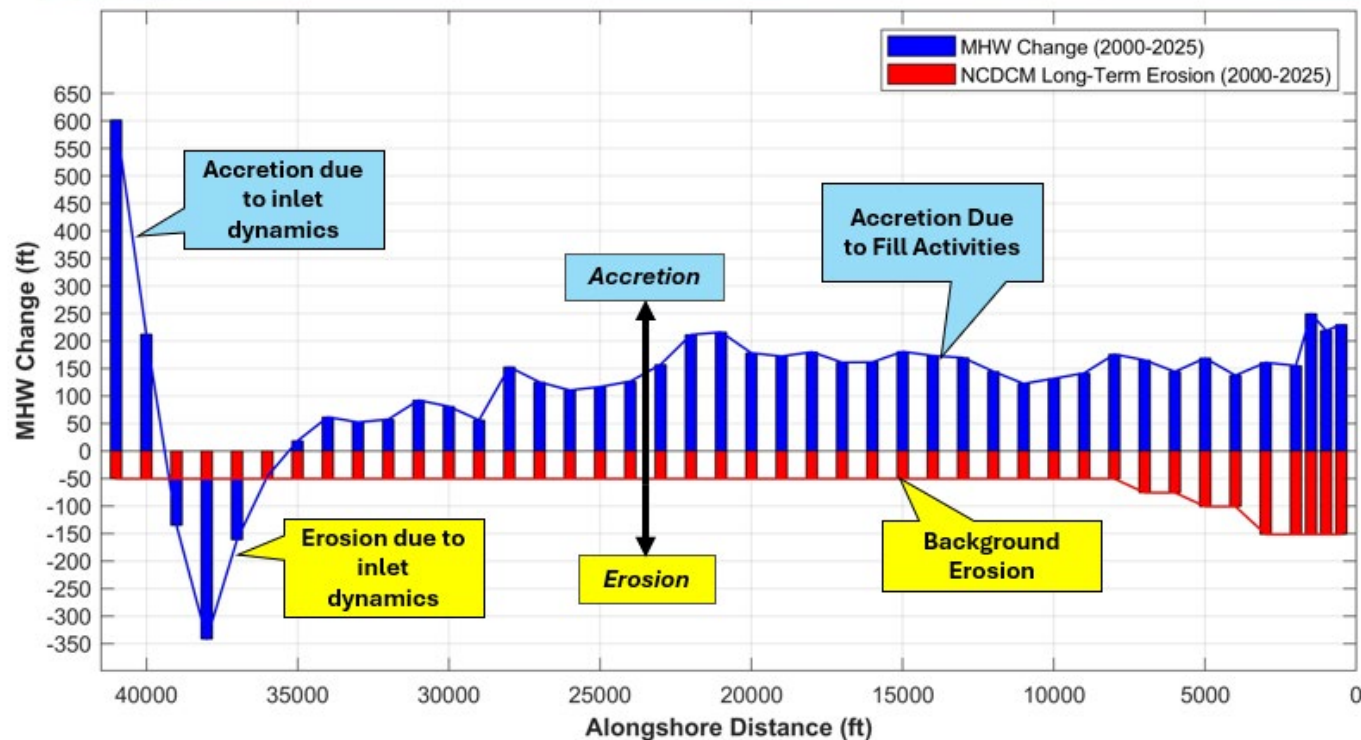
Figure 10. Shallotte Inlet Shoreline Thresholds.

2000 to 2025

Beach much healthier now

Table 3-4. Historical MHW Shoreline Change by Reach (2000 to 2025)

Reach Averages	Stations Included	Historical MHW Change (2000 to 2025) (ft)
LWF Inlet	5 to 15	+232.8
USACE East	15 to 40	+175.7
Town East	40 to 150	+154.6
Pier	150 to 190	+171.1
Town West	190 to 290	+147.5
West Area	290 to 380	-13.1
Shallotte Inlet	380 to 420	+84.3
Central Reach	40 to 290	153.1

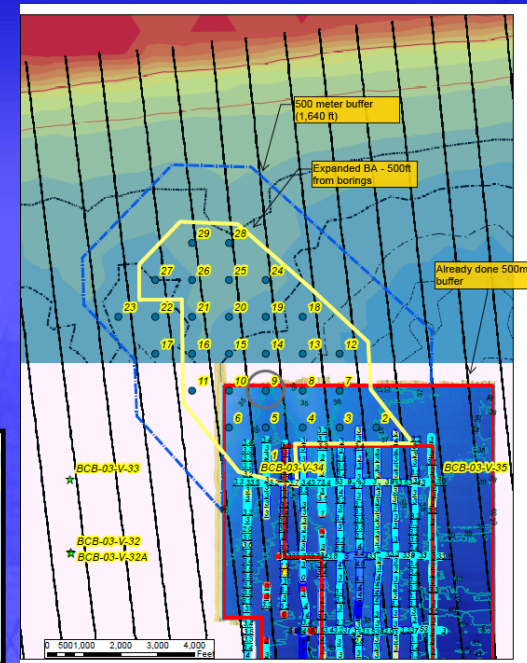
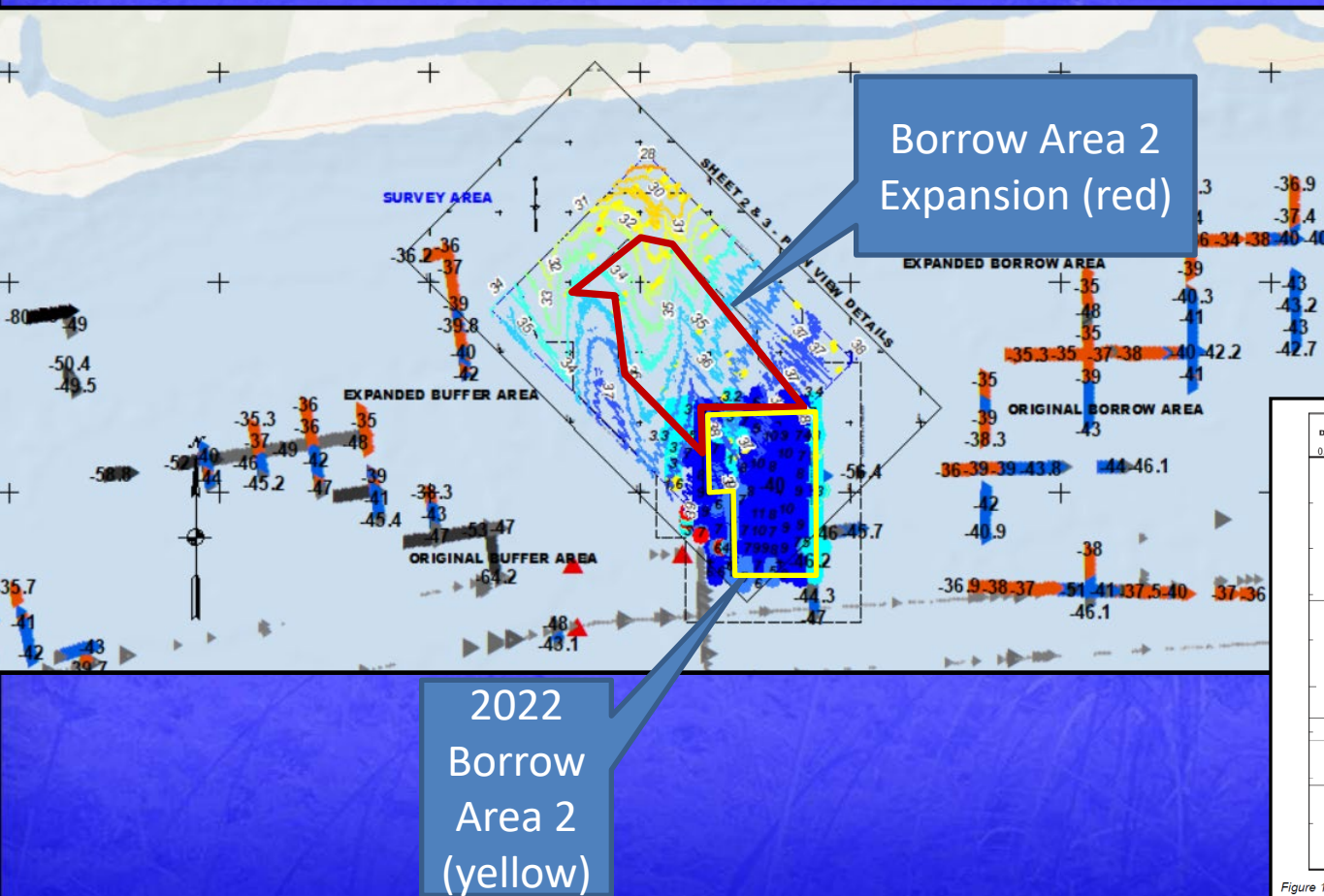


1993 to 2025

Beach much healthier now



Offshore Borrow Area Permit Application Submittal



DEPTH (ft)	LOGGED	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	REC.	REMARKS
0.0		Fine SAND, trace carbonate/silt, well graded, very loose, subround-subangular, olive gray (SY-42), (SW).	HB-19-1C	Sample #HB-19-1C/bt, Depth = 4.0' Mean (mm): 0.29; Phi Sorting: 1.00 Fines (200): 1.07% (SW) Carbonate (0 - 4): 13.4%
3.1		Silty fine SAND, little carbonate, well graded, loose, low burrows, @ 3.5 to 3.83' - medium SAND, some silt, little carbonate, @ 5.4 to 5.7' - coarse carbonate gravel, @ 3.95' - color grades to very dark greenish gray (10Y 3/1) from, dark gray (5Y-4.1), (SW-SM).	HB-19-2	Sample #HB-19-2, Depth = 5.4' Mean (mm): 0.44; Phi Sorting: 1.66 Fines (200): 8.47% (SW-SM)
5.7		Silty fine SAND with fine carbonate gravel, very loose, very dark greenish gray (10Y 3/1), (GM).		
6.2		SILT, very soft, high water content, @ 7.15' - coarse carbonate fragment, very dark greenish gray (10Y 3/1), (MH).		
7.2		Silty fine-medium SAND grading to medium SAND, well graded, very loose, interbedded with silty medium SAND, trace carbonate, very loose, @ 7.58' - organic debris, @ 8.2 to 9.0' - few silty medium SAND rip-up clasts, very dark greenish gray (10Y 3/1), (SW-SM).		
9.0				

Figure 1: Example boring log and analysis. Typically 2-3 grain size sub-samples were analyzed per boring, within the upper layer of suitable sand.

