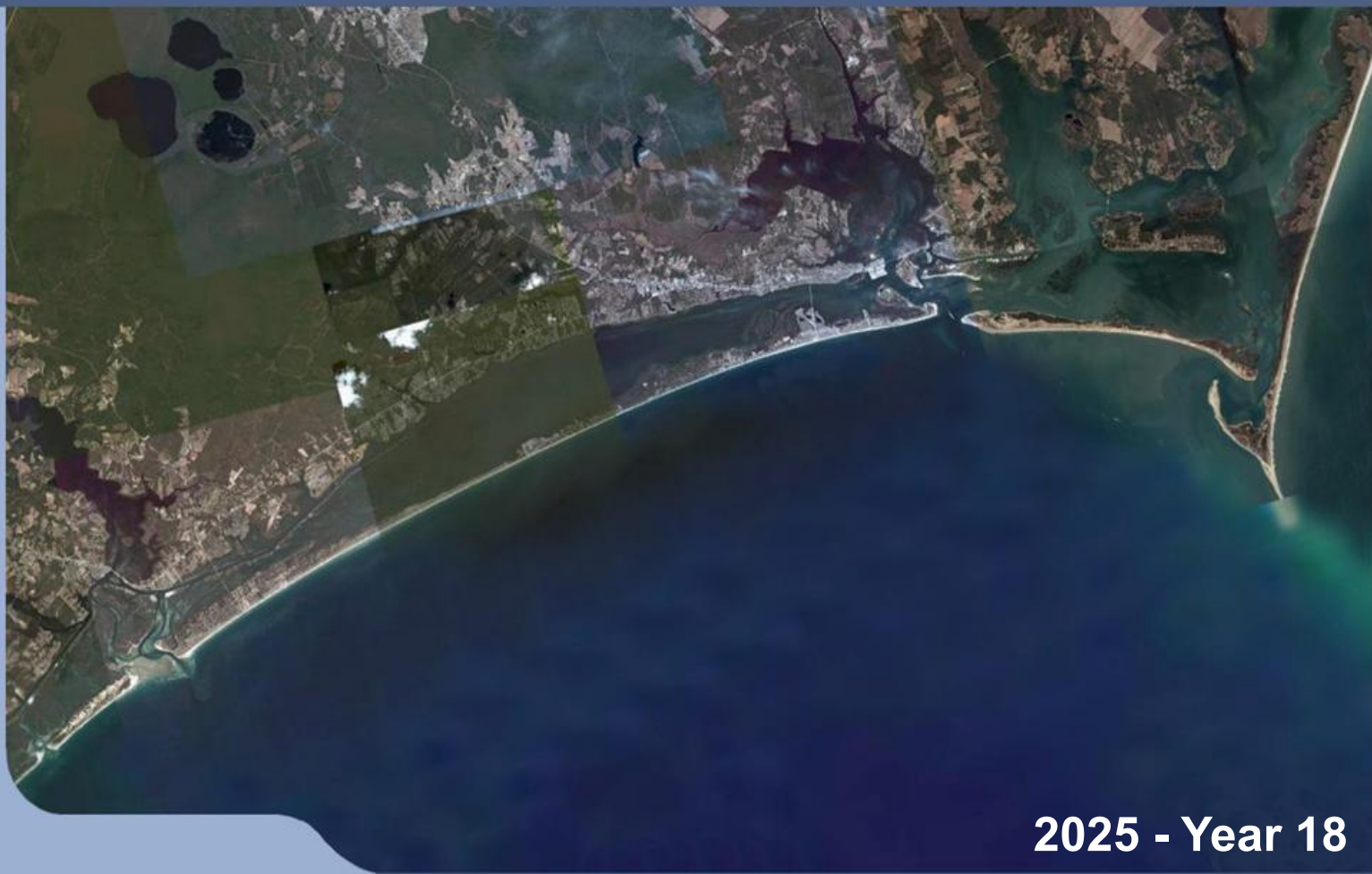


Bogue Banks Beach and Nearshore Mapping Program



Presented By:



moffatt & nichol

2025 - Year 18

August 25, 2025

Presentation Outline

➤ Data Collection

- ❖ Survey Transects
- ❖ Survey Equipment

➤ Methodology

- ❖ Shoreline Change
- ❖ Volume Change

➤ Key Events: April 2024 – April 2025

- ❖ Storm Activity
- ❖ Nourishment

➤ Summary of Annual Findings

- ❖ Shoreline & Volume Change (2024 – 2025)
- ❖ Master Beach Nourishment Plan Trigger Status (2025)
- ❖ Long-term Oceanfront Statistics (2008 – 2025)
- ❖ Background Erosion Rates (1999 – 2025)
- ❖ Inlet Conditions – Beaufort, Bogue, Barden
- ❖ Dune Volume Analysis
- ❖ Vegetation Line Analysis

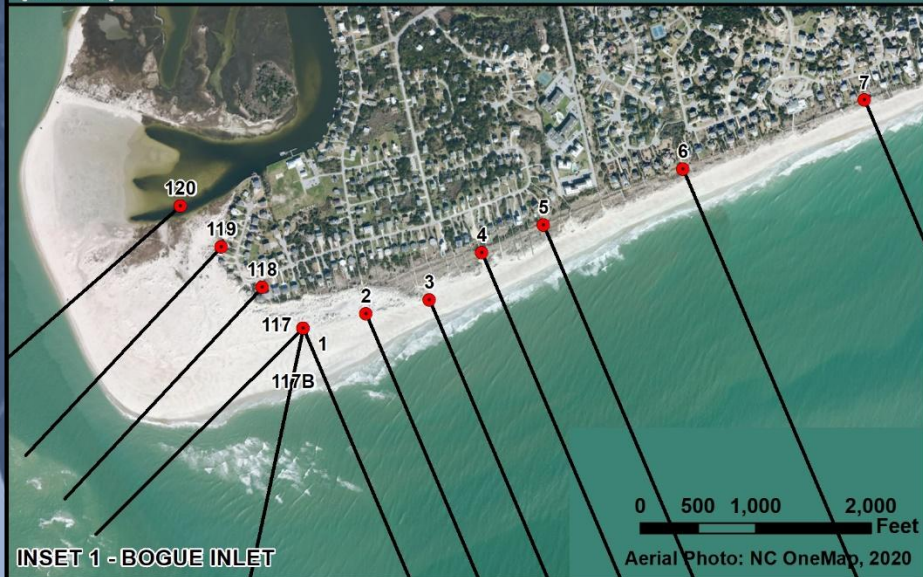
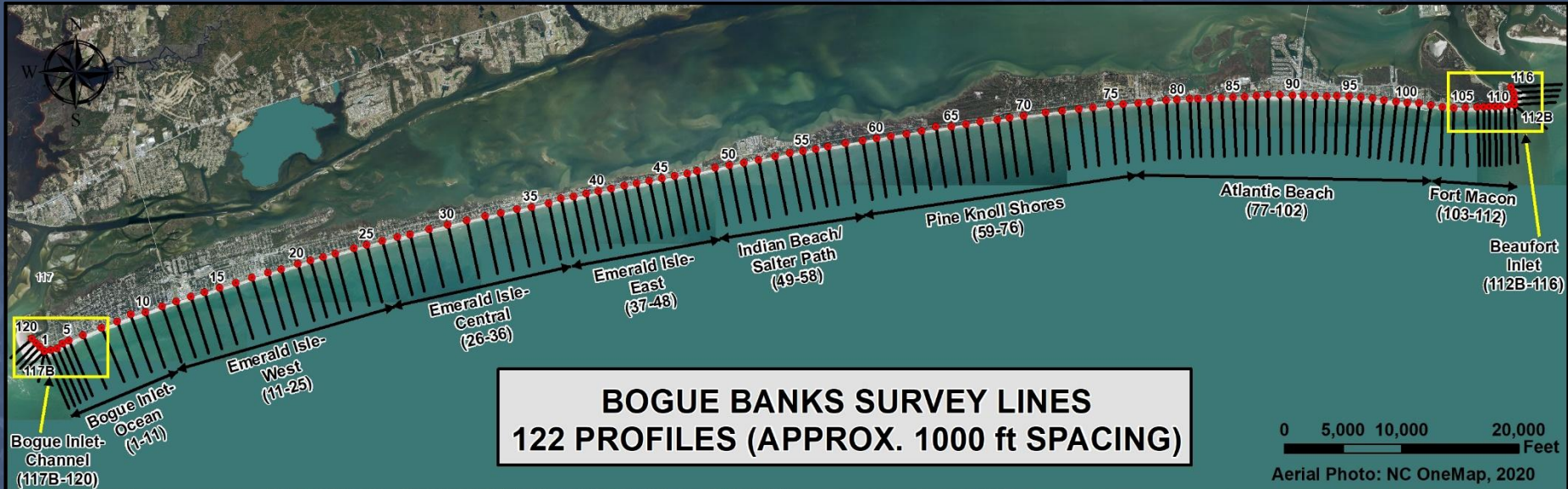
➤ Q&A/Discussion

Data Collection – Survey Transects

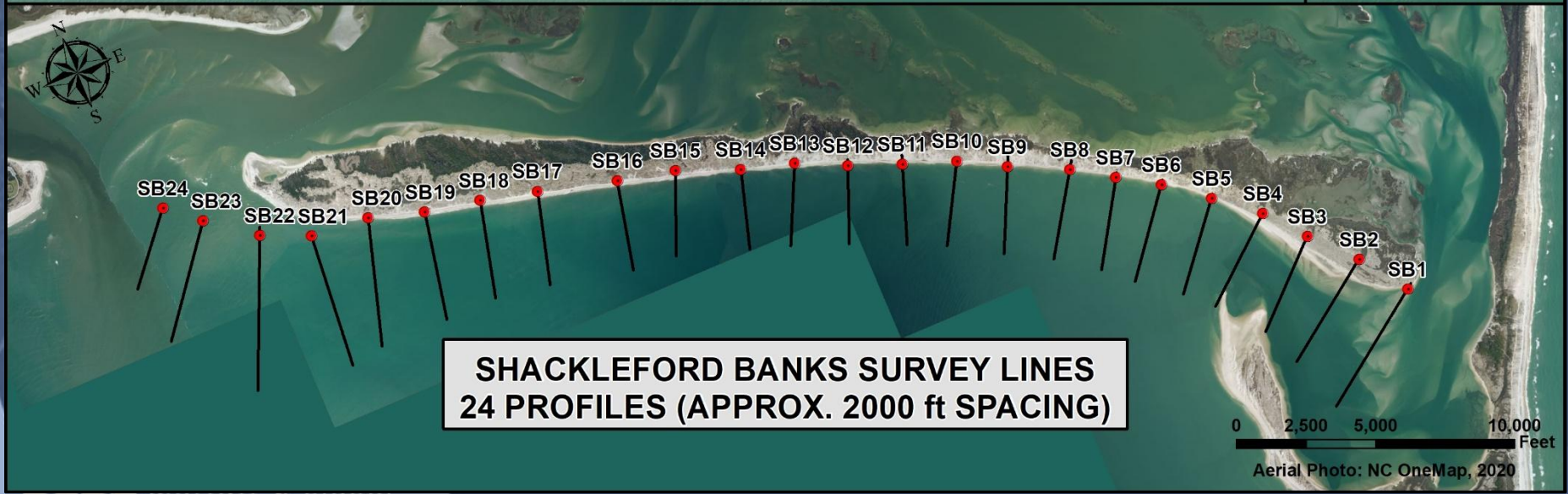
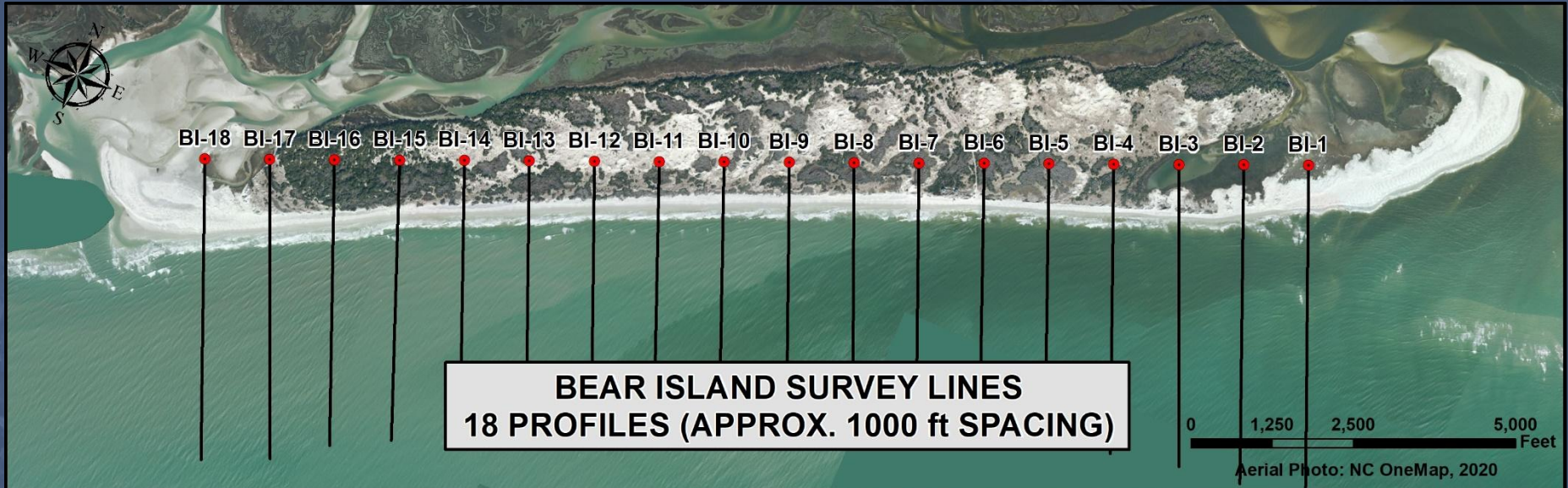
➤ 2025 Survey Dates:

- ❖ **Bogue Banks: March 18 – April 21, 2025**
 - **March 18-20: Transects 1 – 120 (Dune Topo)**
 - **April 16-21: Transects 1 – 120 (Berm Topo & Hydro)**
- ❖ **Shackleford Banks: March 27, 2025**
- ❖ **Bear Island: April 17, 2025**
- ❖ **Spring Surveys Serve As Pre-Storm Conditions**

Data Collection – Survey Transects



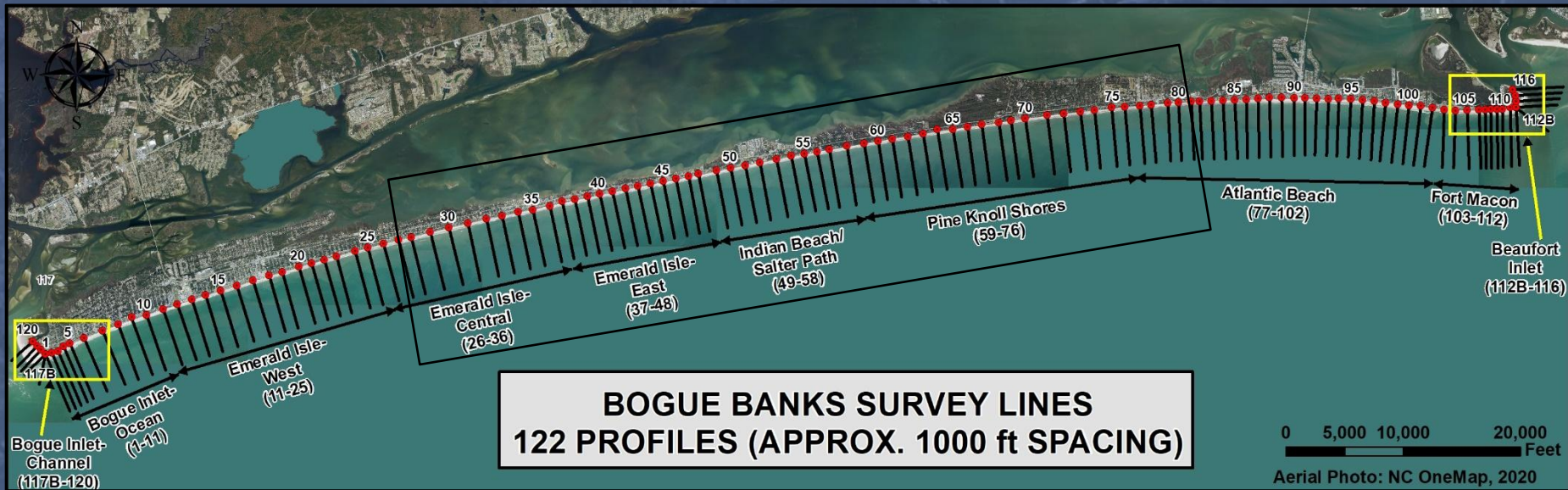
Data Collection – Survey Transects



Data Collection – Laser Scanner

➤ Mobile Laser Scanner - Transects 27 - 82

- ❖ Data Collected from Seaward Face of Incipient Dune to Waterline (Approximately +14 ft NAVD88 – 0 ft NAVD88)



Data Collection – Survey Equipment

➤ Survey Performed By Geodynamics

**RV ECHO – HYDRO
DATA AQUISION**



**ATV – TOPO DATA
AQUISION**



**ATV – MOBILE LASER
SCANNING AQUISION**

Presentation Outline

➤ Data Collection

- ❖ Survey Transects
- ❖ Survey Equipment

➤ Methodology

- ❖ Shoreline Change
- ❖ Volume Change

➤ Key Events: April 2024 – April 2025

- ❖ Storm Activity
- ❖ Nourishment

➤ Summary of Annual Findings

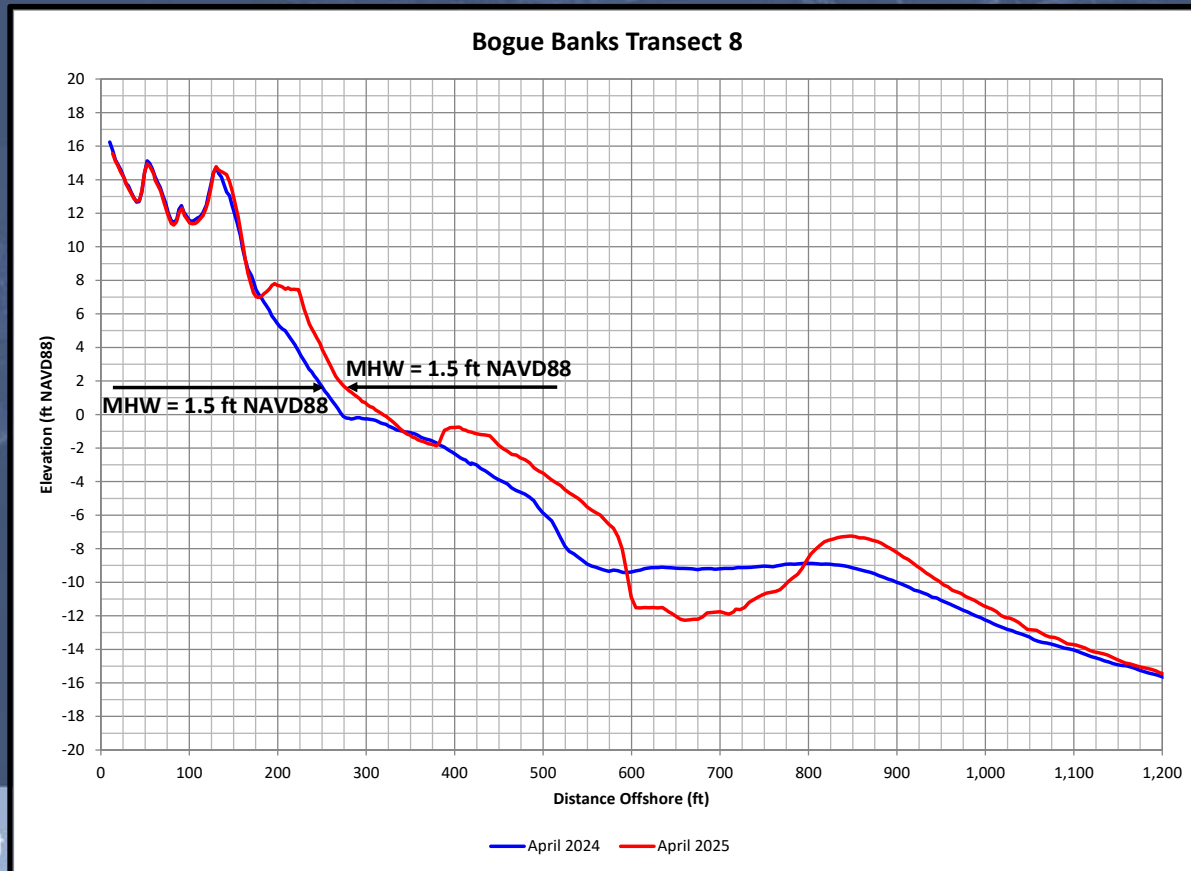
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- ❖ Vegetation Line Analysis

➤ Q&A/Discussion

Methodology – Shoreline Change

➤ Shoreline Defined As Mean High Water (MHW)

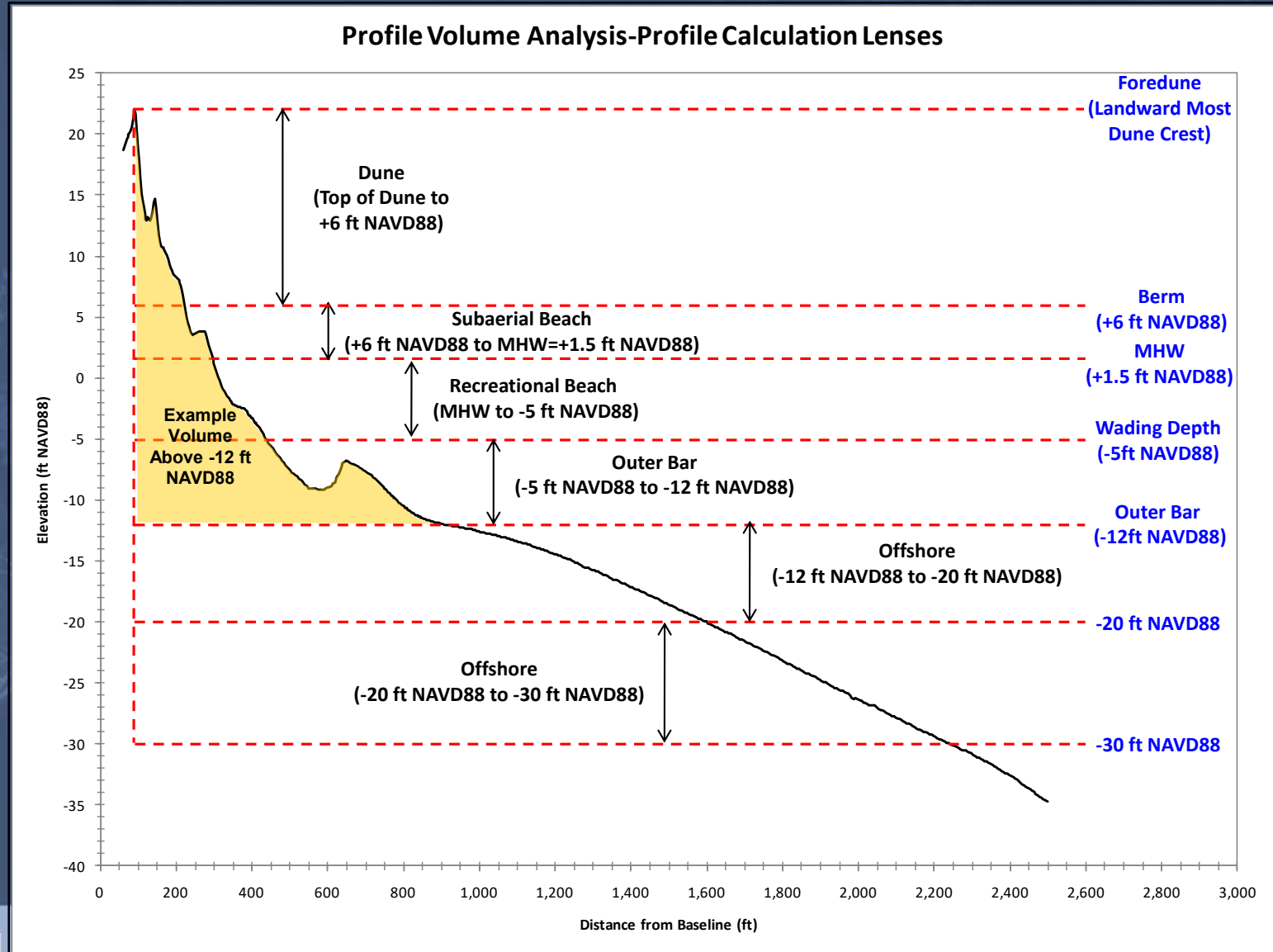
- ❖ Bogue Banks: MHW = 1.5 ft NAVD88
- ❖ Shackleford Banks: MHW = 1.5 ft NAVD88
- ❖ Bear Island: MHW = 1.7 ft NAVD88



Methodology – Volume Change

- Calculate Volume Above Multiple Elevations:
 - ❖ +6.0 ft NAVD88 – Dune
 - ❖ +1.5 ft NAVD88 – MHW
 - ❖ -5 ft NAVD88 – Wading Depth
 - ❖ -12 ft NAVD88 – Offshore Bar
 - ❖ -20 ft NAVD88 – Depth of Closure (Upper Bracket)
 - ❖ -30 ft NAVD88 – Depth of Closure (Lower Bracket)
- Use Volumes For:
 - ❖ Calculating Annual Volume Changes
 - ❖ Calculating/Updating Background Erosion Rates
 - ❖ Assessing Current Profile Conditions Compared to MBNP Nourishment Triggers

Methodology – Volume Calculation Lenses



Presentation Outline

➤ Data Collection

- ❖ Survey Transects
- ❖ Survey Equipment

➤ Methodology

- ❖ Shoreline Change
- ❖ Volume Change

➤ Key Events: April 2024 – April 2025

- ❖ Storm Activity
- ❖ Nourishment

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➤ Q&A/Discussion

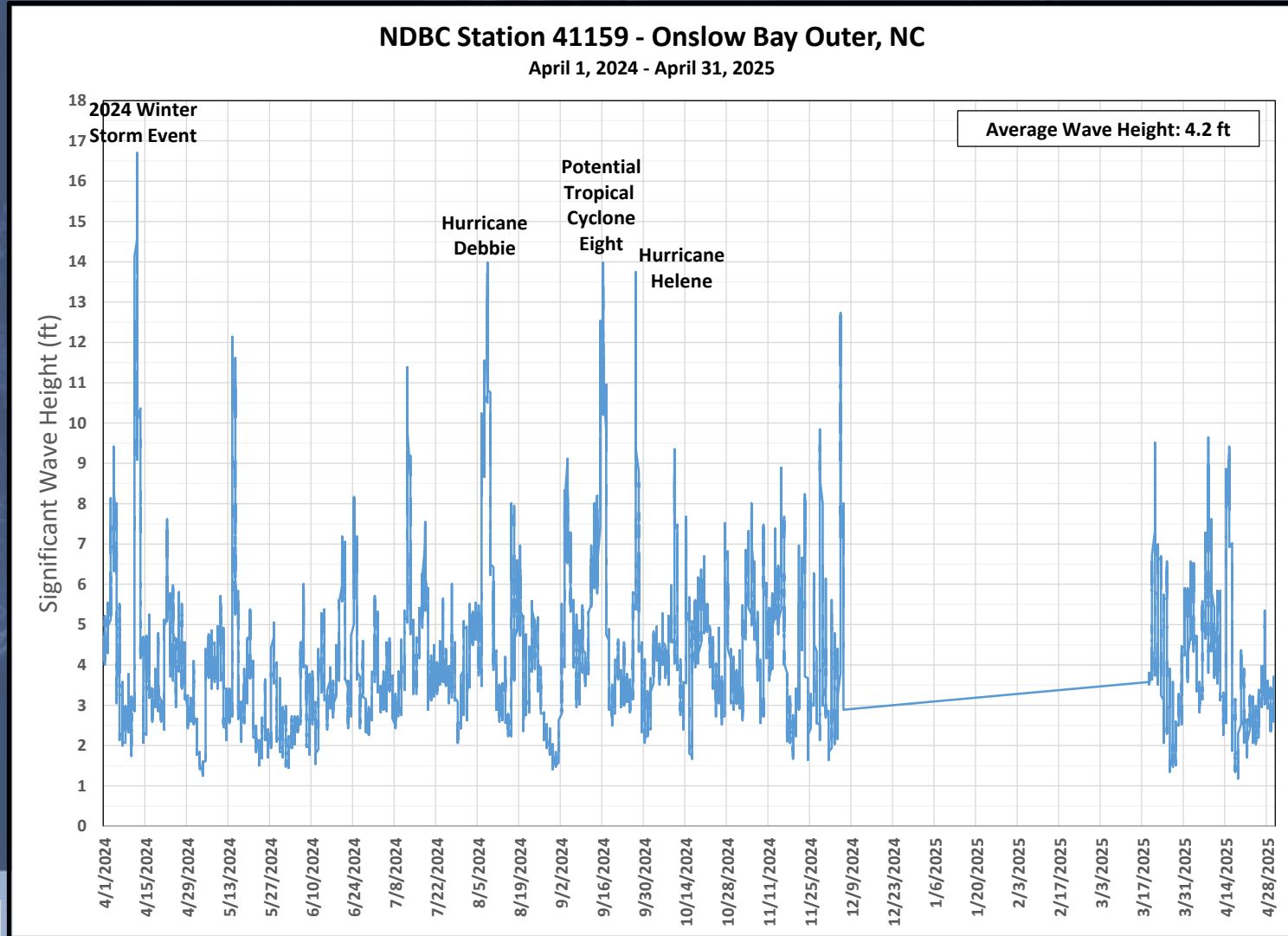
Key Events: April 2024 – April 2025

➤ Storm Activity

- ❖ **2024 Atlantic Hurricane Season (June 2024 – November 2024) Was Slightly Active But No Major Hurricanes**
 - 4 Events From In Which Wave Heights Exceeded 10 ft (3m)
 - Hurricane Debbie (8/8/24) – Max Offshore Wave Height = 13.9 ft
 - PTC #8 (9/16/24) – Max Offshore Wave Height = 13.9 ft
- ❖ **Nor'easter Season (December 2024 – June 2025) Was Fairly Quiescent (Buoy Offline Mid-Dec through Mid-March)**
 - 1 Event In Which Wave Heights Exceeded 10 ft (3m)
 - Typical Nor'Easter Offshore Wave Heights = 10 ft – 13 ft
 - Buoy Offshore of Wilmington Showed 1 Early March Event
 - Previously Year Experienced 11 Events

Key Events: April 2024 – April 2025

➤ Storm Activity: Sta 41159 (Onslow Bay Outer)

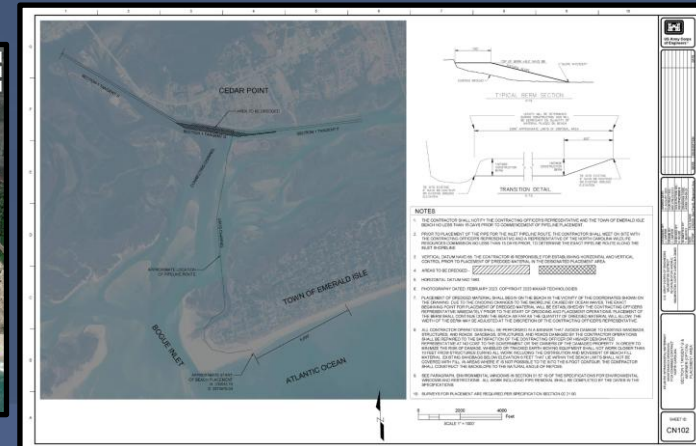
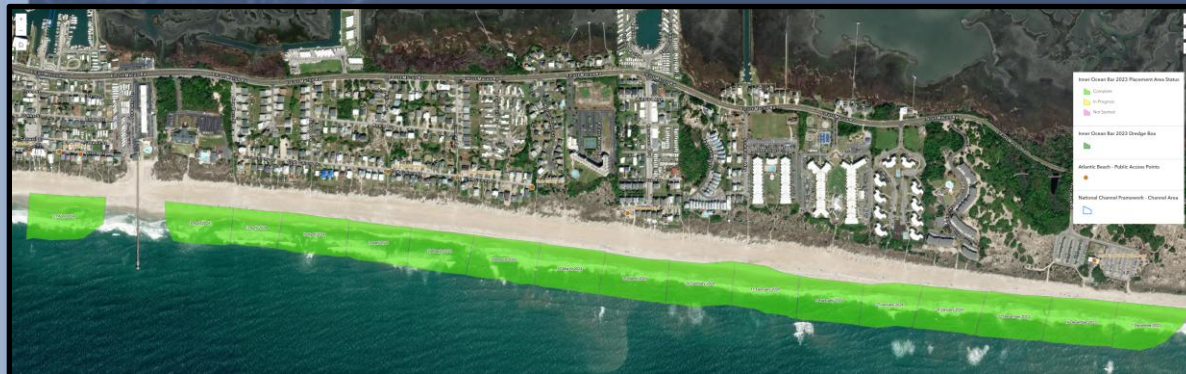


Key Events: April 2024 – April 2025

➤ Nourishment

❖ No Nourishment Events During 2024 to 2025 Monitoring Period

- Previously (December 2023 – April 2024) USACE Placement of Approximately 797,475 cy on Atlantic Beach from MCH Maintenance Dredging
- Previously (January 2024 – March 2024) USACE Placement of Approximately 210,000 cy in Emerald Isle from Dredging of Bogue Inlet AIWW Crossing



Presentation Outline

➤ Data Collection

- ❖ Survey Transects
- ❖ Survey Equipment

➤ Methodology

- ❖ Shoreline Change
- ❖ Volume Change

➤ Key Events: April 2024 – April 2025

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- ❖ Nourishment

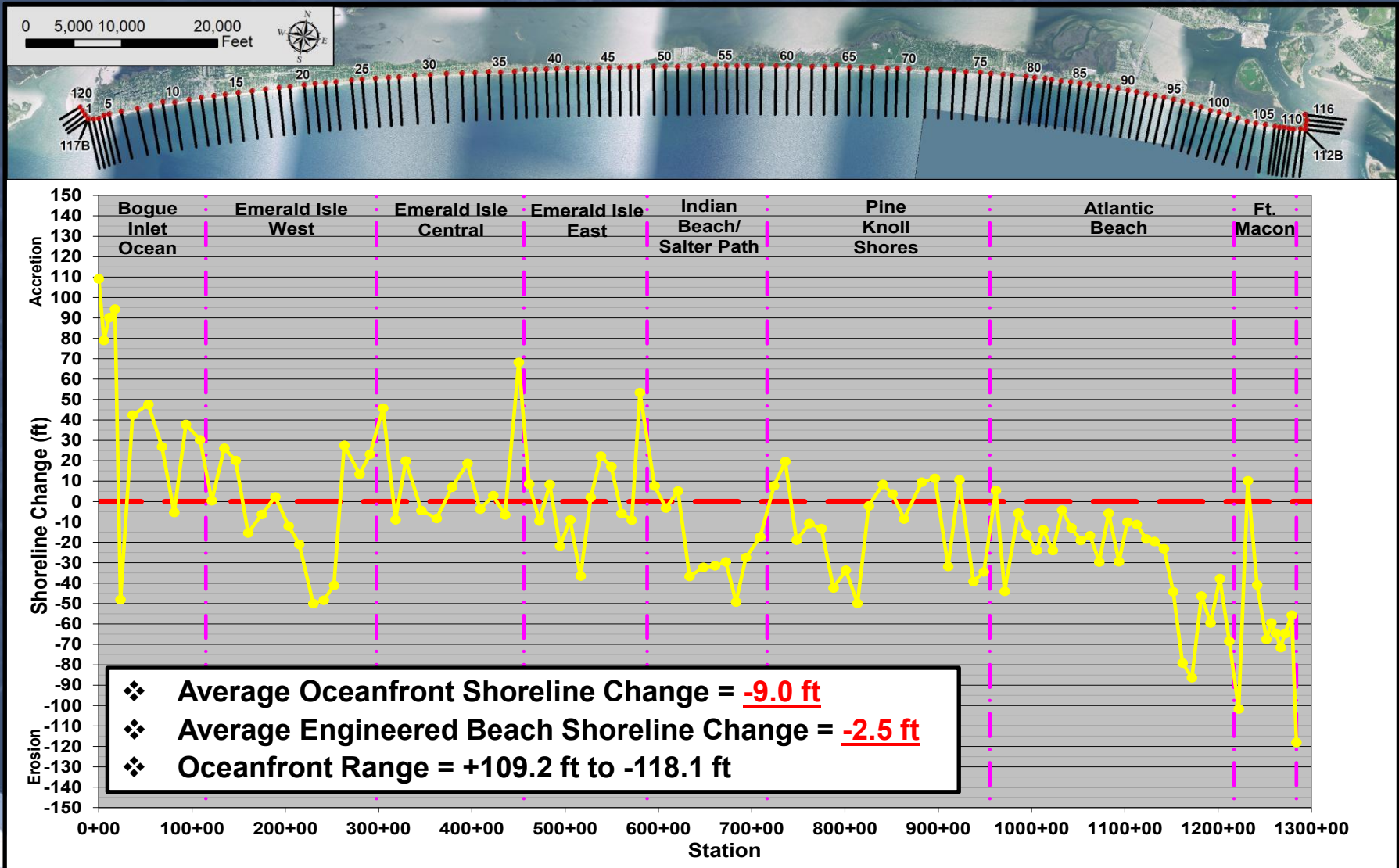
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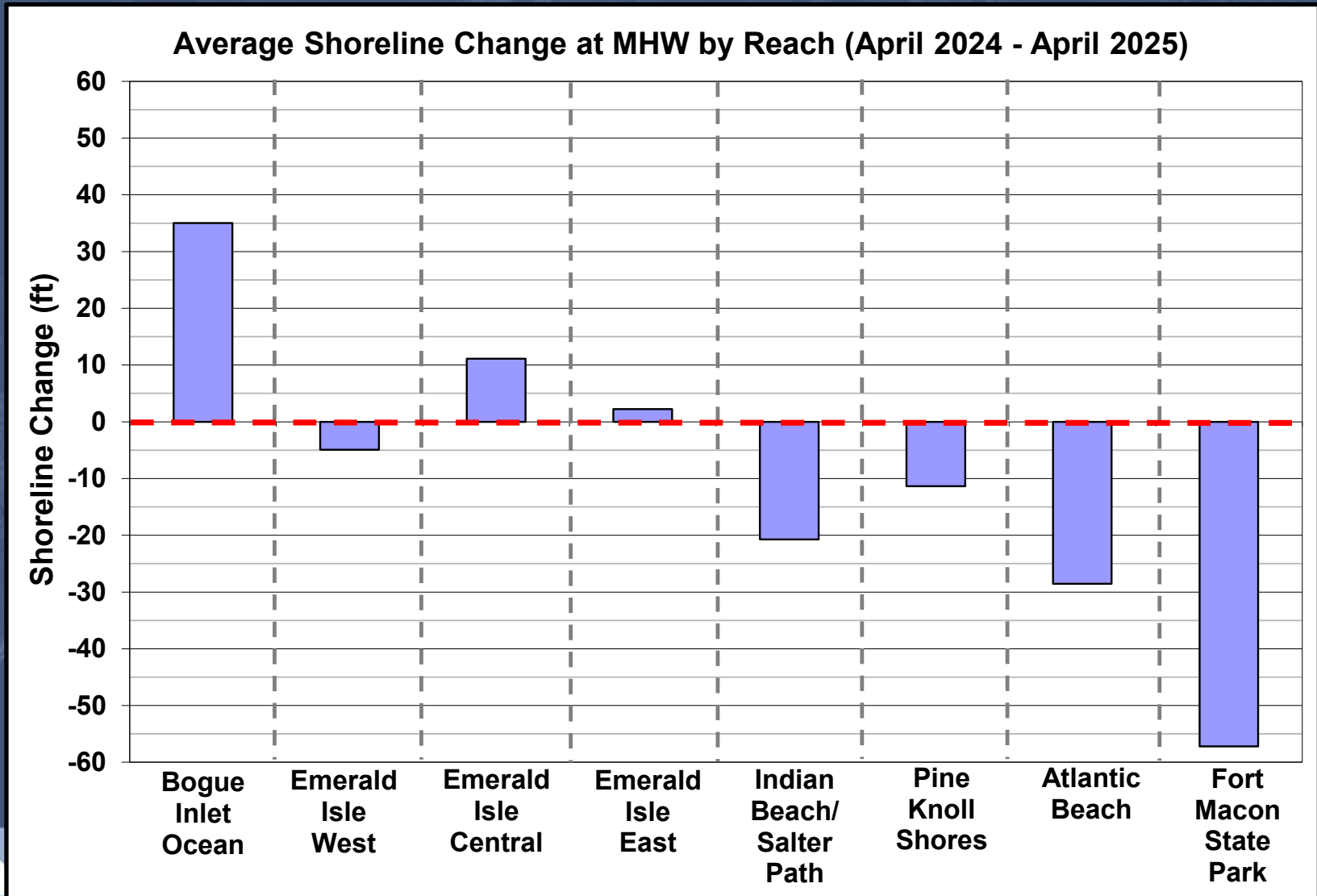
Summary of Findings – Shoreline Change

➤ Bogue Banks - Oceanfront



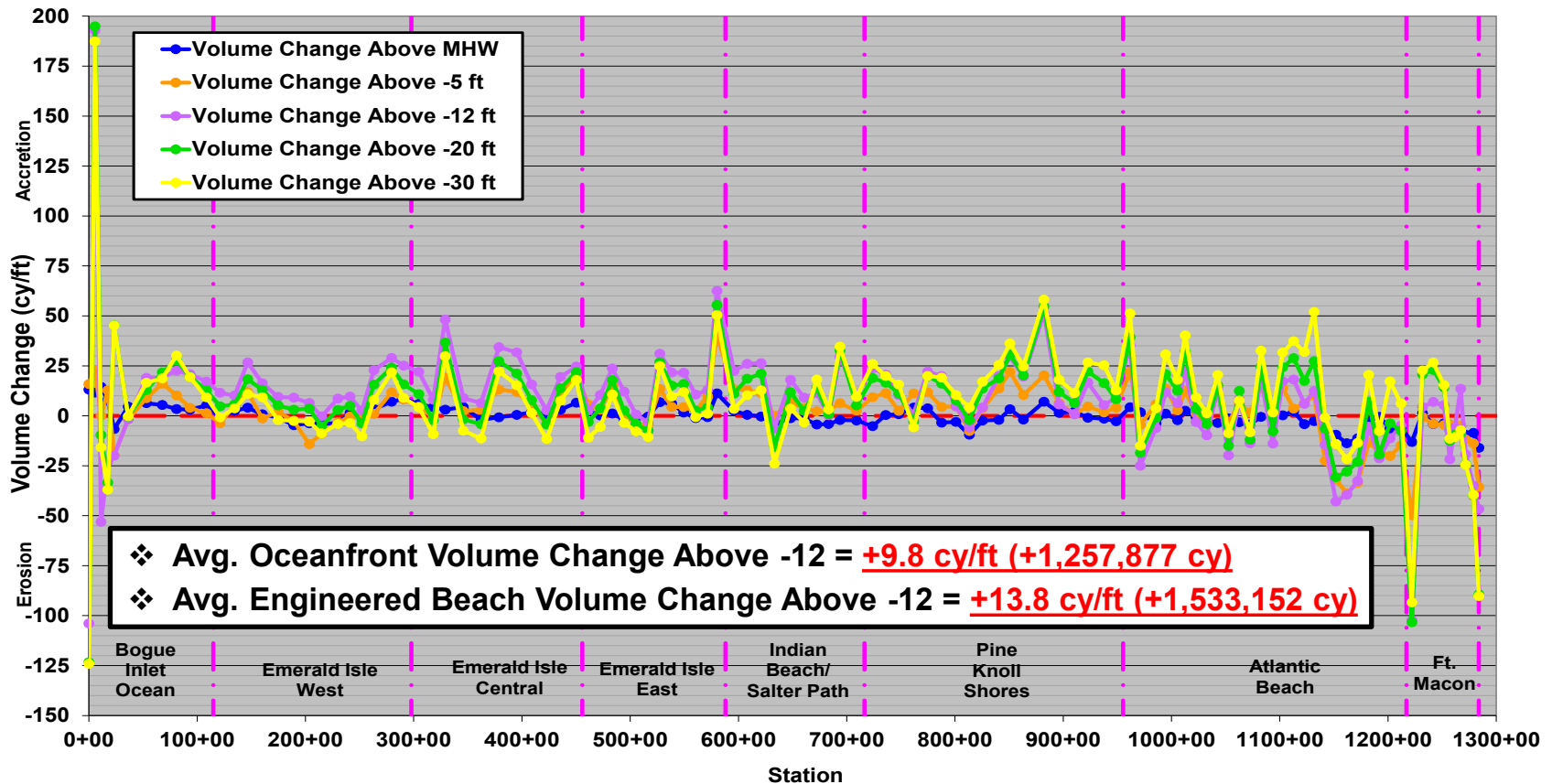
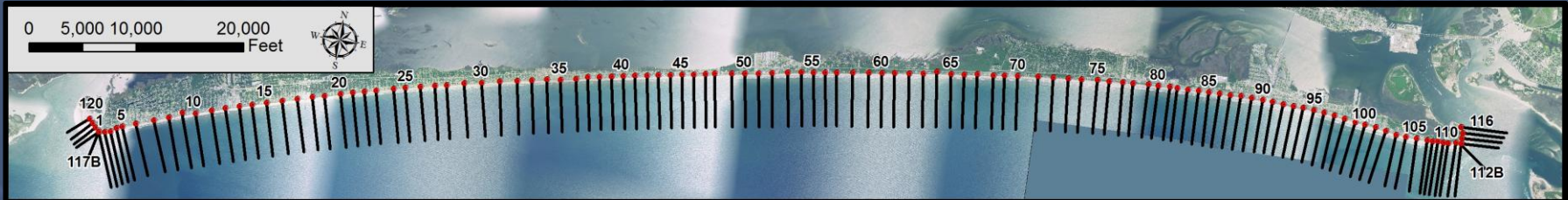
Summary of Findings – Shoreline Change

➤ Bogue Banks - Oceanfront



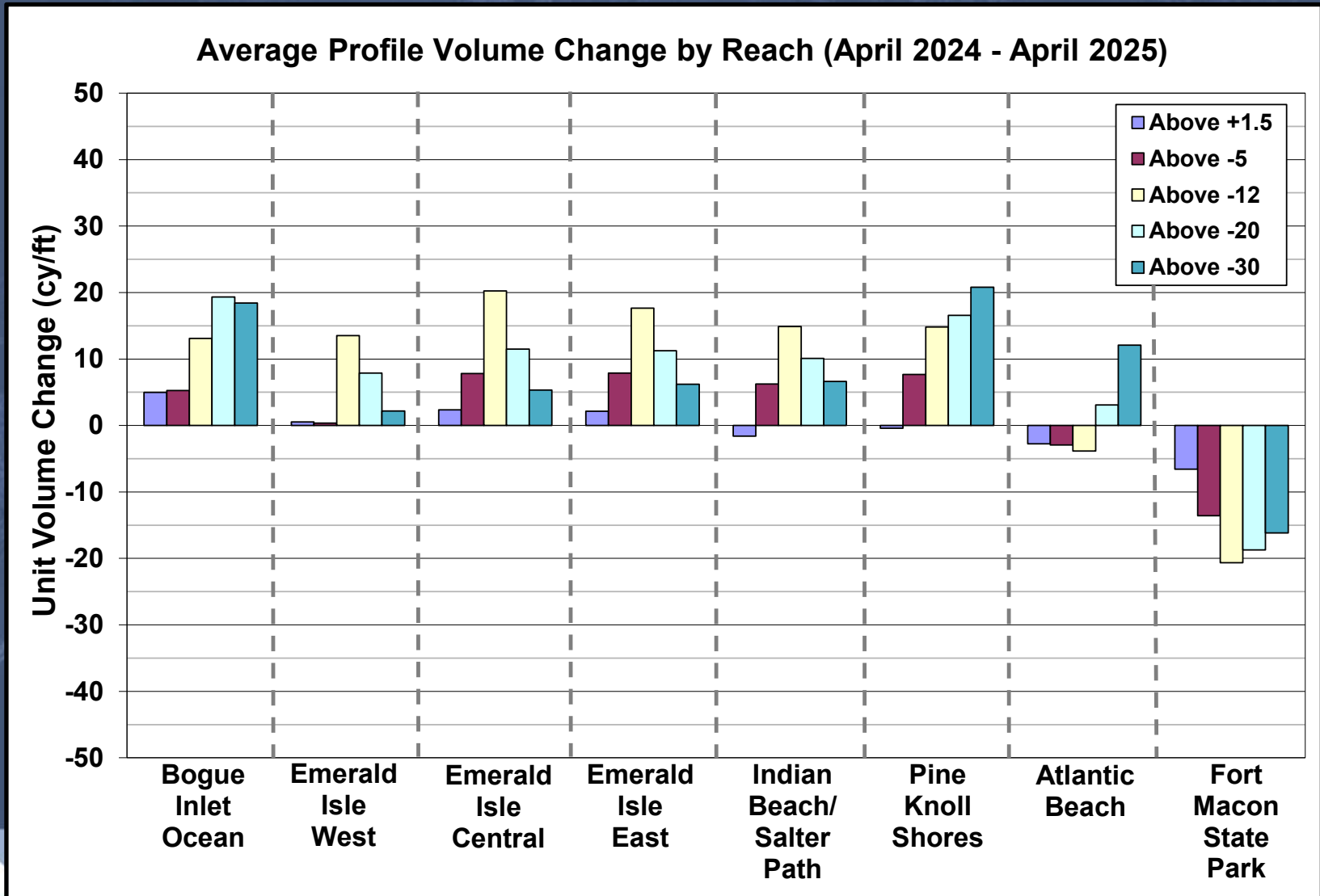
Summary of Findings – Volume Change

➤ Bogue Banks - Oceanfront



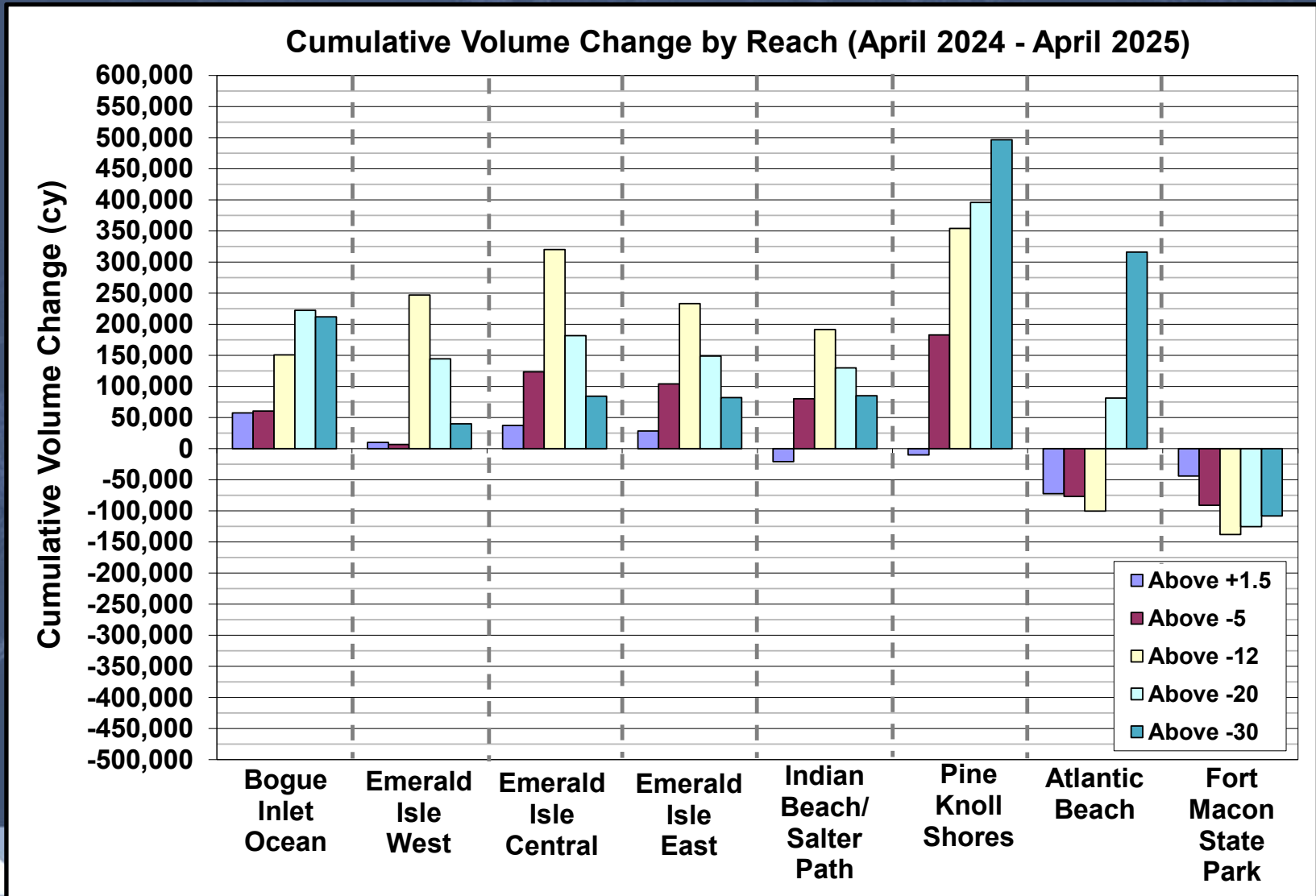
Summary of Findings – Volume Change

➤ Bogue Banks - Oceanfront



Summary of Findings – Volume Change

➤ Bogue Banks - Oceanfront



Summary of Findings – Volume Change

➤ Bogue Banks FEMA Engineered Beach Volume Change:

- ❖ Above +1.5 ft NAVD88 = **+0.8 cy/ft** = **+90,306 cy**
 - *Range = -9.5 – +14.5 cy/ft*
- ❖ Above -5 ft NAVD88 = **+5.9 cy/ft** = **+654,670 cy**
 - *Range = -19.8 – +40.2 cy/ft*
- ❖ Above -12 ft NAVD88 = **+13.8 cy/ft** = **+1,533,152 cy**
 - *Range = -104.0 - +192.9 cy/ft*
- ❖ Above -20 ft NAVD88 = **+12.1 cy/ft** = **+1,343,819 cy**
 - *Range = -123.4 - +194.9 cy/ft*
- ❖ Above -30 ft NAVD88 = **+10.9 cy/ft** = **+1,212,959 cy**
 - *Range = -124.1 - +187.3 cy/ft*

Summary of Findings – Volume Change

➤ Bogue Banks Oceanfront Volume Change:

- ❖ Above +1.5 ft NAVD88 = **-0.1 cy/ft = -14,475 cy**
 - *Range = -16.0 – +14.5 cy/ft*

- ❖ Above -5 ft NAVD88 = **+3.0 cy/ft = +389,650 cy**
 - *Range = -49.8 - +40.2 cy/ft*

- ❖ Above -12 ft NAVD88 = **+9.8 cy/ft = +1,257,877 cy**
 - *Range = -104.0 - +192.9 cy/ft*

- ❖ Above -20 ft NAVD88 = **+9.2 cy/ft = +1,178,262 cy**
 - *Range = -123.4 - +194.9 cy/ft*

- ❖ Above -30 ft NAVD88 = **+9.4 cy/ft = +1,207,838 cy**
 - *Range = -124.1 - +187.3 cy/ft*

Summary of Findings – Volume Change

➤ Bogue Banks Statistics

Reach (Transects)	Reach Length	Average Shoreline Change @ MHW +1.5 ft NAVD88	Average Volume Change Above +1.5 ft NAVD88	Cumulative Volume Change Above +1.5 ft NAVD88	Average Volume Change Above -5 ft NAVD88	Cumulative Volume Change Above -5 ft NAVD88	Average Volume Change Above -12 ft NAVD88	Cumulative Volume Change Above -12 ft NAVD88	Average Volume Change Above -20 ft NAVD88	Cumulative Volume Change Above -20 ft NAVD88	Average Volume Change Above -30 ft NAVD88	Cumulative Volume Change Above -30 ft NAVD88
	ft	ft	cy/ft	cy	cy/ft	cy	cy/ft	cy	cy/ft	cy	cy/ft	cy
Bogue Inlet-Ocean (Transects 1-11)	11,488	35.0	5.0	57,373	5.3	60,376	13.1	150,594	19.3	222,173	18.4	211,726
Emerald Isle-West (Transects 12-25)	18,288	-4.9	0.5	10,001	0.4	6,482	13.5	246,930	7.9	144,320	2.2	39,926
Emerald Isle-Central (Transects 26-36)	15,802	11.1	2.4	37,287	7.8	123,566	20.3	320,088	11.5	181,705	5.3	84,417
Emerald Isle-East (Transects 37-48)	13,220	2.2	2.1	28,278	7.9	104,106	17.6	233,276	11.3	148,783	6.2	82,194
Indian Beach-Salter Path (Transects 49-58)	12,850	-20.7	-1.6	-20,784	6.2	80,220	14.9	191,432	10.1	129,842	6.6	85,126
Pine Knoll Shores (Transects 59-76)	23,878	-11.4	-0.4	-10,128	7.7	182,817	14.8	354,116	16.6	395,571	20.8	496,597
Atlantic Beach - West (Transects 77 - 91)	15,255	-16.7	-0.8	-11,721	6.4	97,102	2.4	36,716	8.0	121,424	14.0	212,973
Atlantic Beach - East (Transects 92 - 102)	10,921	-45.1	-5.6	-60,746	-15.9	-174,116	-12.6	-137,110	-3.7	-40,276	9.4	103,093
Fort Macon State Park (Transects 103-112)	6,691	-57.2	-6.6	-44,035	-13.6	-90,904	-20.6	-138,165	-18.7	-125,281	-16.2	-108,214
Beaufort Inlet (Transects 112B-116)	2,000	57.5	4.0	7,981	13.0	26,084	23.0	46,082	38.4	76,875	45.2	90,402
Bogue Inlet-Channel (Transects 117-120)**	2,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Reach Length	Weighted Avg	Weighted Avg	Total	Weighted Avg	Total	Weighted Avg	Total	Weighted Avg	Total	Weighted Avg	Total
FEMA Engineered Beach (Transects 1-91)	110,781	-2.5	0.8	90,306	5.9	654,670	13.8	1,533,152	12.1	1,343,819	10.9	1,212,959
Oceanfront (Transects 1-112)	128,393	-9.0	-0.1	-14,475	3.0	389,650	9.8	1,257,877	9.2	1,178,262	9.4	1,207,838

Summary of Findings – Volume Change

➤ Bogue Banks Statistics

Reach (Transects)	Reach Length	Average Shoreline Change @ MHW +1.5 ft NAVD88	Average Volume Change Above +1.5 ft NAVD88	Cumulative Volume Change Above +1.5 ft NAVD88	Average Volume Change Above -5 ft NAVD88	Cumulative Volume Change Above -5 ft NAVD88	Average Volume Change Above -12 ft NAVD88	Cumulative Volume Change Above -12 ft NAVD88	Average Volume Change Above -20 ft NAVD88	Cumulative Volume Change Above -20 ft NAVD88	Average Volume Change Above -30 ft NAVD88	Cumulative Volume Change Above -30 ft NAVD88
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Summary of Findings – Volume Change

➤ Bogue Banks Statistics

***2023-2024: Lost 1,733,395 cy Along Engineered Beach**

Reach (Transects)	Reach Length	Average Shoreline Change @ MHW +1.5 ft NAVD88	Average Volume Change Above +1.5 ft NAVD88	Cumulative Volume Change Above +1.5 ft NAVD88	Average Volume Change Above -5 ft NAVD88	Cumulative Volume Change Above -5 ft NAVD88	Average Volume Change Above -12 ft NAVD88	Cumulative Volume Change Above -12 ft NAVD88	Average Volume Change Above -20 ft NAVD88	Cumulative Volume Change Above -20 ft NAVD88	Average Volume Change Above -30 ft NAVD88	Cumulative Volume Change Above -30 ft NAVD88
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Summary of Findings – Volume Change

➤ Bogue Banks Statistics

***USACE Placed 797,475 cy from Transect 94 to 103**

Reach (Transects)	Reach Length	Average Shoreline Change @ MHW +1.5 ft NAVD88	Average Volume Change Above +1.5 ft NAVD88	Cumulative Volume Change Above +1.5 ft NAVD88	Average Volume Change Above -5 ft NAVD88	Cumulative Volume Change Above -5 ft NAVD88	Average Volume Change Above -12 ft NAVD88	Cumulative Volume Change Above -12 ft NAVD88	Average Volume Change Above -20 ft NAVD88	Cumulative Volume Change Above -20 ft NAVD88	Average Volume Change Above -30 ft NAVD88	Cumulative Volume Change Above -30 ft NAVD88
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Atlantic Beach - East (Transects 92 - 102)	10,921	-45.1	-5.6	-60,746	-15.9	-174,116	-12.6	-137,110	-3.7	-40,276	9.4	103,093
Fort Macon State Park (Transects 103-112)	6,691	-57.2	-6.6	-44,035	-13.6	-90,904	-20.6	-138,165	-18.7	-125,281	-16.2	-108,214
Beaufort Inlet (Transects 112B-116)	2,000	57.5	4.0	7,981	13.0	26,084	23.0	46,082	38.4	76,875	45.2	90,402
Bogue Inlet-Channel (Transects 117-120)**	2,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Reach Length	Weighted Avg	Weighted Avg	Total	Weighted Avg	Total	Weighted Avg	Total	Weighted Avg	Total	Weighted Avg	Total
FEMA Engineered Beach (Transects 1-91)	110,781	-2.5	0.8	90,306	5.9	654,670	13.8	1,533,152	12.1	1,343,819	10.9	1,212,959
Oceanfront (Transects 1-112)	128,393	-9.0	-0.1	-14,475	3.0	389,650	9.8	1,257,877	9.2	1,178,262	9.4	1,207,838

Summary of Findings – Volume Change

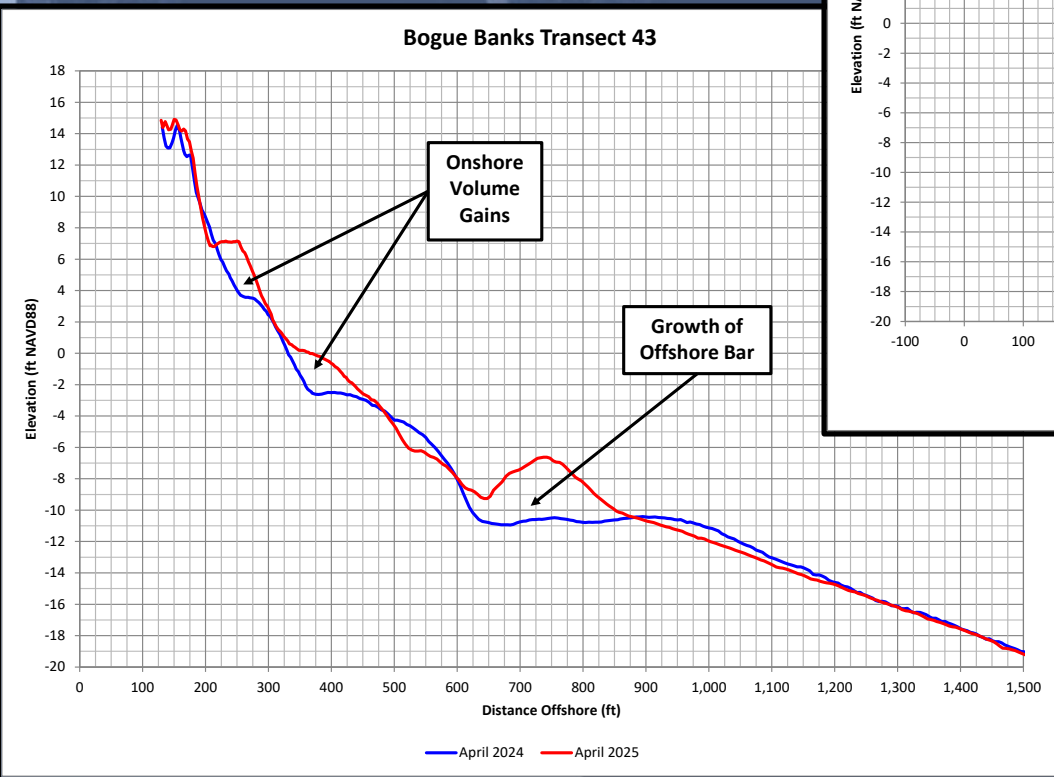
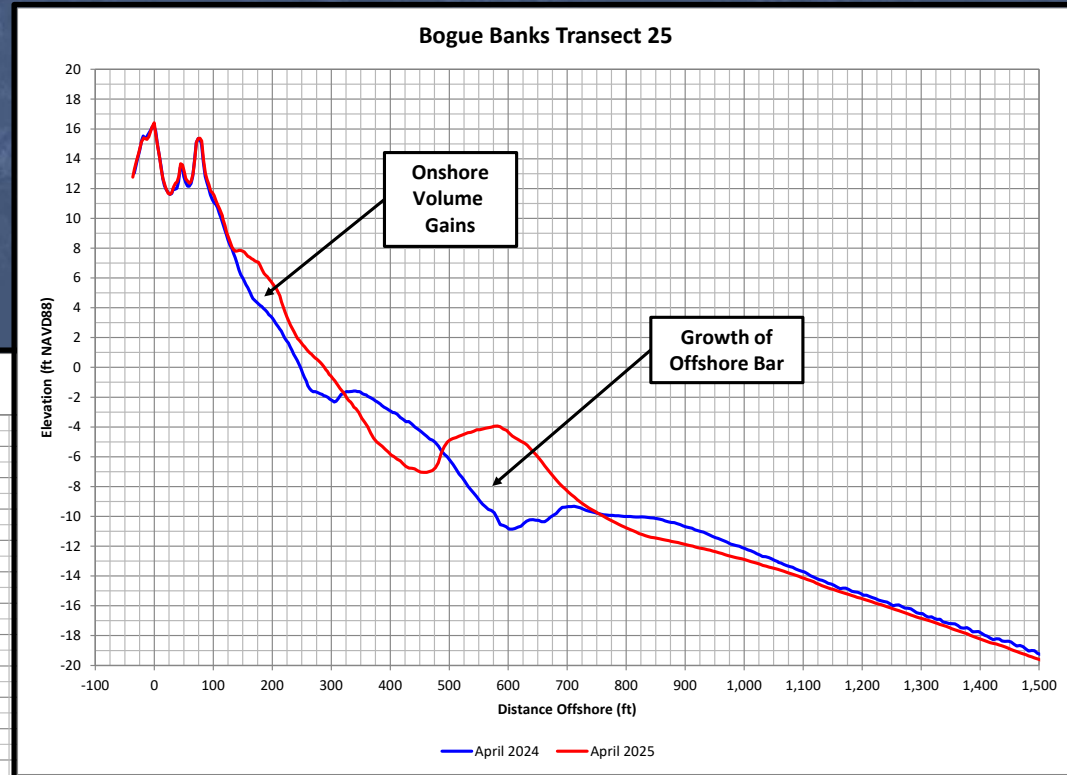
➤ Bogue Banks Statistics

Reach (Transects)	Reach Length	Average Shoreline Change @ MHW +1.5 ft NAVD88	Average Volume Change Above +1.5 ft NAVD88	Cumulative Volume Change Above +1.5 ft NAVD88	Average Volume Change Above -5 ft NAVD88	Cumulative Volume Change Above -5 ft NAVD88	Average Volume Change Above -12 ft NAVD88	Cumulative Volume Change Above -12 ft NAVD88	Average Volume Change Above -20 ft NAVD88	Cumulative Volume Change Above -20 ft NAVD88	Average Volume Change Above -30 ft NAVD88	Cumulative Volume Change Above -30 ft NAVD88
	ft	ft	cy/ft	cy	cy/ft	cy	cy/ft	cy	cy/ft	cy	cy/ft	cy
Bogue Inlet-Ocean (Transects 1-11)	11,488	35.0	5.0	57,373	5.3	60,376	13.1	150,594	19.3	222,173	18.4	211,726
Emerald Isle-West (Transects 12-25)	18,288	-4.9	0.5	10,001	0.4	6,482	13.5	246,930	7.9	144,320	2.2	39,926
Emerald Isle-Central (Transects 26-36)	15,802	11.1	2.4	37,287	7.8	123,566	20.3	320,088	11.5	181,705	5.3	84,417
Emerald Isle-East (Transects 37-48)	13,220	2.2	2.1	28,278	7.9	104,106	17.6	233,276	11.3	148,783	6.2	82,194
Indian Beach-Salter Path (Transects 49-58)	12,850	-20.7	-1.6	-20,784	6.2	80,220	14.9	191,432	10.1	129,842	6.6	85,126
Pine Knoll Shores (Transects 59-76)	23,878	-11.4	-0.4	-10,128	7.7	182,817	14.8	354,116	16.6	395,571	20.8	496,597
Atlantic Beach - West (Transects 77 - 91)	15,255	-16.7	-0.8	-11,721	6.4	97,102	2.4	36,716	8.0	121,424	14.0	212,973
Atlantic Beach - East (Transects 92 - 102)	10,921	-45.1	-5.6	-60,746	-15.9	-174,116	-12.6	-137,110	-3.7	-40,276	9.4	103,093
Fort Macon State Park (Transects 103-112)	6,691	-57.2	-6.6	-44,035	-13.6	-90,904	-20.6	-138,165	-18.7	-125,281	-16.2	-108,214
Beaufort Inlet (Transects 112B-116)	2,000	57.5	4.0	7,981	13.0	26,084	23.0	46,082	38.4	76,875	45.2	90,402
Bogue Inlet-Channel (Transects 117-120)**	2,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Reach Length	Weighted Avg	Weighted Avg	Total	Weighted Avg	Total	Weighted Avg	Total	Weighted Avg	Total	Weighted Avg	Total
FEMA Engineered Beach (Transects 1-91)	110,781	-2.5	0.8	90,306	5.9	654,670	13.8	1,533,152	12.1	1,343,819	10.9	1,212,959
Oceanfront (Transects 1-112)	128,393	-9.0	-0.1	-14,475	3.0	389,650	9.8	1,257,877	9.2	1,178,262	9.4	1,207,838

Summary of Findings – Volume Change

➤ Bogue Banks – Typical Profiles (EI, IBSP, PKS)

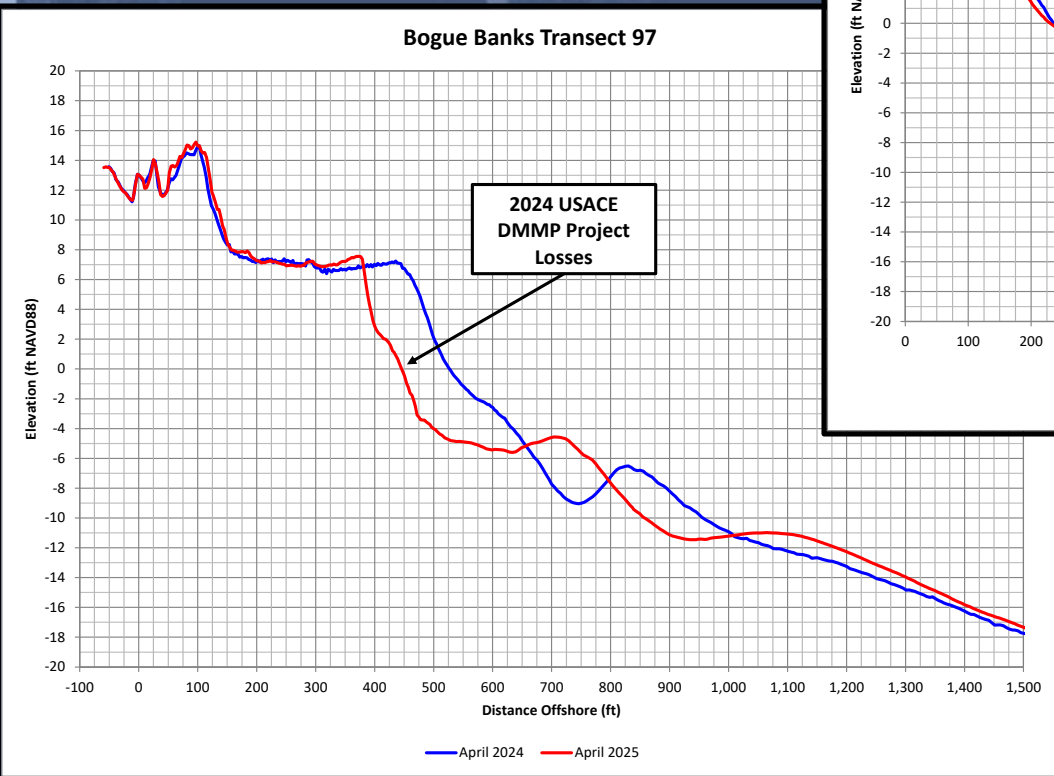
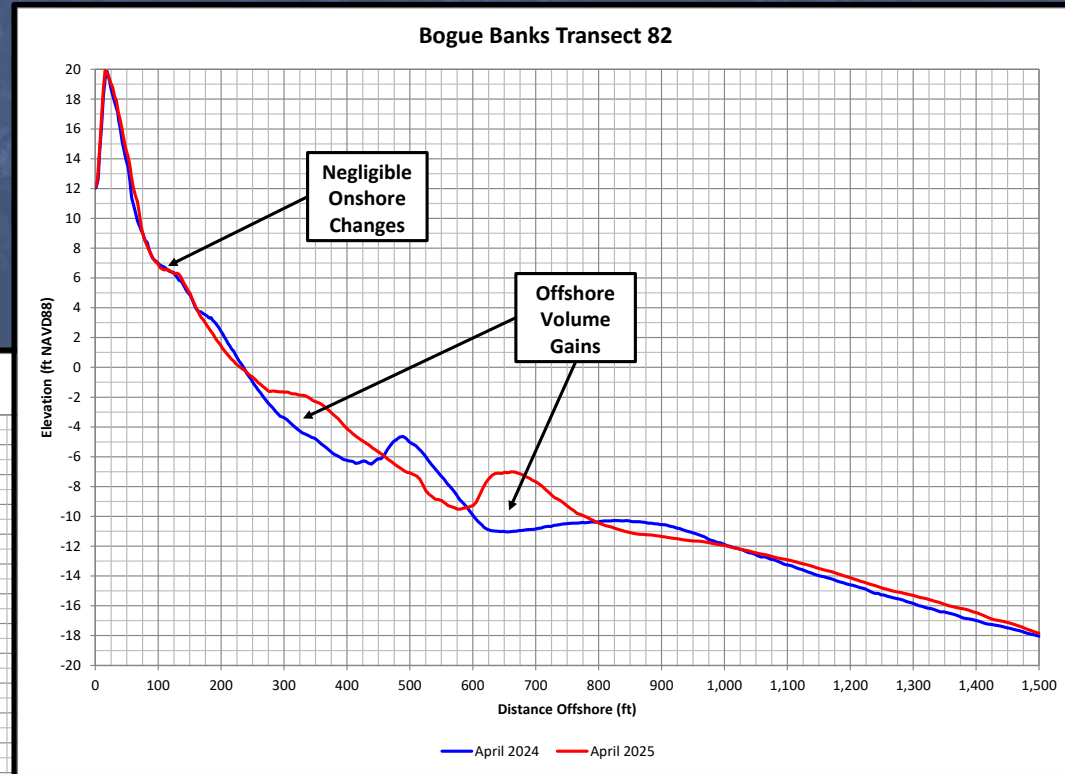
❖ Onshore Volume Gains & Growth of Offshore Bar



Summary of Findings – Volume Change

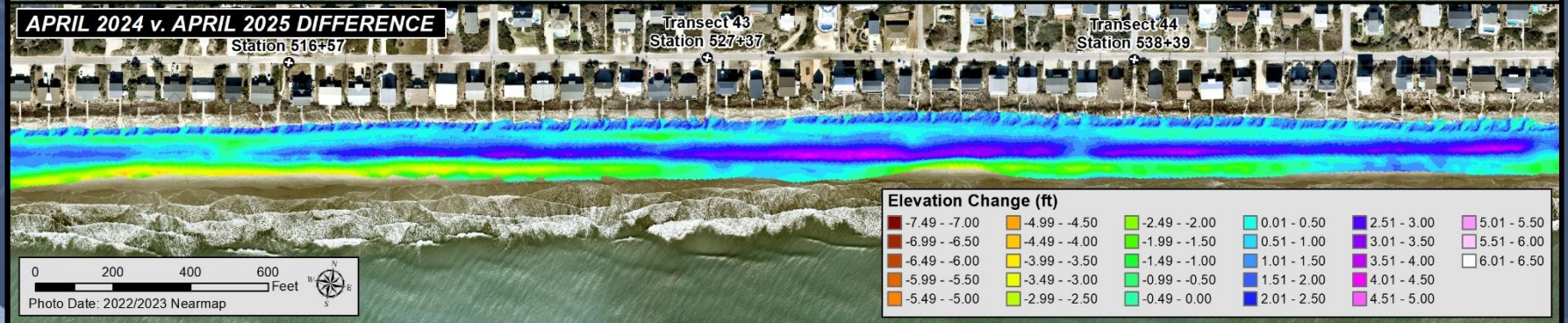
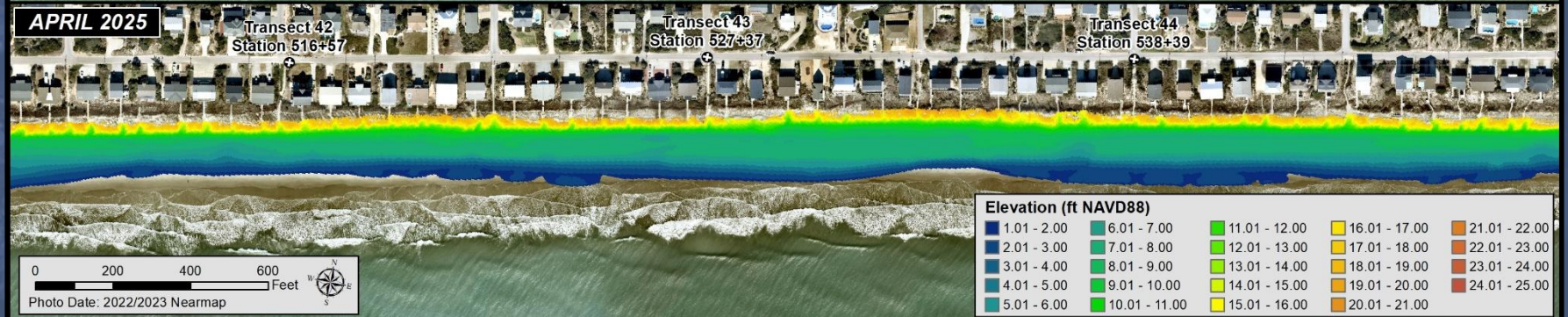
➤ Bogue Banks – Typical Profiles (Atlantic Beach)

❖ Western AB: Smaller Onshore Changes, Offshore Volume Gains

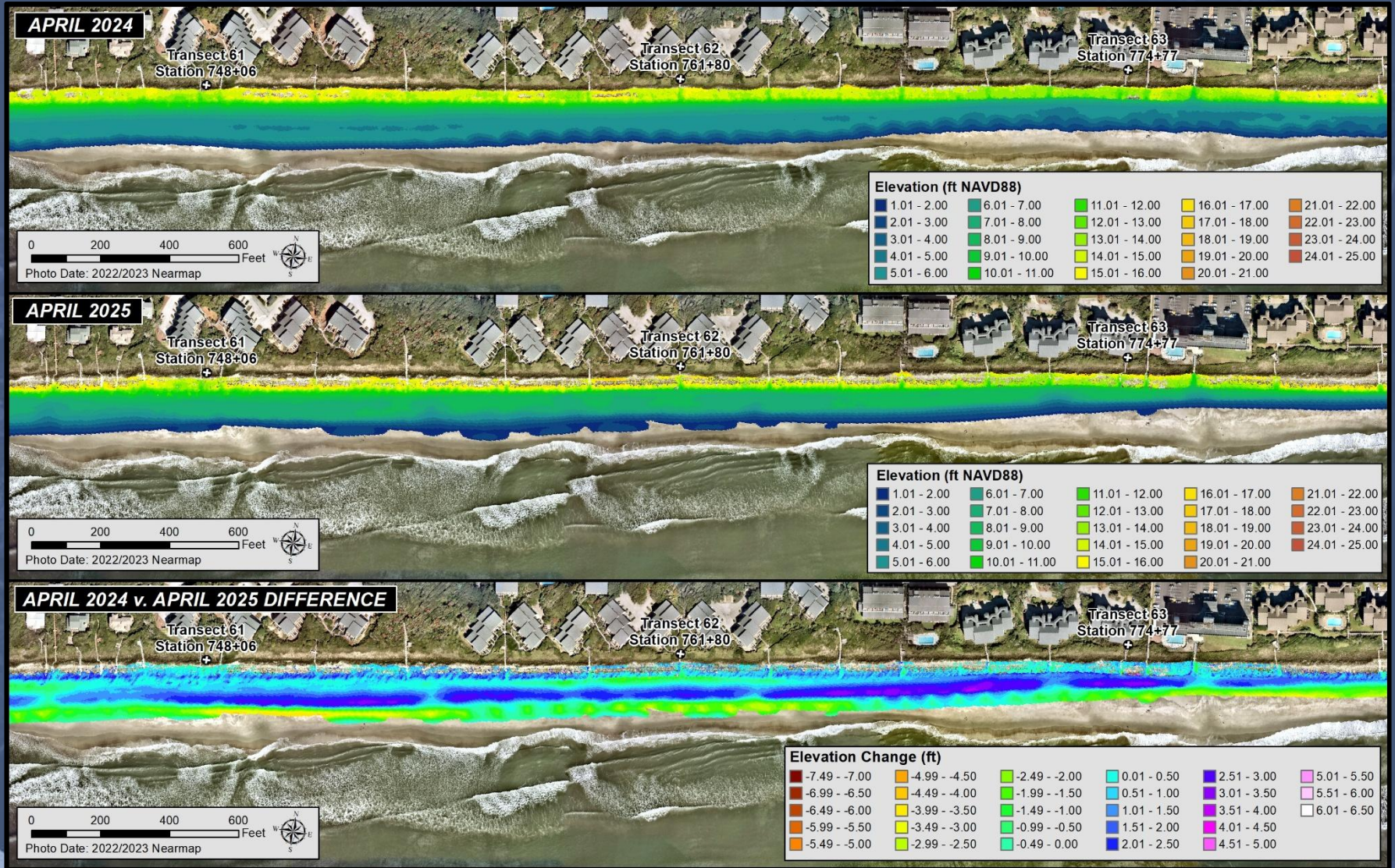


❖ Eastern AB: 2024 DMMP Project Losses As Expected

Summary of Findings – Laser Scanner

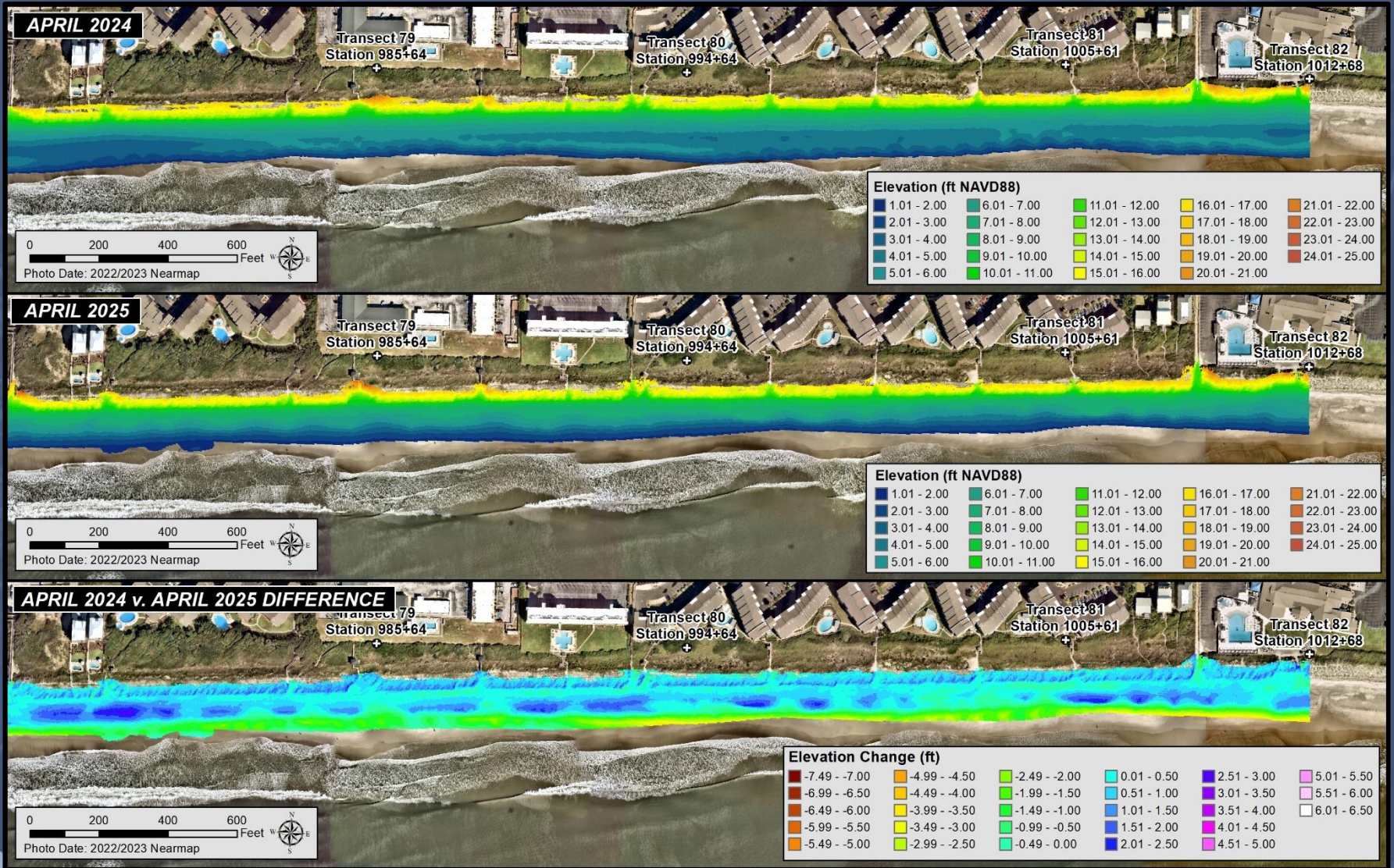


Summary of Findings – Laser Scanner



***Pine Knoll Shores – Onshore Volume Gains, MHW Losses**

Summary of Findings – Laser Scanner

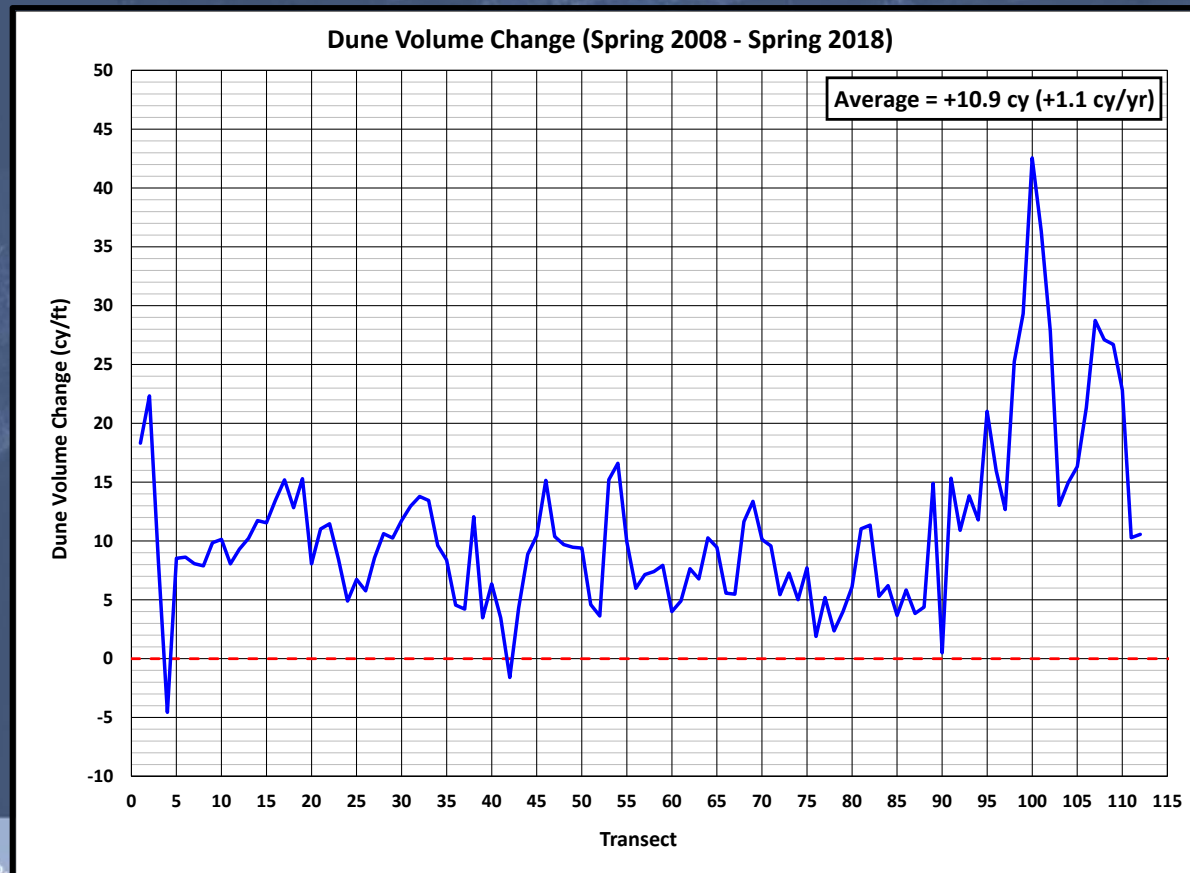


***Atlantic Beach – Onshore Volume Gains, MHW Losses**

Summary of Findings – Dune Analysis

➤ Dune Volume Change – Annual and Historical

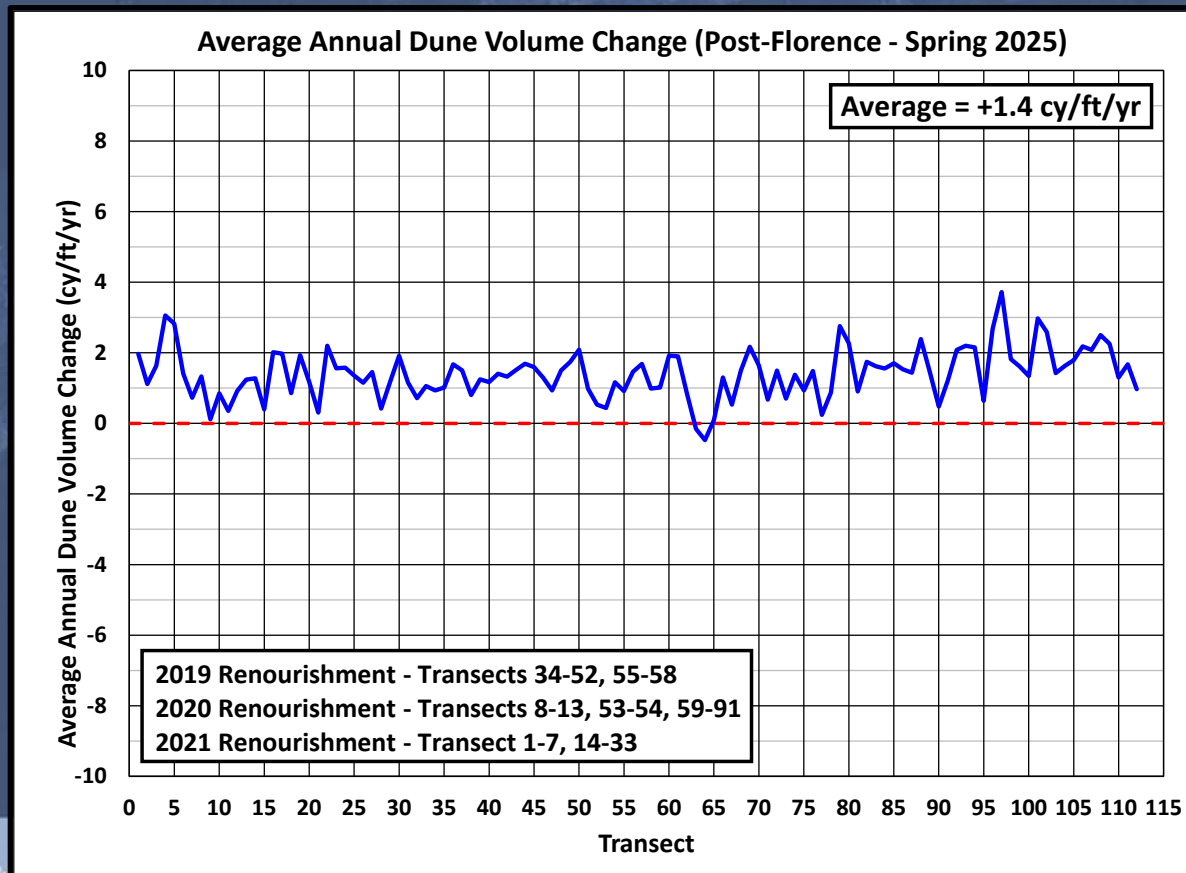
- ❖ **Historical Average 2008 – 2018 = +1.1 cy/yr**
- ❖ **Historical Average Post-Florence (2019-2021) – 2025 = +1.4 cy/yr**
- ❖ **Annual Average 2024 – 2025 = +1.4 cy/yr**



Summary of Findings – Dune Analysis

➤ Dune Volume Change – Annual and Historical

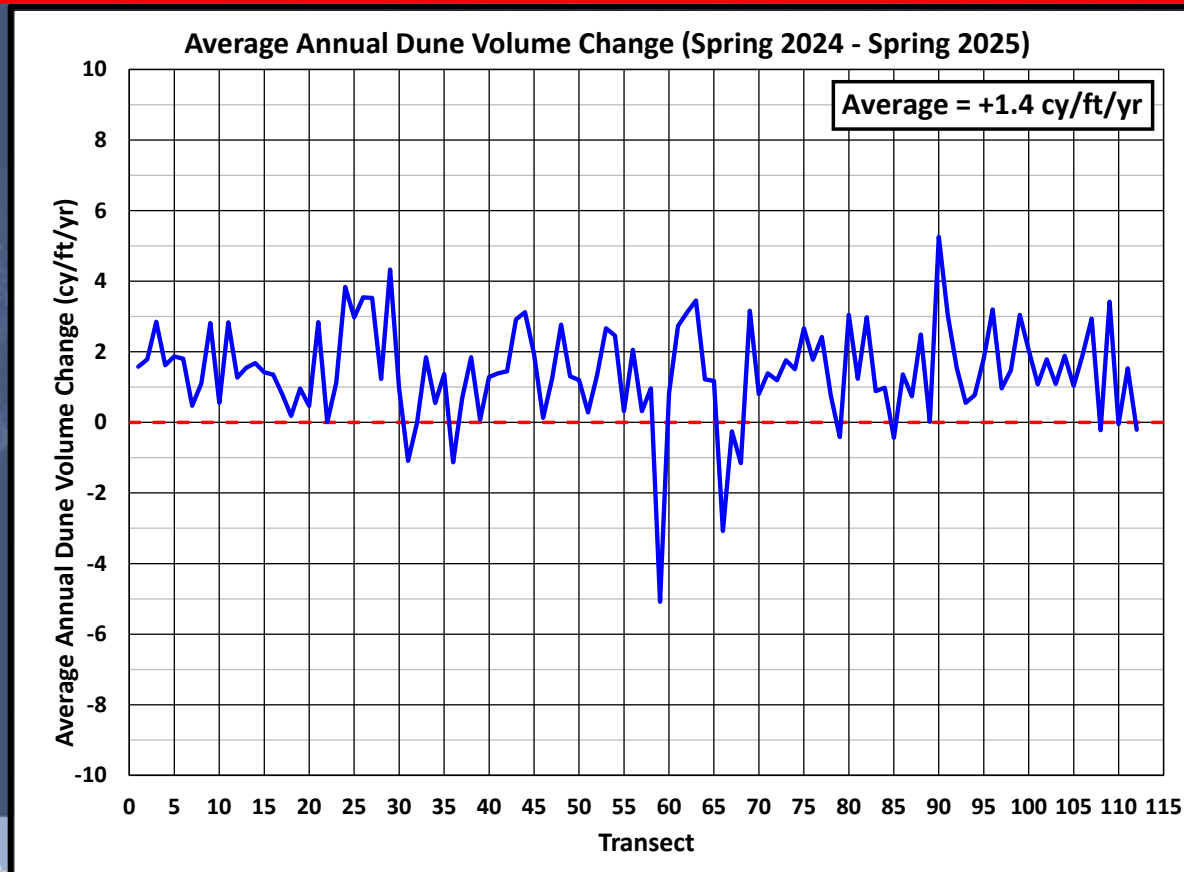
- ❖ Historical Average 2008 – 2018 = +1.1 cy/yr
- ❖ **Historical Average Post-Florence (2019-2021) – 2025 = +1.4 cy/yr**
- ❖ Annual Average 2024 – 2025 = +1.4 cy/yr



Summary of Findings – Dune Analysis

➤ Dune Volume Change – Annual and Historical

- ❖ Historical Average 2008 – 2018 = +1.1 cy/yr
- ❖ Historical Average Post-Florence (2019-2021) – 2025 = +1.4 cy/yr
- ❖ Annual Average 2024 – 2025 = +1.4 cy/yr



Summary of Findings – Vegetation Line

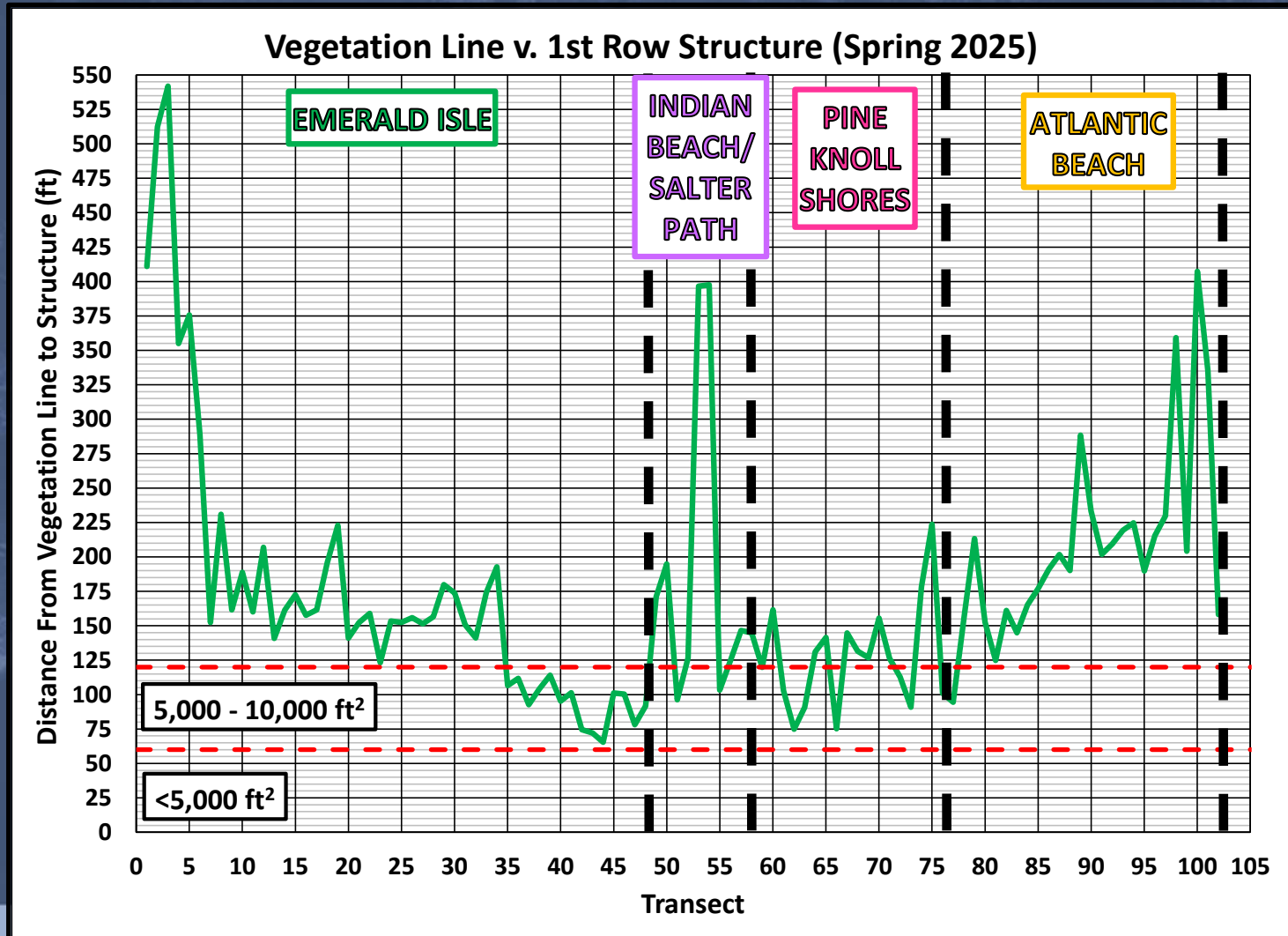
➤ Distance from 1st Row of Structures



➤ Graduated Setback Factors (Setback Factor for Bogue Banks = 2)

Summary of Findings – Vegetation Line

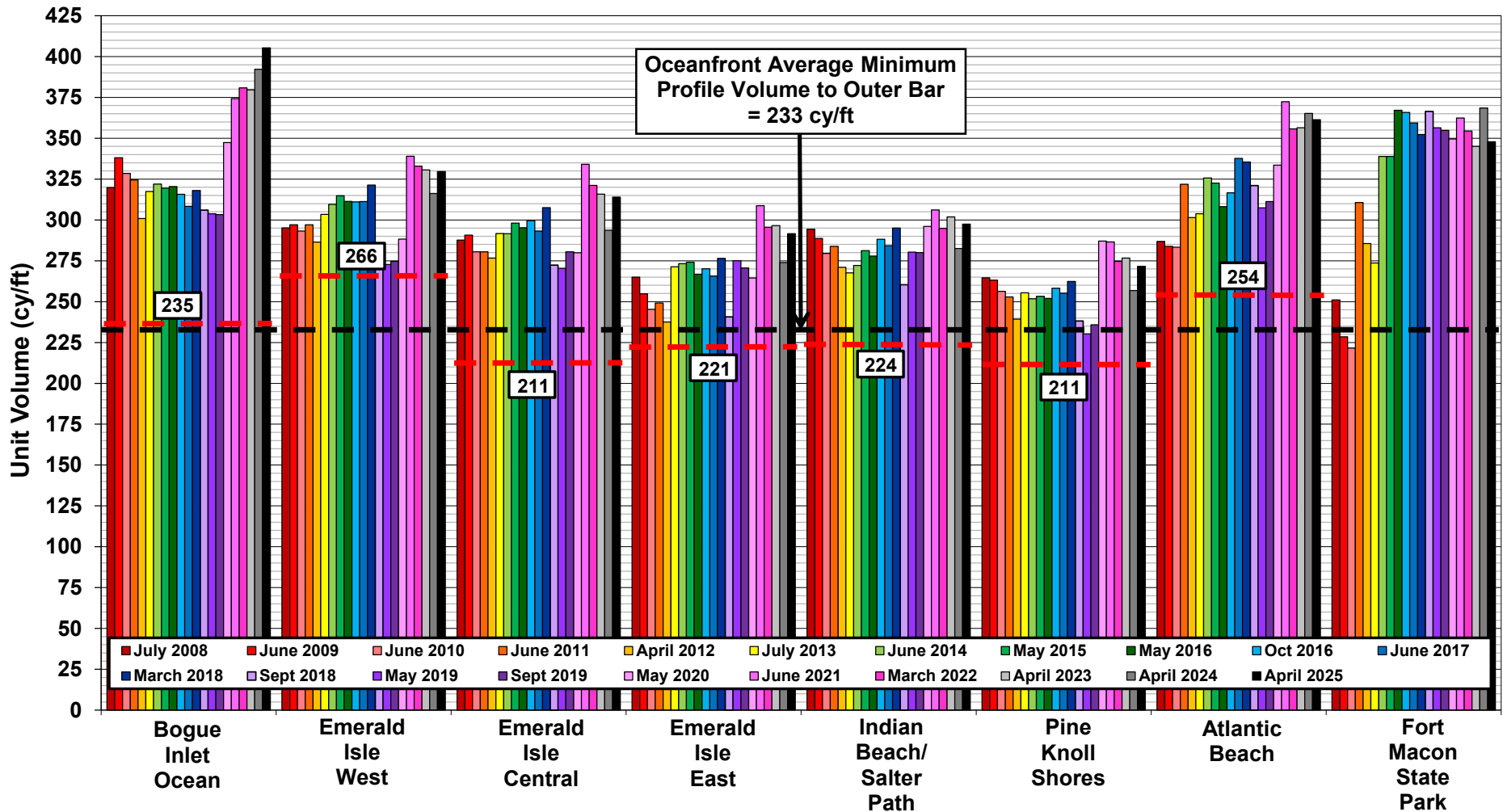
➤ Vegetation Line Position



Summary of Findings – MBNP Triggers

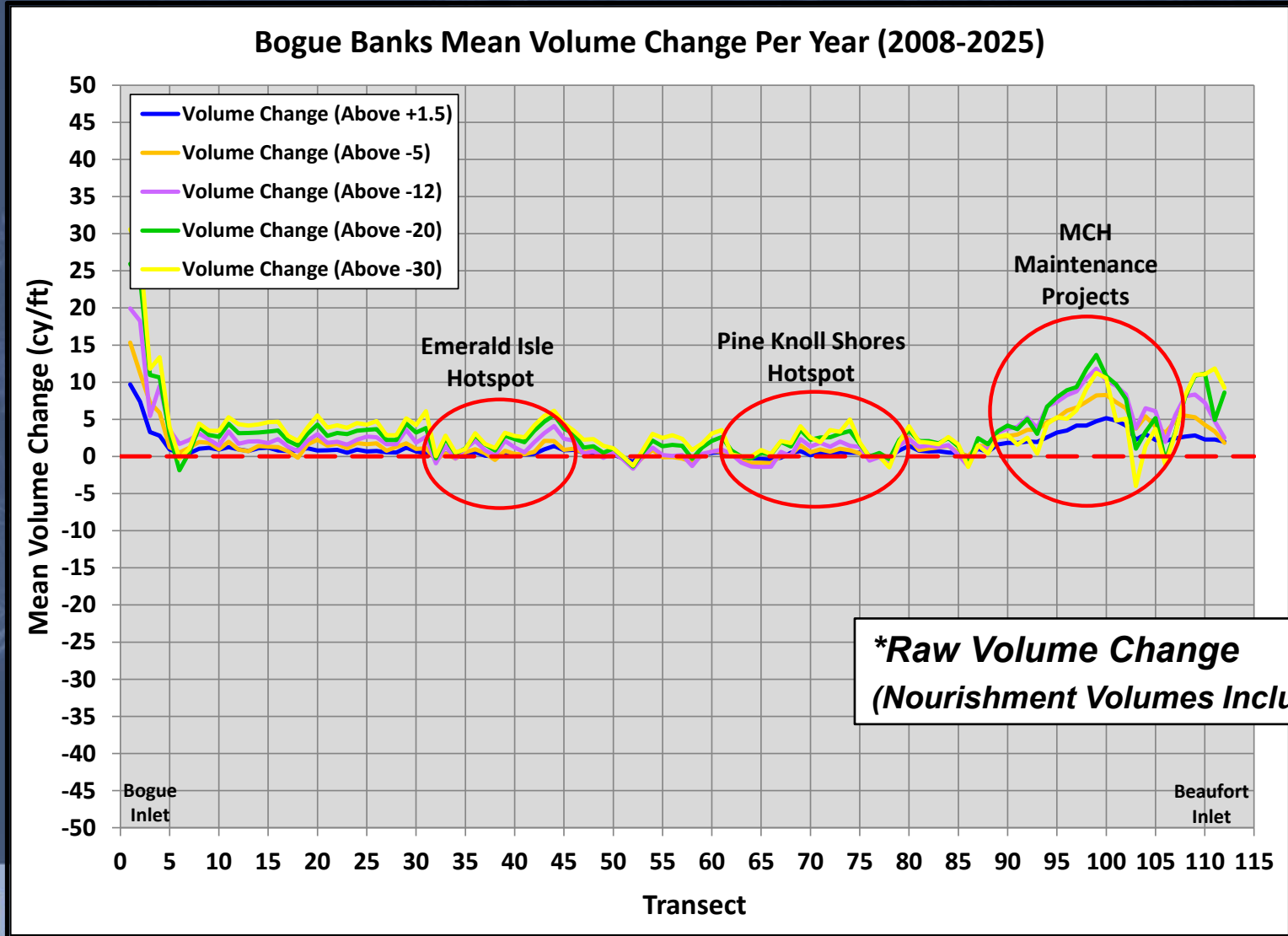
➤ Volume Triggers – Master Beach Nourishment Plan

Average Profile Volume by Reach Above -12ft NAVD88



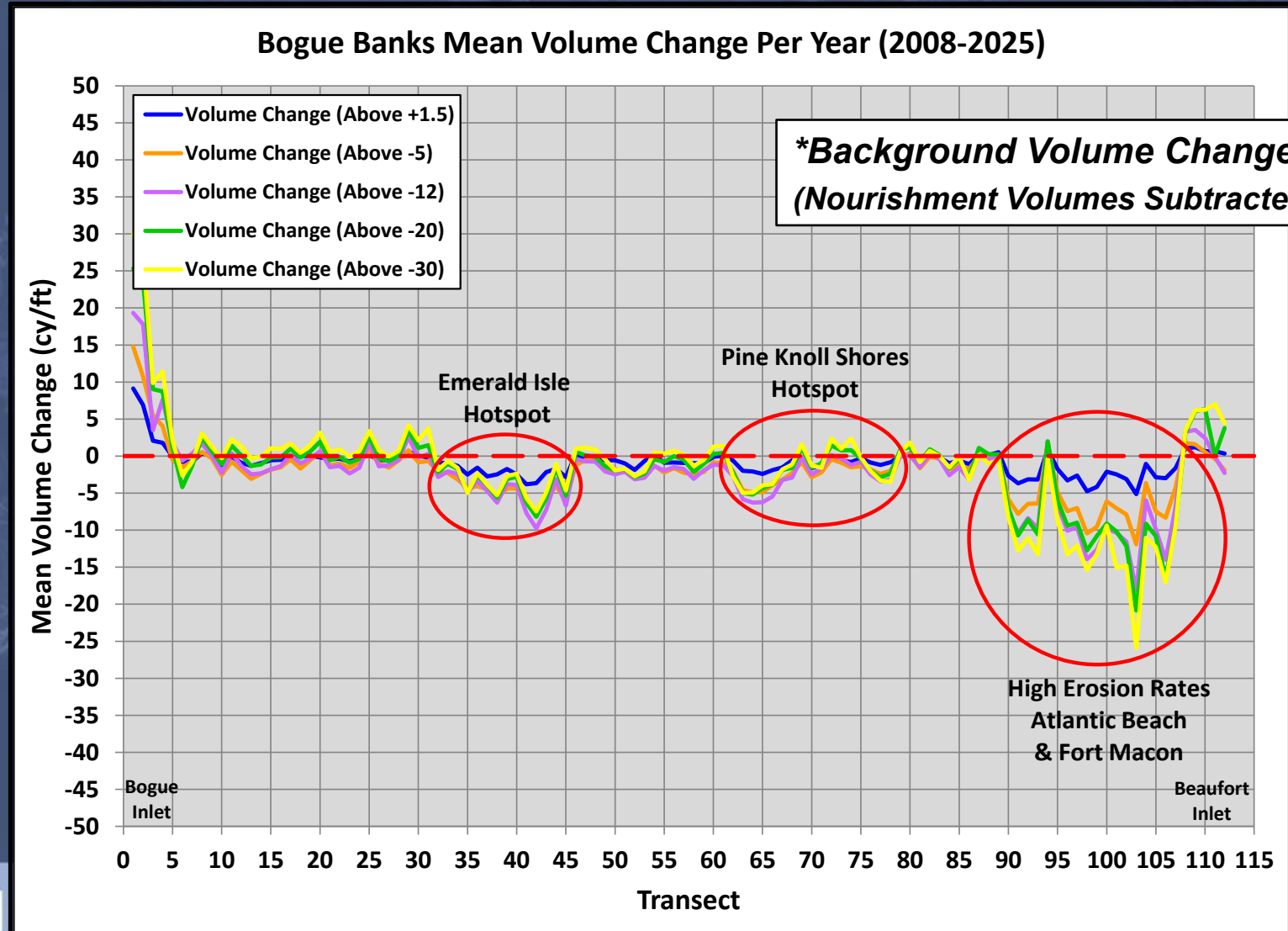
Summary of Findings – Long-Term Statistics

➤ Average Annual Volume Change – With Nourishment



Summary of Findings – Long-Term Statistics

➤ Average Annual Volume Change – Without Nourishment



Summary of Findings – Long-Term Statistics

➤ Background Erosion Rate (Without Nourishment)

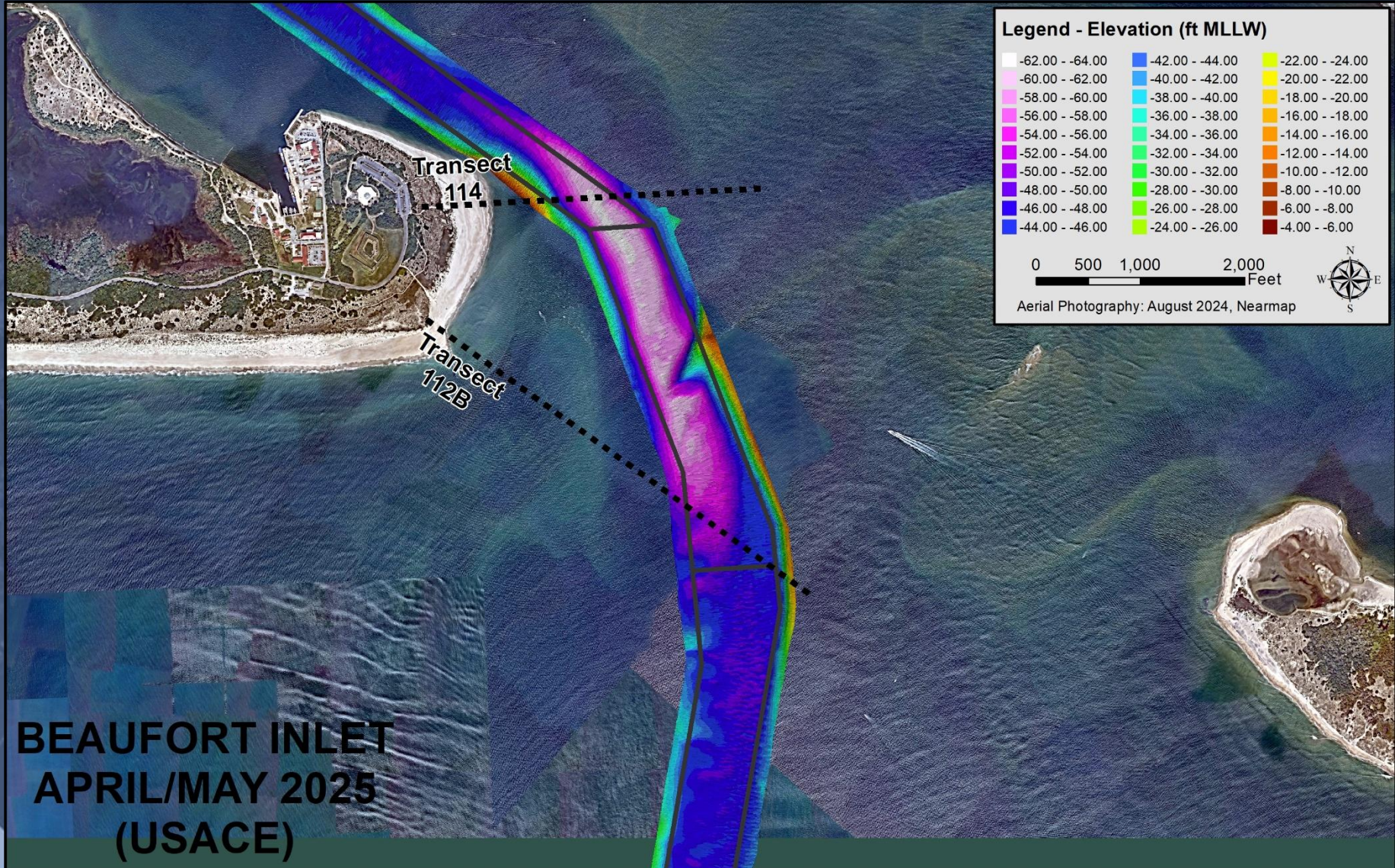
❖ Previously -3.48 cy/ft/yr in 2023 – 2024 Analysis

Reach (Transects)	Length (ft)	Volume Change Above -12 ft NAVD88 (cy) (1999-2025)	Nourishment Volume (cy) (1999-2025)	Background Erosion (cy) (1999-2025)	Average Annual Background Erosion Rates (cy/ft/yr)
Bogue Inlet-Ocean (Transects 1-11)	11,488	881,130	788,733	92,397	0.31
Emerald Isle-West (Transects 12-25)	18,288	1,551,663	1,850,355	-298,692	-0.63
Emerald Isle-Central (Transects 26-36)	15,802	1,510,432	1,964,580	-454,148	-1.11
Emerald Isle-East (Transects 37-48)	13,220	1,135,643	2,630,434	-1,494,791	-4.35
Indian Beach/Salter Path (Transects 49-58)	12,850	1,001,127	1,865,472	-864,345	-2.59
Pine Knoll Shores (Transects 59-76)	23,878	1,911,135	3,616,215	-1,705,080	-2.75
Atlantic Beach (Transects 77-102)	26,176	3,097,722	6,766,839	-3,669,117	-5.39
Fort Macon State Park (Transects 103-112)	6,691	704,565	2,207,168	-1,502,603	-8.64
Total	128,393	11,793,415	21,689,796	-9,896,381	-2.96

EI-East
Hotspot

USACE
Project

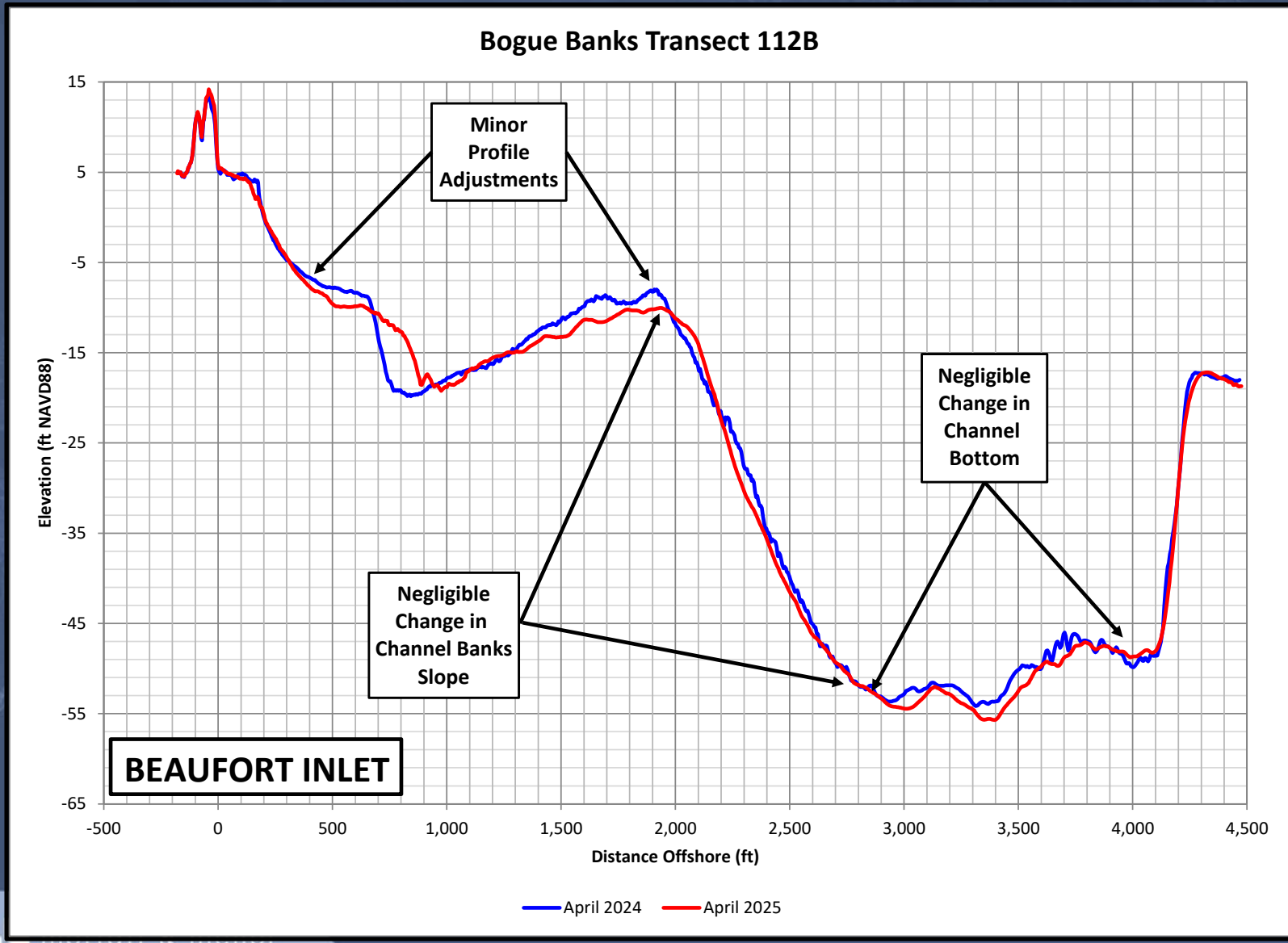
Summary of Findings – Inlet Conditions



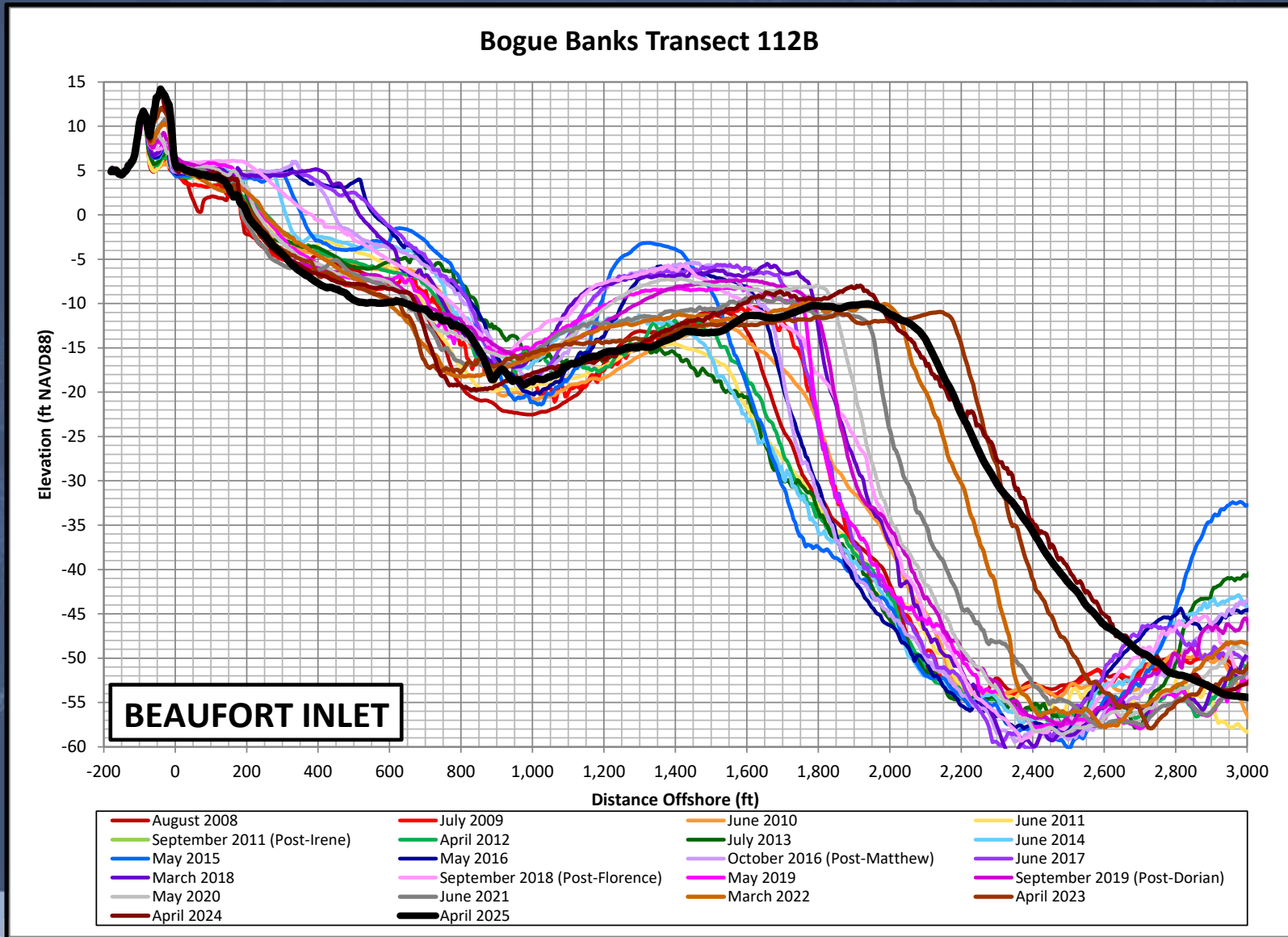
**BEAUFORT INLET
APRIL/MAY 2025
(USACE)**



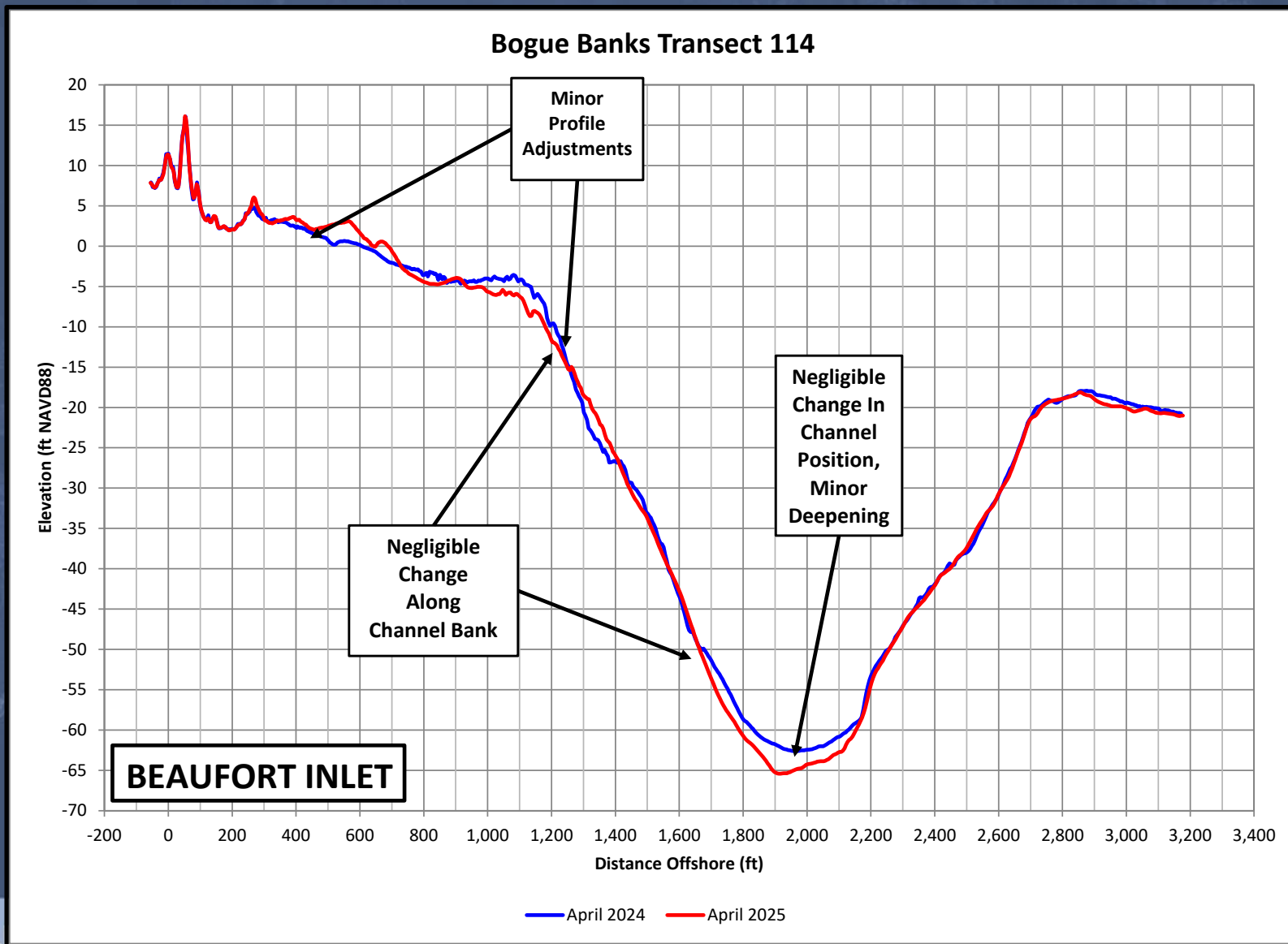
Summary of Findings – Inlet Conditions



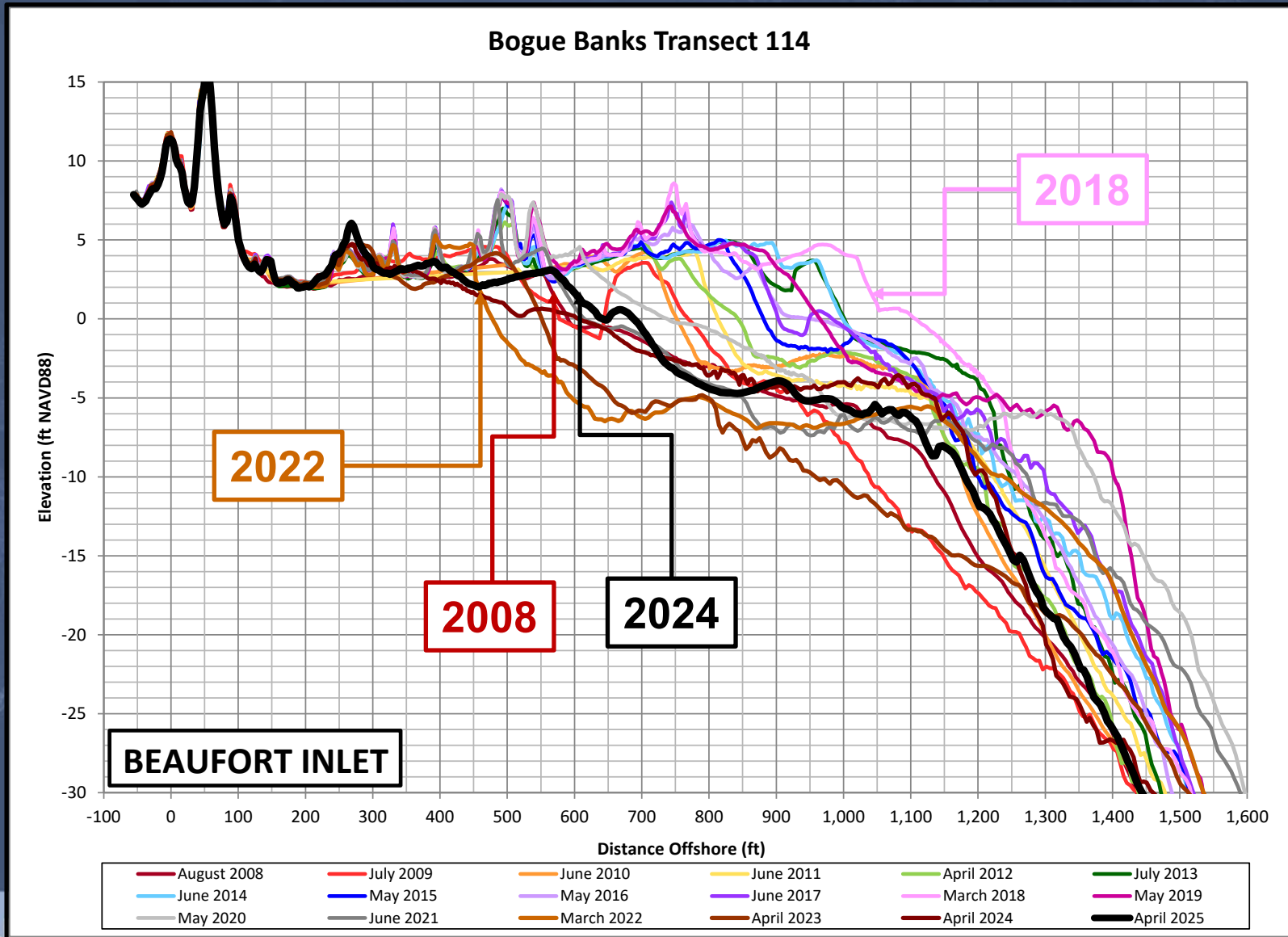
Summary of Findings – Inlet Conditions



Summary of Findings – Inlet Conditions

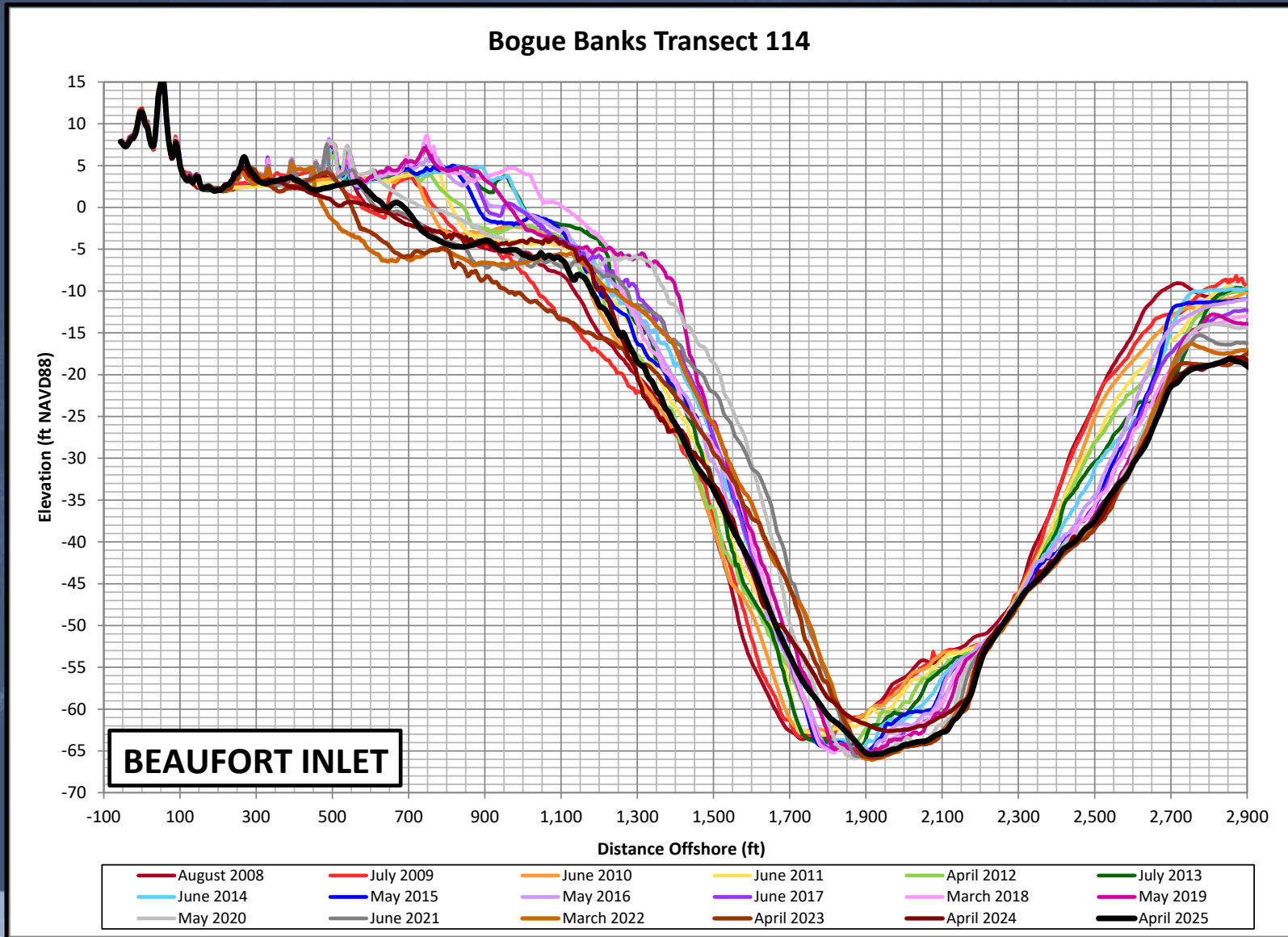


Summary of Findings – Inlet Conditions

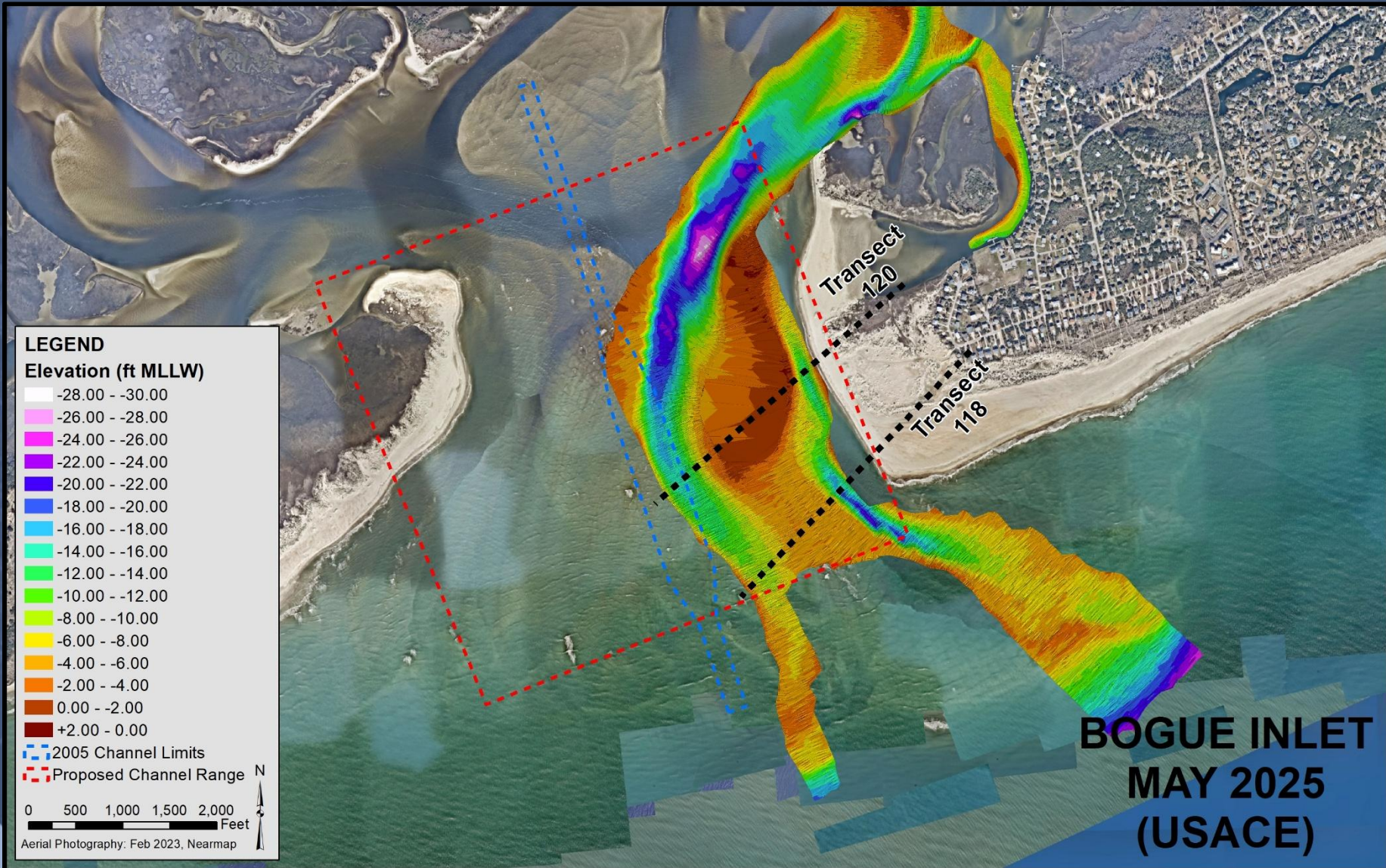




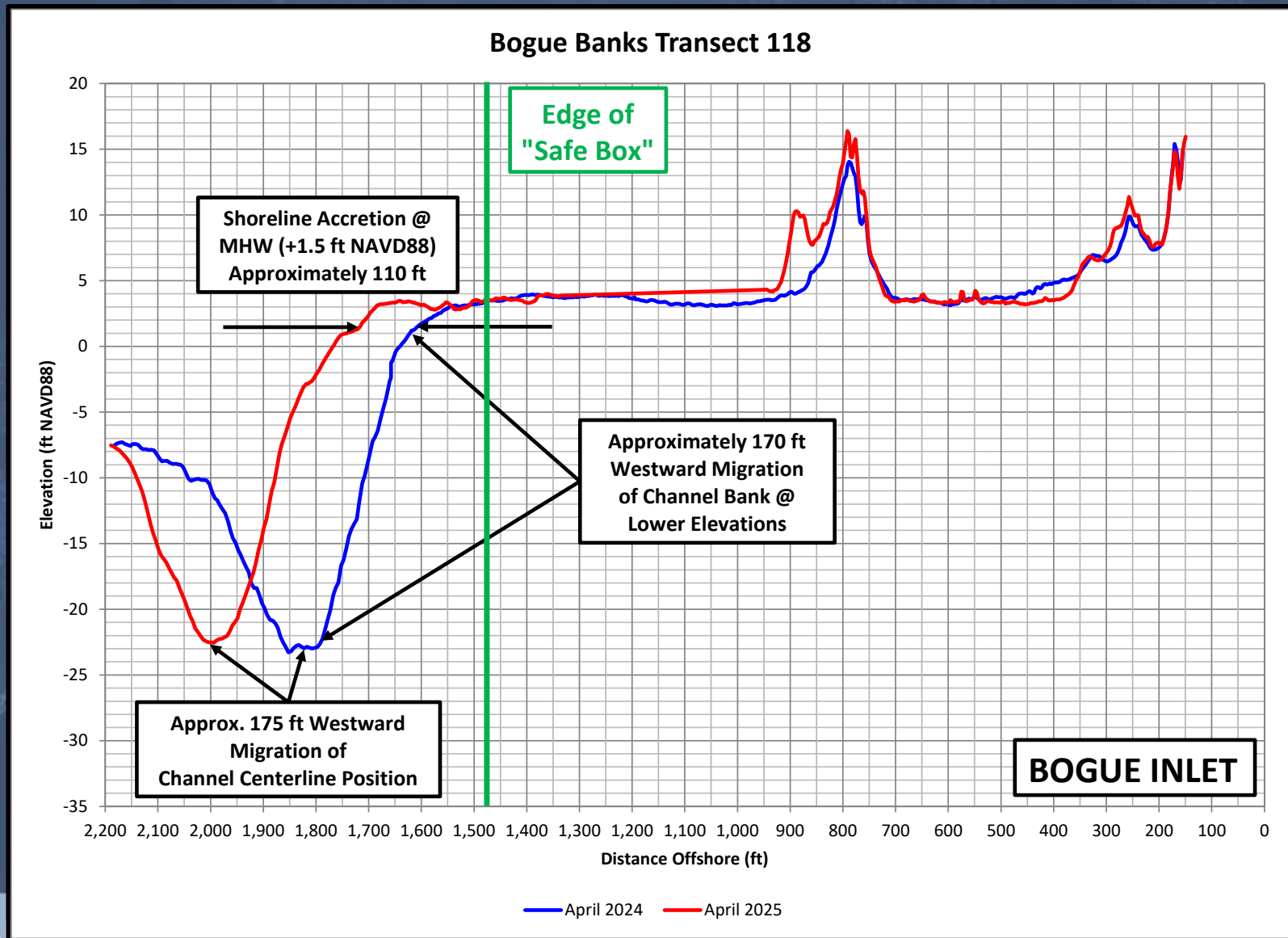
Summary of Findings – Inlet Conditions



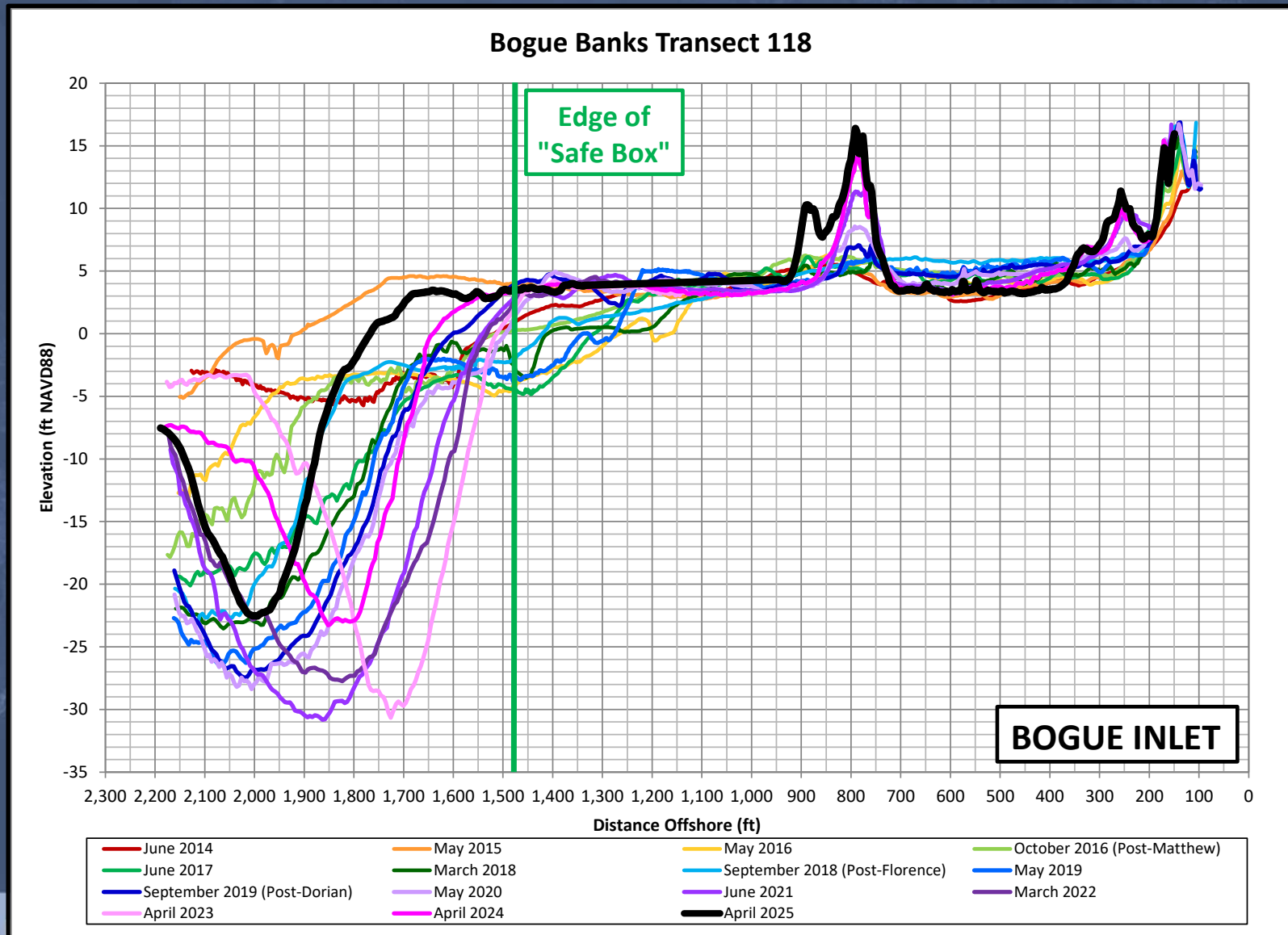
Summary of Findings – Inlet Conditions



Summary of Findings – Inlet Conditions

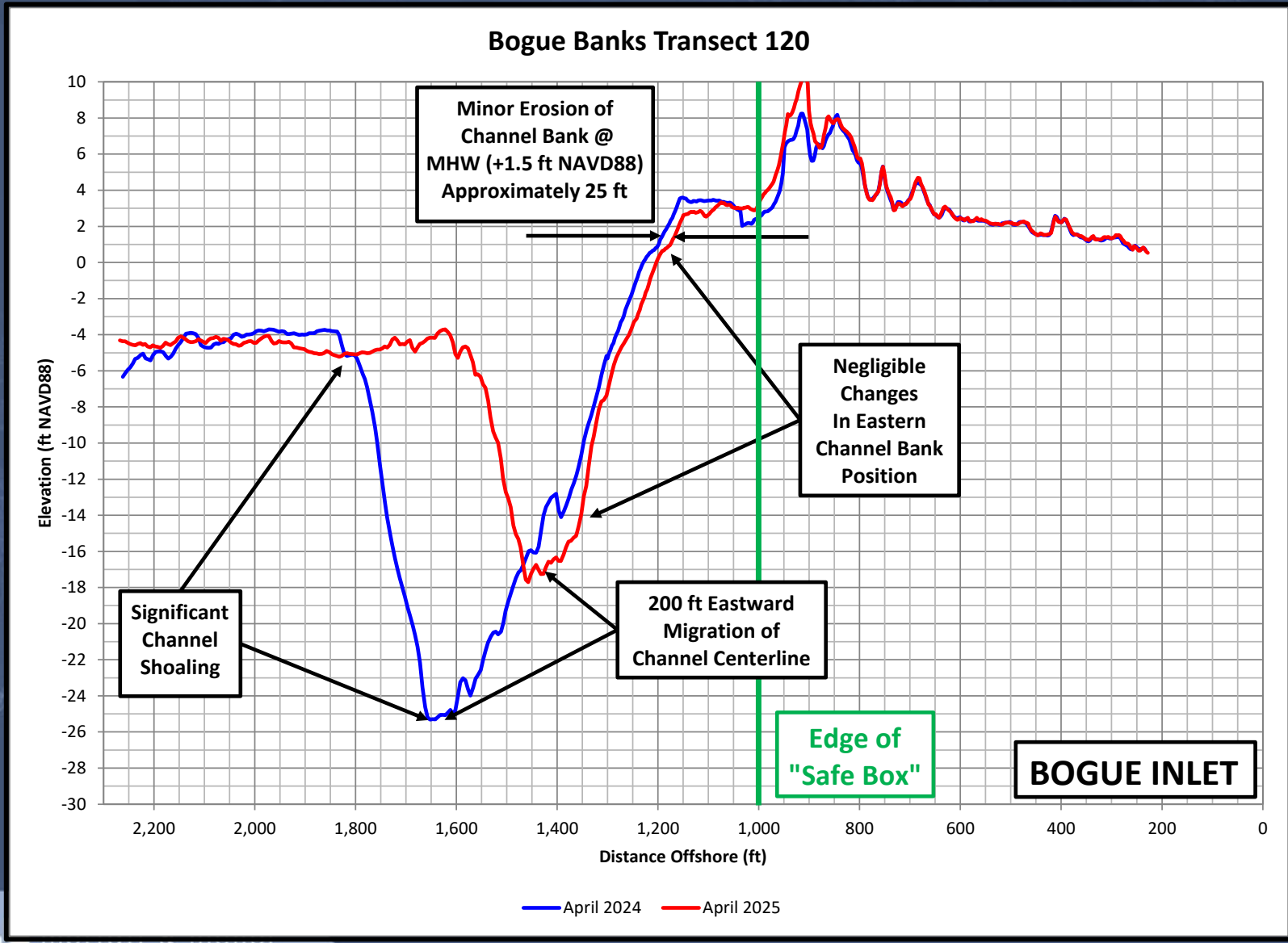


Summary of Findings – Inlet Conditions



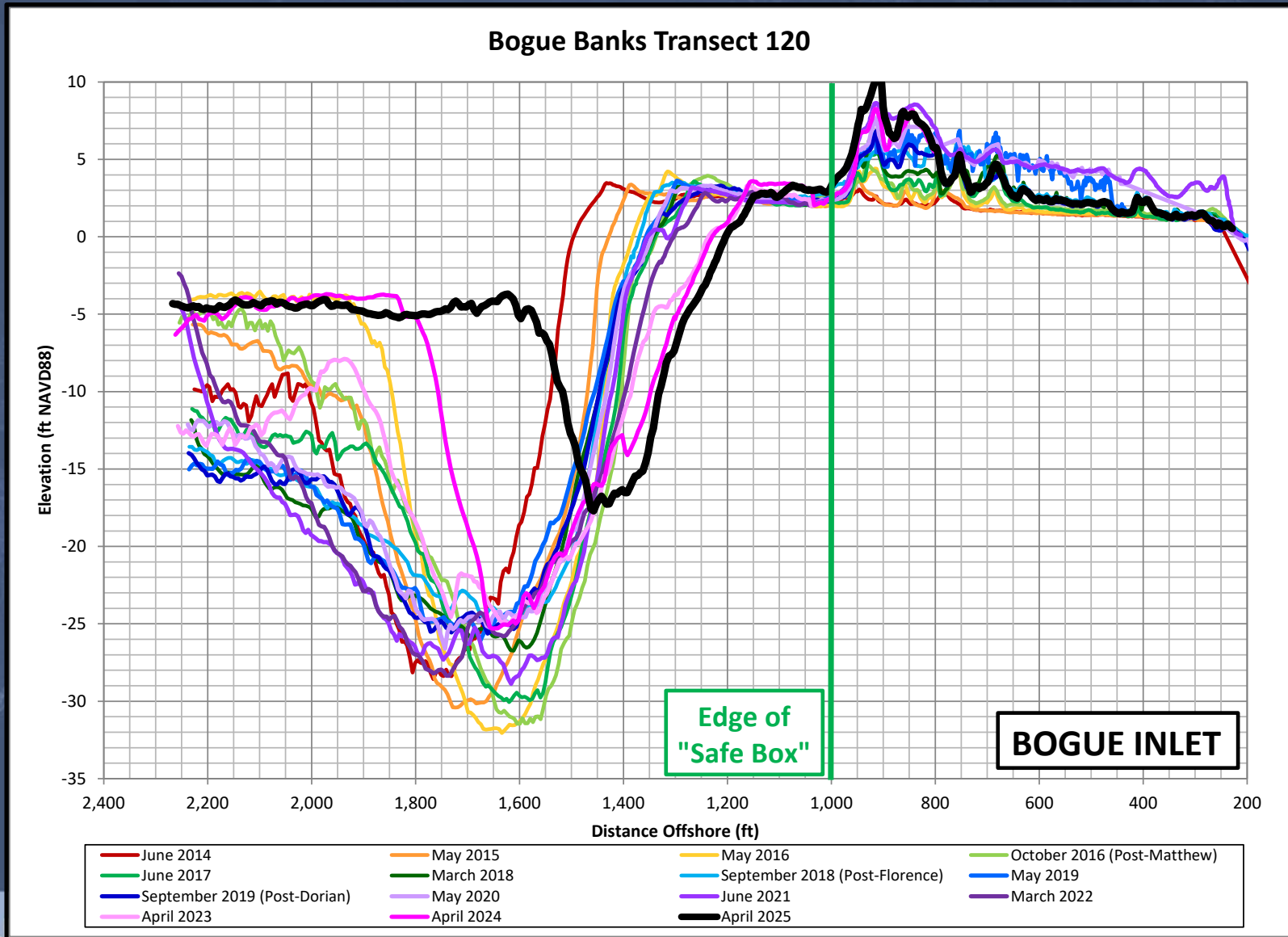


Summary of Findings – Inlet Conditions



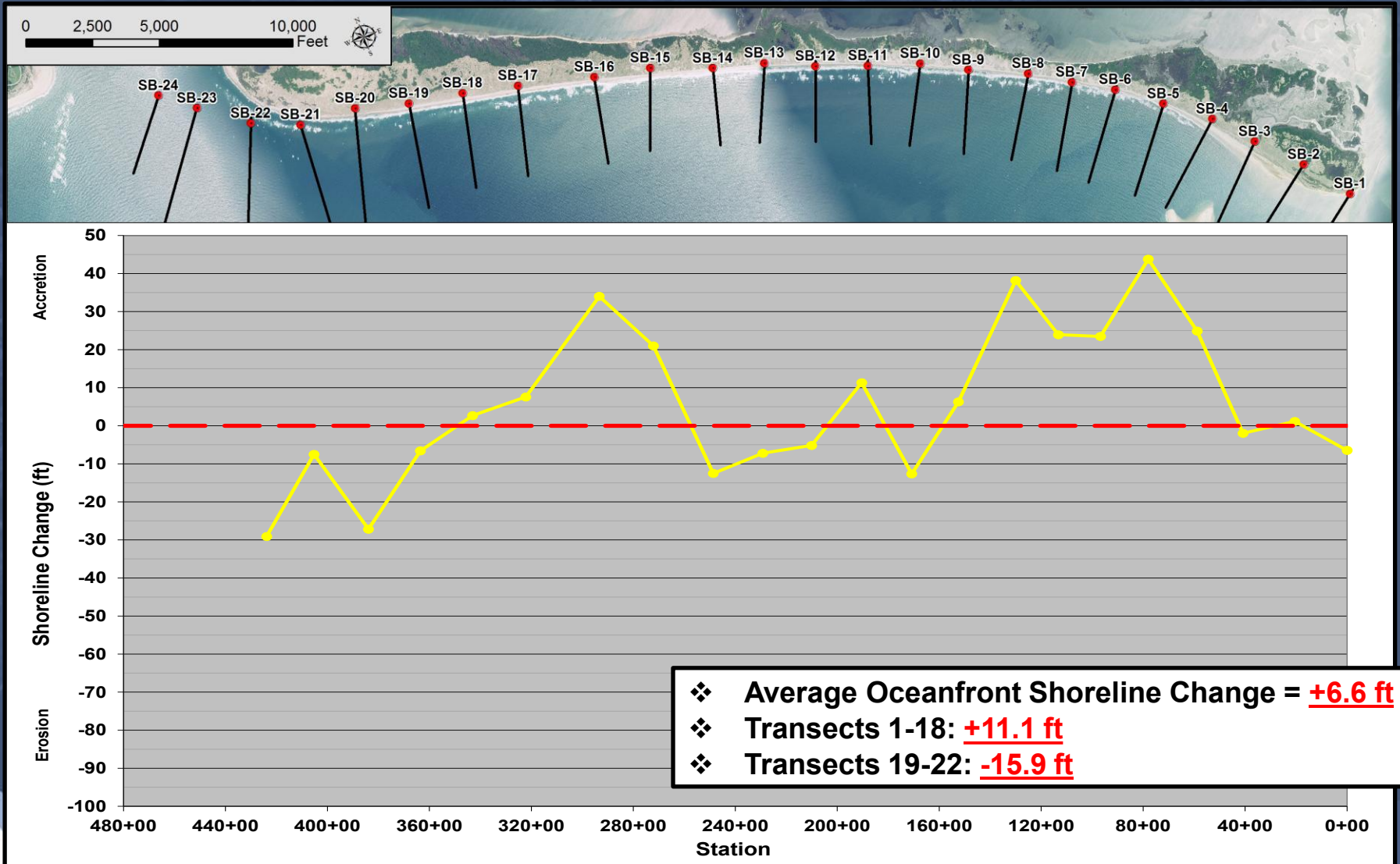


Summary of Findings – Inlet Conditions



Summary of Findings – Shoreline Change

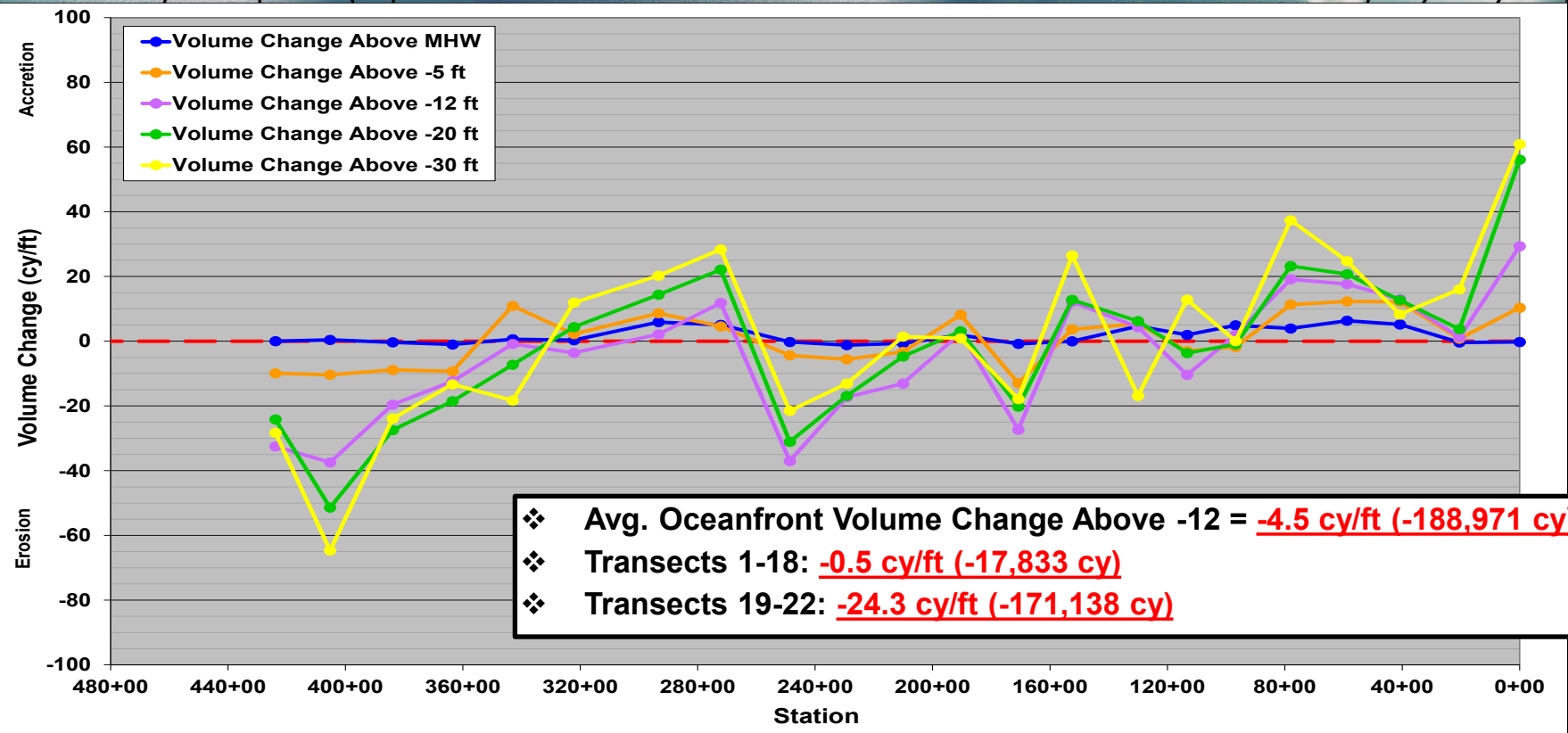
➤ Shackleford Banks





Summary of Findings – Volume Change

➤ Shackleford Banks



- ❖ Avg. Oceanfront Volume Change Above -12 = **-4.5 cy/ft (-188,971 cy)**
- ❖ Transects 1-18: **-0.5 cy/ft (-17,833 cy)**
- ❖ Transects 19-22: **-24.3 cy/ft (-171,138 cy)**

Summary of Findings – Volume Change

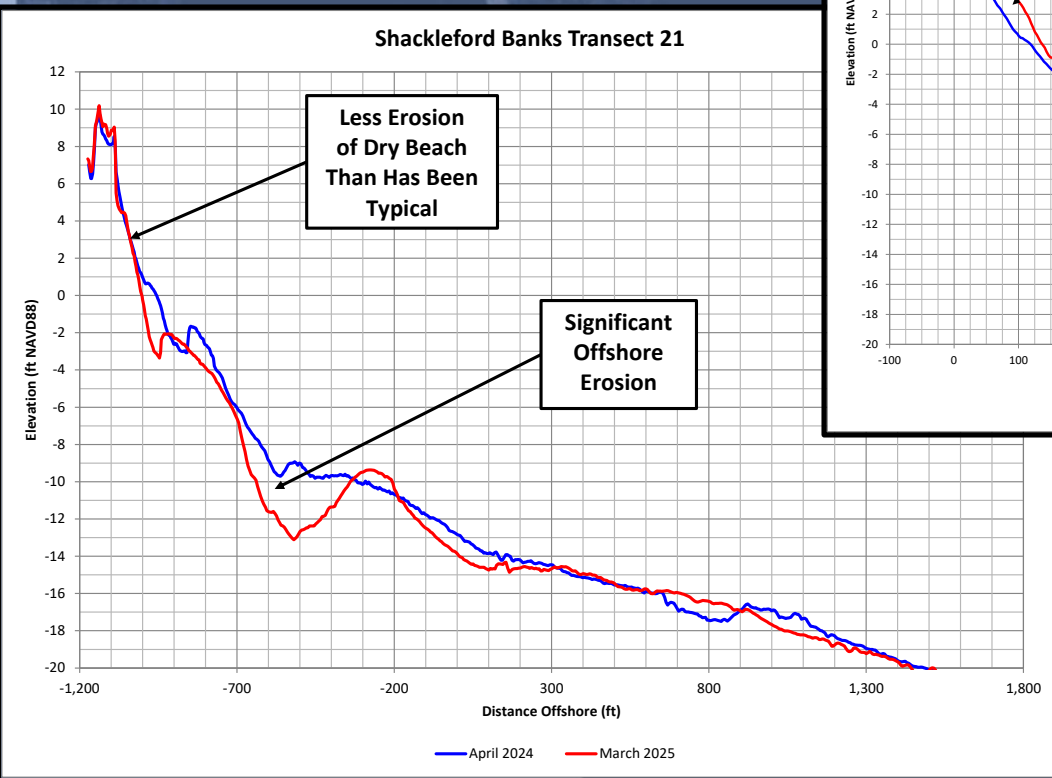
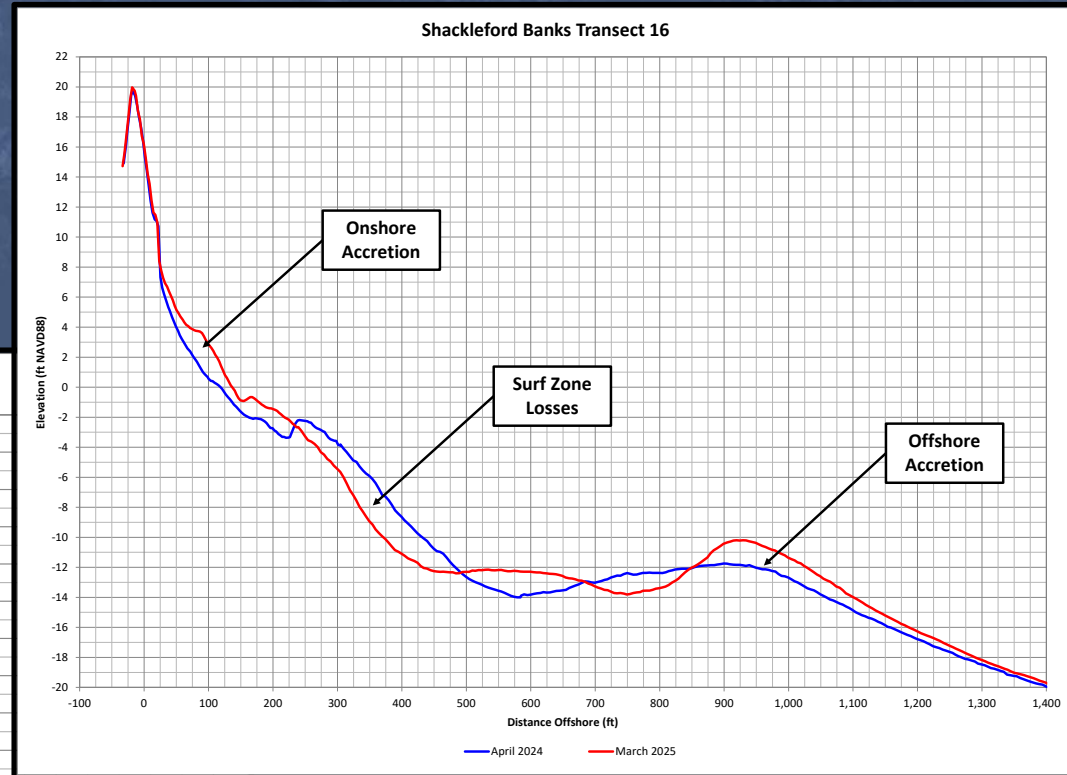
➤ Average Volume Change – Shackleford Banks:

- ❖ Above +1.5 ft NAVD88 = **+1.7 cy/ft = +73,480 cy**
 - Range = -1.2 – +6.3 cy/ft
 - Transects 1-18: **+2.1 cy/ft (+75,413 cy)** ; Transects 19-22: **-0.3 cy/ft (-1,932 cy)**
- ❖ Above -5 ft NAVD88 = **+1.1 cy/ft = +47,271 cy**
 - Range = -13.0 - +12.3 cy/ft
 - Transects 1-18: **+3.2 cy/ft (+114,726 cy)**; Transects 19-22: **-9.6 cy/ft (-67,455cy)**
- ❖ Above -12 ft NAVD88 = **-4.5 cy/ft = -188,971 cy**
 - Range = -37.5 - +29.4 cy/ft
 - Transects 1-18: **-0.5 cy/ft (-17,833 cy)**; Transects 19-22: **-24.3 cy/ft (-171,138 cy)**
- ❖ Above -20 ft NAVD88 = **-1.8 cy/ft = -77,225 cy**
 - Range = -51.4 - +56.1 cy/ft
 - Transects 1-18: **+4.0 cy/ft (+142,995 cy)**; Transects 19-22: **-31.2 cy/ft (-220,220 cy)**
- ❖ Above -30 ft NAVD88 = **-1.0 cy/ft = -42,796 cy**
 - Range = -64.7 - +60.9 cy/ft
 - Transects 1-18: **+7.8 cy/ft (+275,286 cy)**; Transects 19-22: **33.0 cy/ft (-232,490 cy)**

Summary of Findings – Volume Change

➤ Typical Profiles - Shackleford Banks (Mid/East Island)

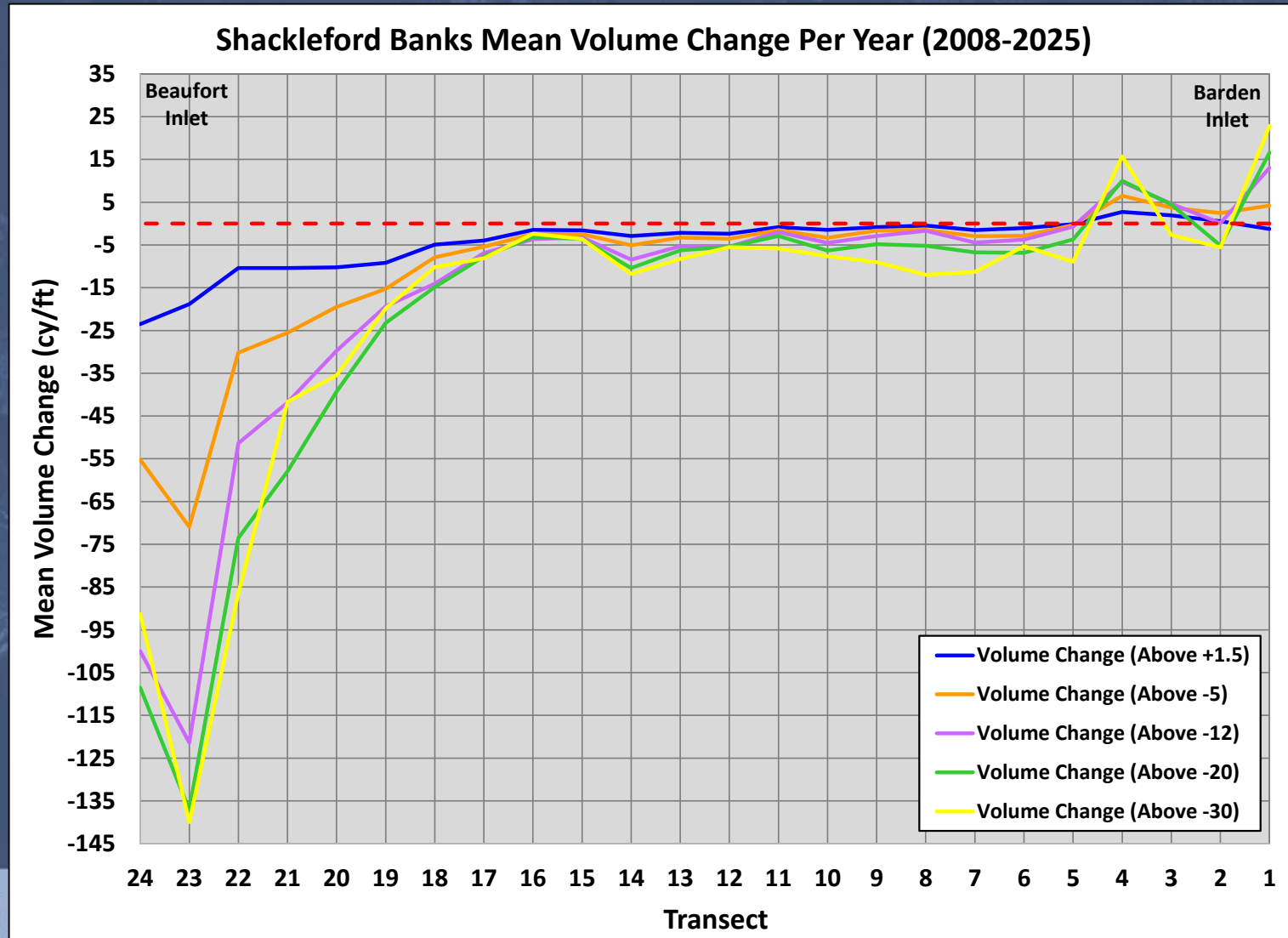
- ❖ East End/Middle: Onshore Volume Gains, Surf Zone Losses, Offshore Volume Gains



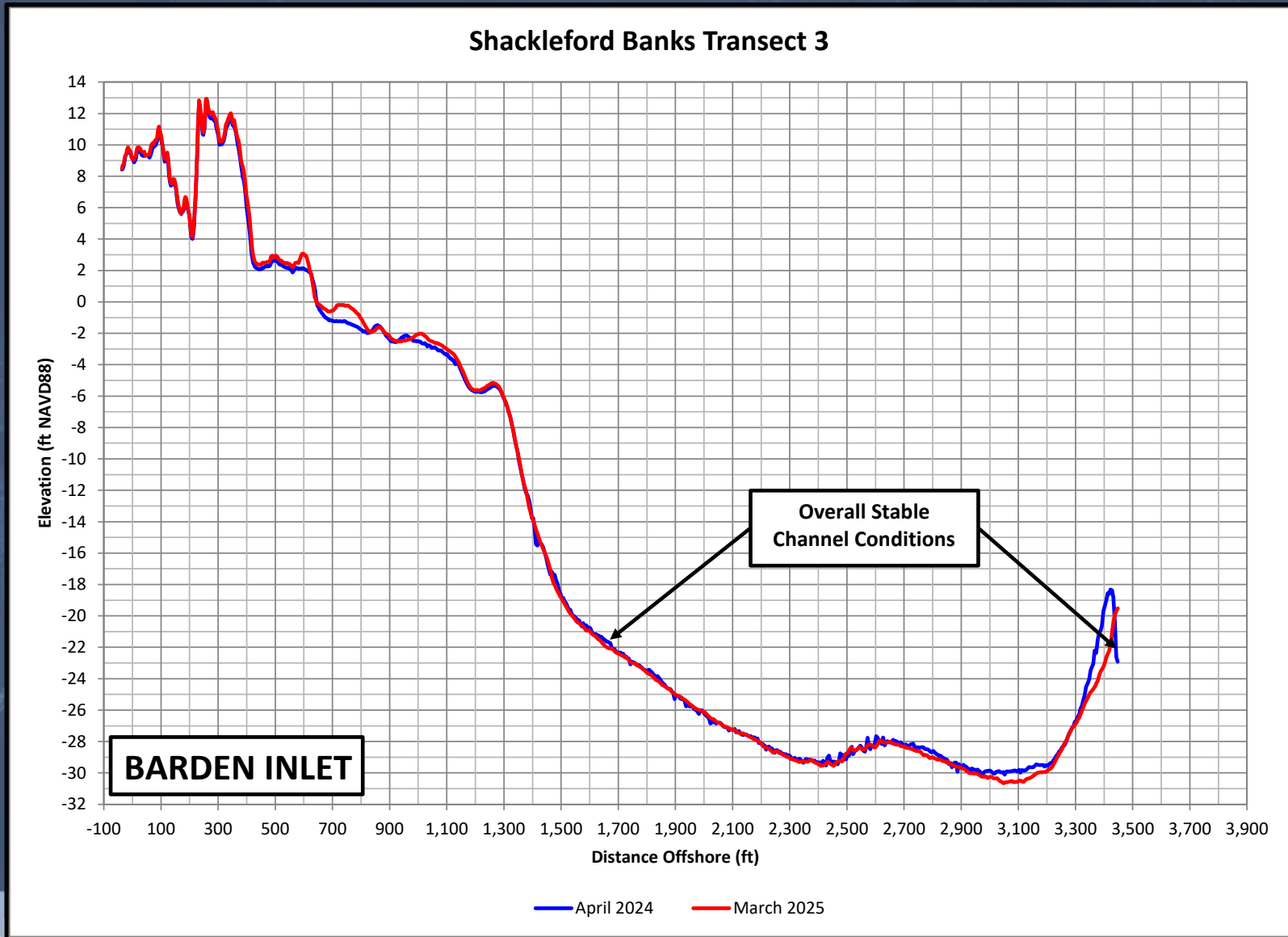
- ❖ West End: Less Erosion Than Previous Years

Summary of Findings – Long-Term Statistics

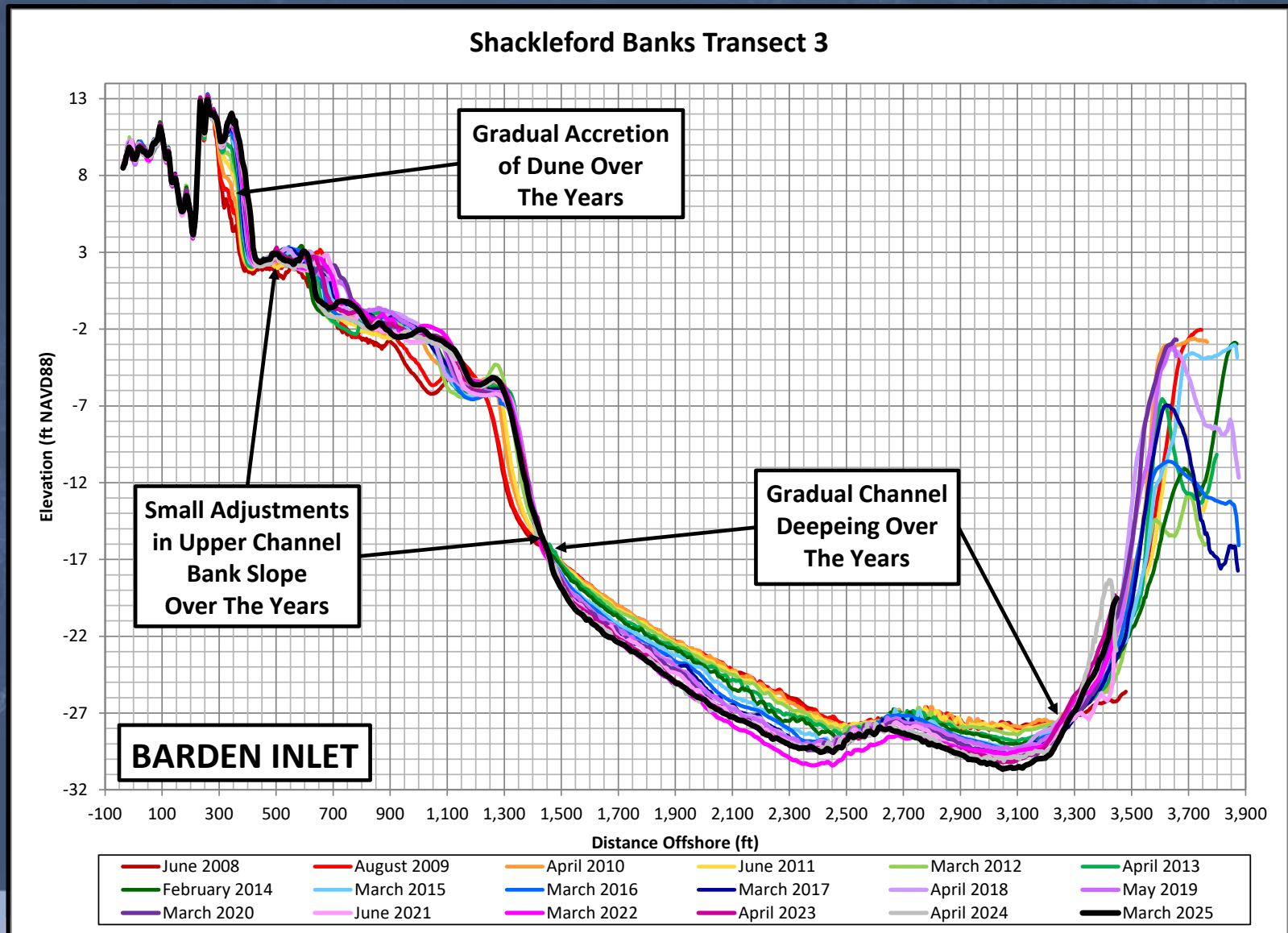
➤ Shackleford Banks 2008 - 2025



Summary of Findings – Inlet Conditions

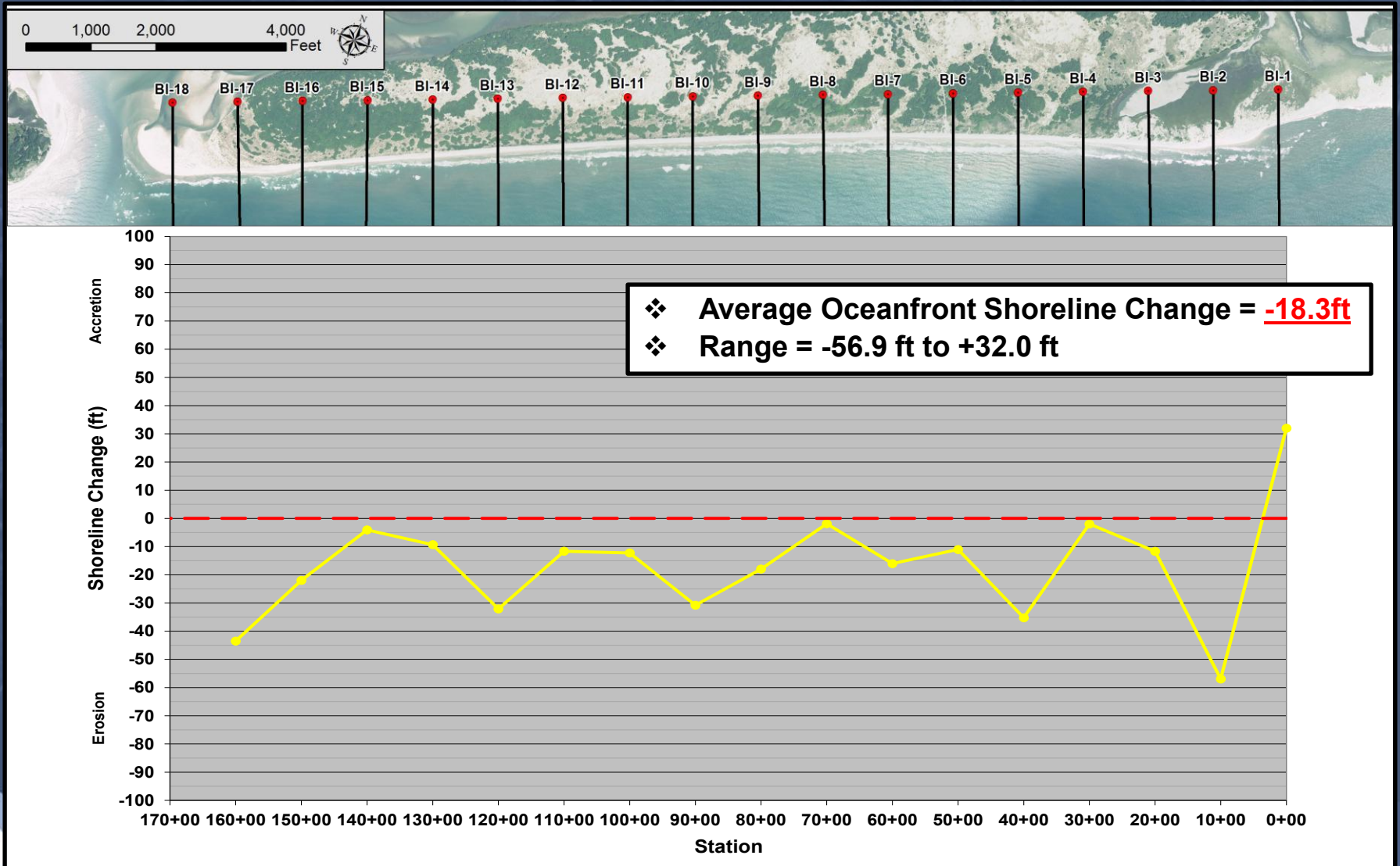


Summary of Findings – Inlet Conditions



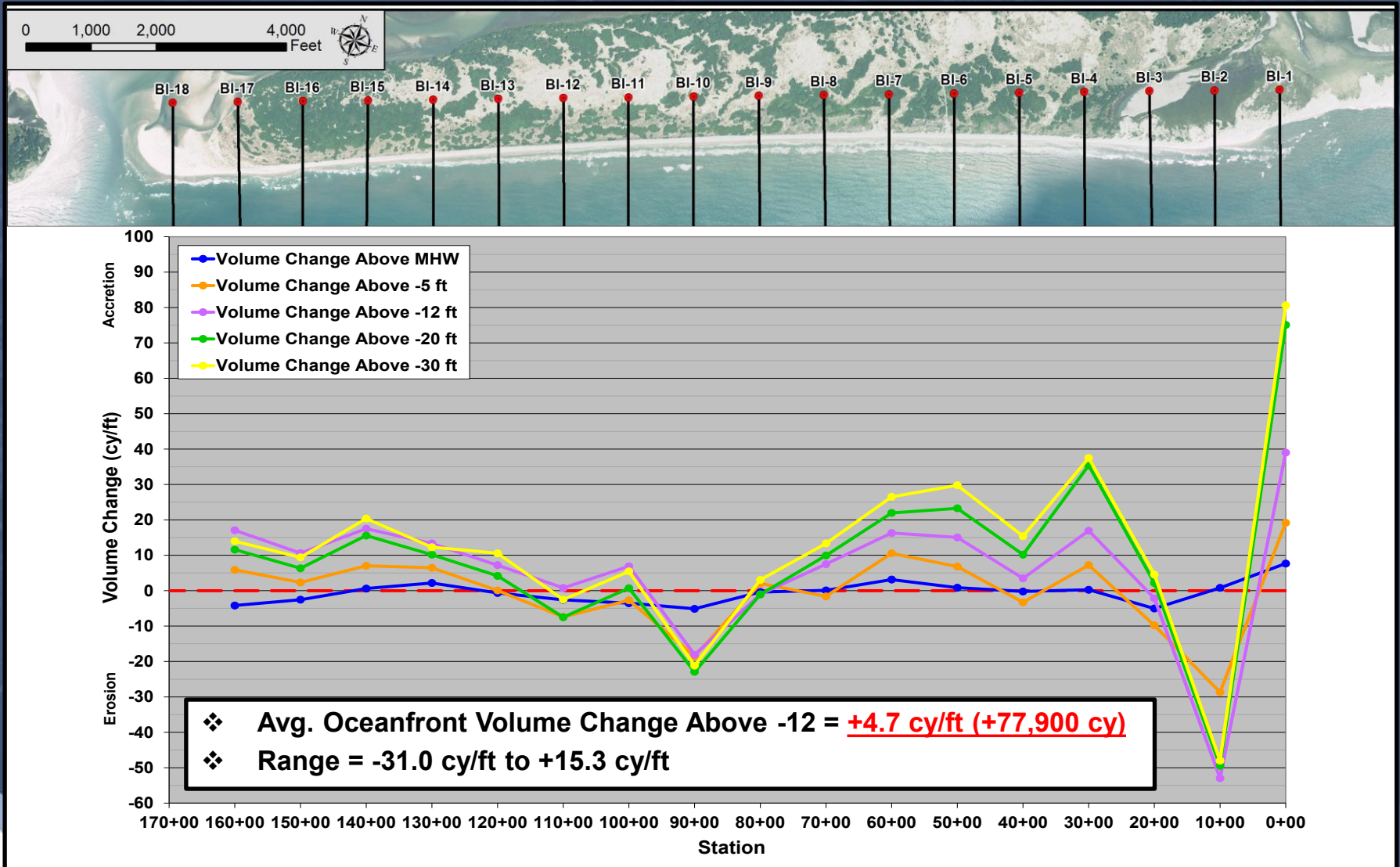
Summary of Findings – Shoreline Change

➤ Bear Island



Summary of Findings – Volume Change

➤ Bear Island



Summary of Findings – Volume Change

➤ Average Volume Change – Bear Island:

❖ Above +1.7 ft NAVD88 = **-0.8 cy/ft** = **-12,487 cy**

- *Range = -5.1 – +7.7 cy/ft*

❖ Above -5 ft NAVD88 = **-0.8 cy/ft** = **-13,965 cy**

- *Range = -28.7 - +19.2 cy/ft*

❖ Above -12 ft NAVD88 = **+4.7 cy/ft** = **+77,900 cy**

- *Range = -53.0 - +39.0 cy/ft*

❖ Above -20 ft NAVD88 = **+6.5 cy/ft** = **+108,066 cy**

- *Range = -49.5 - +75.1 cy/ft*

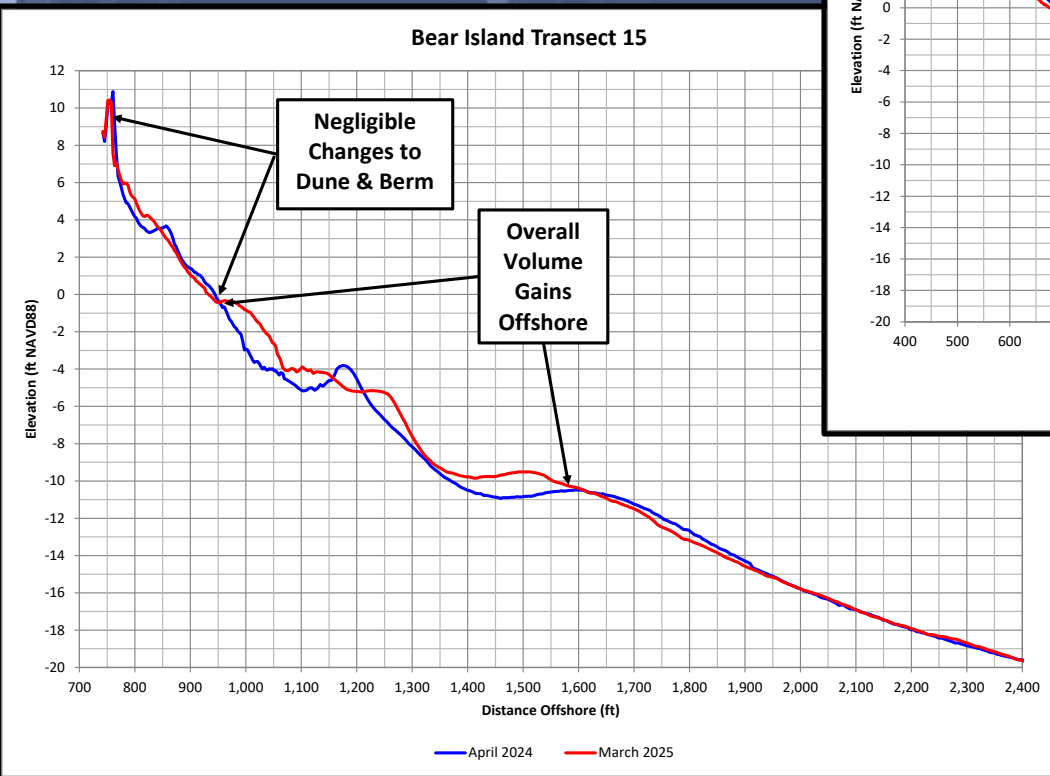
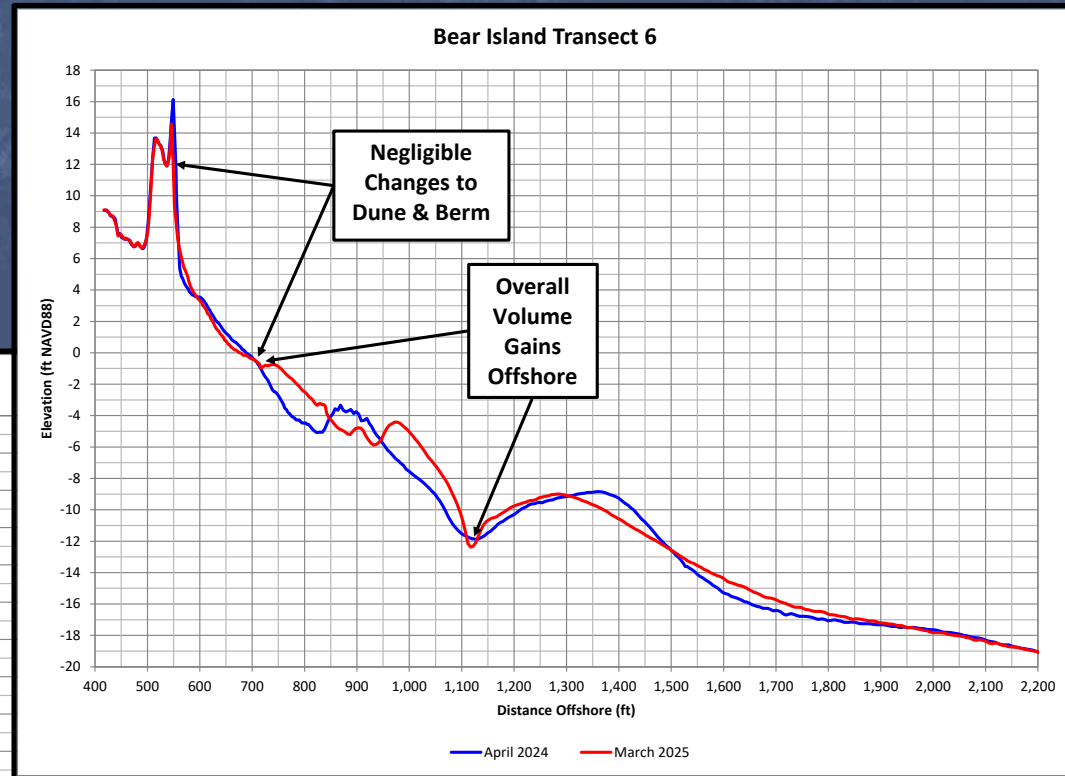
❖ Above -30 ft NAVD88 = **+10.4 cy/ft** = **+170,799 cy**

- ❖ *Range = -48.0 - +80.6 cy/ft*

Summary of Findings – Volume Change

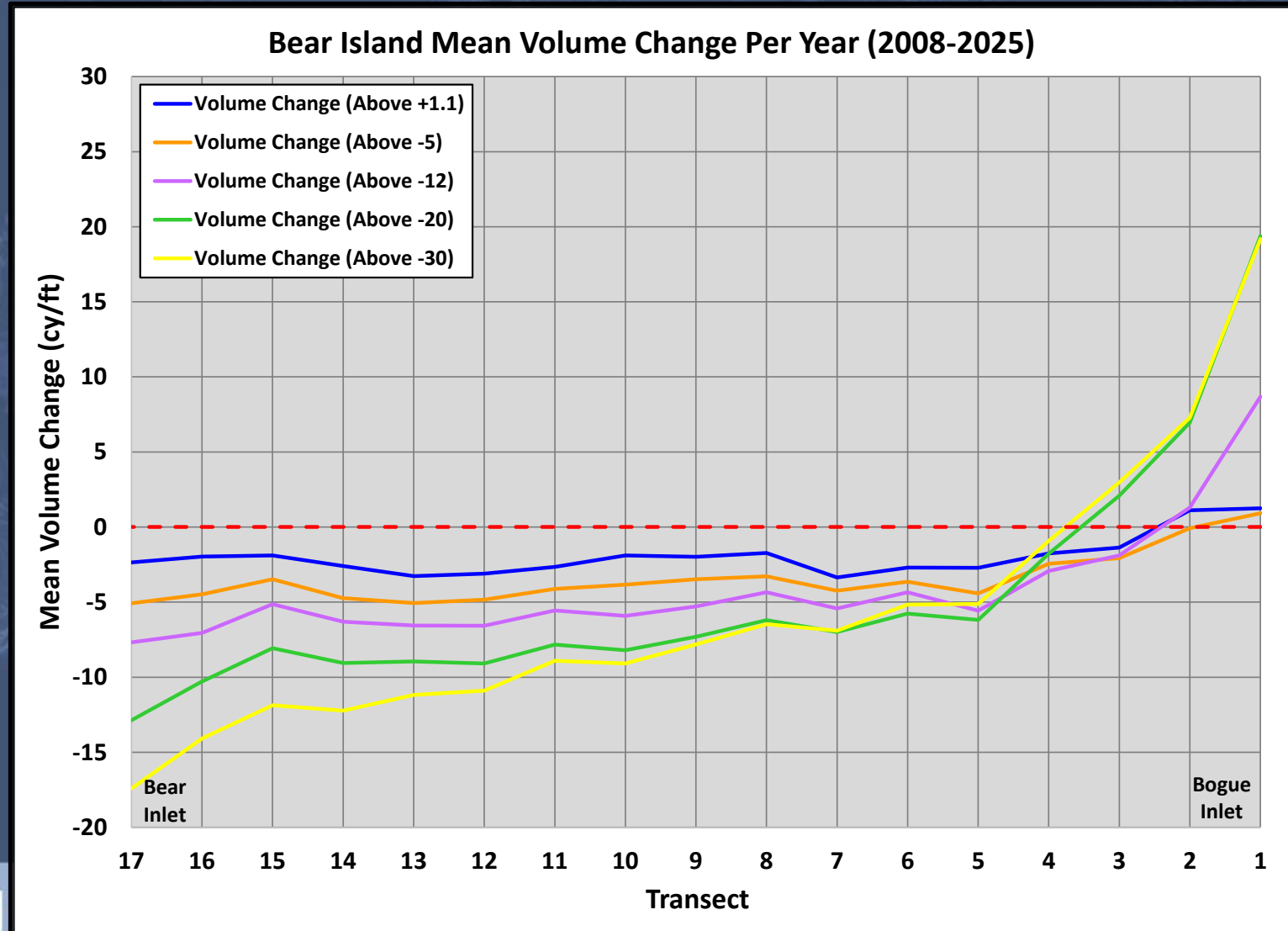
➤ Typical Profile – Bear Island

- ❖ Negligible Changes / Small Adjustments to Dune & Berm
- ❖ Overall Volume Gains Offshore



Summary of Findings – Long-Term Statistics

➤ Bear Island 2008 - 2025



Summary of Findings – Overall

➤ Bogue Banks:

- ❖ **Recession of the Shoreline at MHW, More Significant on Eastern Half of Bogue Banks**
- ❖ **Overall Significant Volume Gains Above -12 ft NAVD88 to Engineered Beach & Entire Oceanfront Due to Natural Recovery During Quiescent Winter Storm Season**
- ❖ **Losses Within 2024 DMMP Project Area in Atlantic Beach As Expected & Also Within Fort Macon**

Reach (Transects)	Reach Length	Average Shoreline Change @ MHW (+1.5 ft NAVD88)	Average Volume Change Above +1.5 ft NAVD88	Cumulative Volume Change Above +1.5 ft NAVD88	Average Volume Change Above -5 ft	Cumulative Volume Change Above -5 ft NAVD88	Average Volume Change Above - 12 ft	Cumulative Volume Change Above -12 ft NAVD88	Average Volume Change Above - 20 ft	Cumulative Volume Change Above -20 ft NAVD88	Average Volume Change Above - 30 ft	Cumulative Volume Change Above -30 ft NAVD88
		ft	cv/ft	cv	cv/ft	cv	cv/ft	cv	cv/ft	cv	cv/ft	cv
FEMA Engineered Beach (Transects 1-91)	110,781	-2.5	0.8	90,306	5.9	654,670	13.8	1,533,152	12.1	1,343,819	10.9	1,212,959
Bogue Banks Oceanfront (Transects 1-112)	128,393	-9.0	-0.1	-14,475	3.0	389,650	9.8	1,257,877	9.2	1,178,262	9.4	1,207,838
Bear Island (Transects 1-17)	16,500	-18.3	-0.8	-12,487	-0.8	-13,965	4.7	77,900	6.5	108,066	10.4	170,799
Shackleford Banks (Transects 1-22)	42,385	6.6	1.7	73,480	1.1	47,271	-4.5	-188,971	-1.8	-77,225	1.0	42,796

Summary of Findings – Overall

➤ Shackleford Banks:

- ❖ Did Not Experience Significant Recovery From 2023-2024 Volume Losses Like Bogue Banks
- ❖ Minor Losses Above -12 ft NAVD88 But Most Material Captured Above -20 ft NAVD88

➤ Bear Island:

- ❖ Experienced Minor Recovery From 2023-2024 Volume Losses
- ❖ Small Volume Gains Above -12 ft NAVD88 and Out to Closure

Reach (Transects)	Reach Length	Average Shoreline Change @ MHW (+1.5 ft NAVD88)	Average Volume Change Above +1.5 ft NAVD88	Cumulative Volume Change Above +1.5 ft NAVD88	Average Volume Change Above -5 ft	Cumulative Volume Change Above -5 ft NAVD88	Average Volume Change Above - 12 ft	Cumulative Volume Change Above -12 ft NAVD88	Average Volume Change Above - 20 ft	Cumulative Volume Change Above -20 ft NAVD88	Average Volume Change Above - 30 ft	Cumulative Volume Change Above -30 ft NAVD88
		ft	cy/ft	cy	cy/ft	cy	cy/ft	cy	cy/ft	cy	cy/ft	cy
FEMA Engineered Beach (Transects 1-91)	110,781	-2.5	0.8	90,306	5.9	654,670	13.8	1,533,152	12.1	1,343,819	10.9	1,212,959
Bogue Banks Oceanfront (Transects 1-112)	128,393	-9.0	-0.1	-14,475	3.0	389,650	9.8	1,257,877	9.2	1,178,262	9.4	1,207,838
Bear Island (Transects 1-17)	16,500	-18.3	-0.8	-12,487	-0.8	-13,965	4.7	77,900	6.5	108,066	10.4	170,799
Shackleford Banks (Transects 1-22)	42,385	6.6	1.7	73,480	1.1	47,271	-4.5	-188,971	-1.8	-77,225	1.0	42,796

Presentation Outline

➤ Data Collection

- ❖ Survey Transects
- ❖ Survey Equipment

➤ Methodology

- ❖ Shoreline Change
- ❖ Volume Change

➤ Key Events: April 2024 – April 2025

- ❖ Storm Activity
- ❖ Nourishment

➤ Summary of Annual Findings

- ❖ Shoreline & Volume Change (2024 – 2025)
- ❖ Master Beach Nourishment Plan Trigger Status (2025)
- ❖ Long-term Oceanfront Statistics (2008 – 2025)
- ❖ Background Erosion Rates (1999 – 2025)
- ❖ Inlet Conditions – Beaufort, Bogue, Barden
- ❖ Dune Volume Analysis
- ❖ Vegetation Line Analysis

➤ Q&A/Discussion

Q&A/Discussion

