Town of Caswell Beach, NC
2023 Beach Monitoring

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Background:

- December 2014 – Bald Head Island (BHI) began monitoring Caswell Beach
- June 2018 – USACE Wilmington Harbor Maintenance placed approx. 1,140,000 cy on Caswell Beach and Oak Island
- December 2018 to March 2019 – BHI removed 1.1 MCY from JBS
- September 2019 – Moffatt & Nichol finalizes modeling report for JBS dredge project
- Oct. 2019 to Feb. 2020 – Coordination between Oak Island, Caswell Beach, and BHI on permit conditions (Monitoring and Mitigation)
- October 2020 – Last monitoring survey performed by Bald Head Island

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Background (continued):

- March 2020 – Permit issued for initial Oak Island project
- March 2021 – Initial Town-wide beach profile survey conducted
- April/May 2021 – Oak Island Nourishment Project
- October 2021 – Town-wide beach profile survey conducted
- February/April 2022 – Oak Island Phase 2 Nourishment Project
- May 2022 – Town-wide beach profile survey conducted
- May 2023 – Town-wide beach profile survey conducted (Year-1)

2021 Oak Island Nourishment Project:

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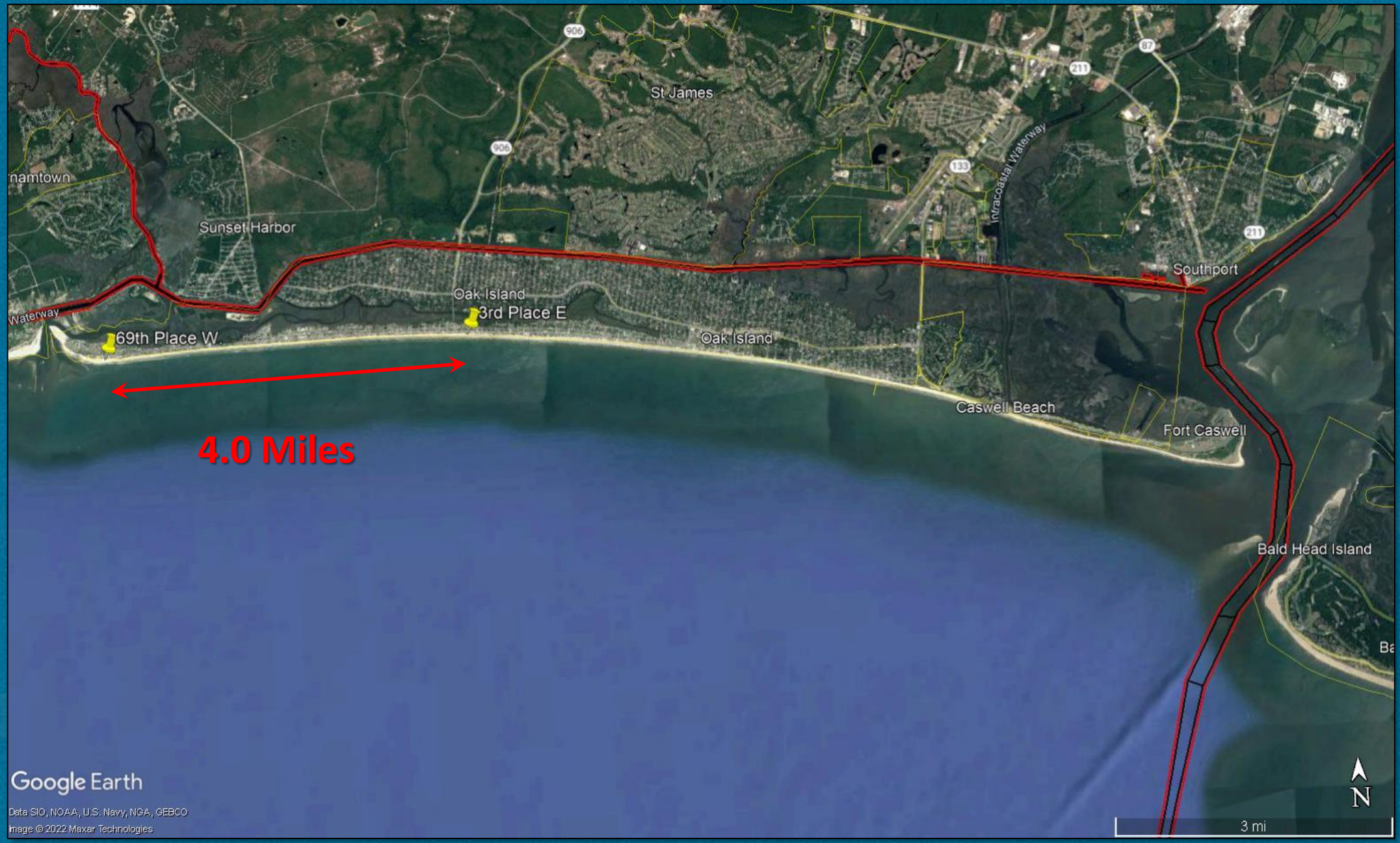
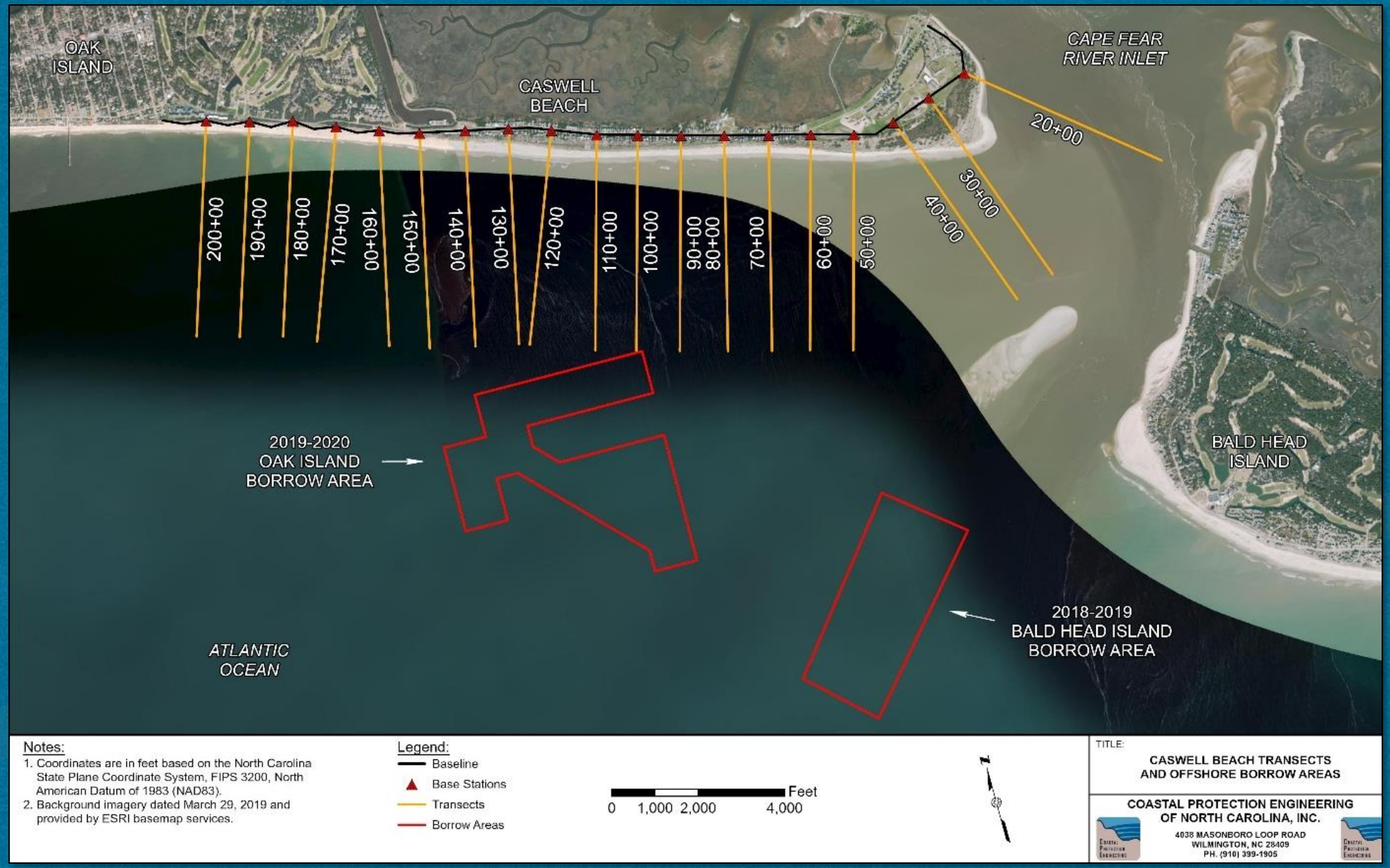
2022 Oak Island Nourishment Project:



Project Area:



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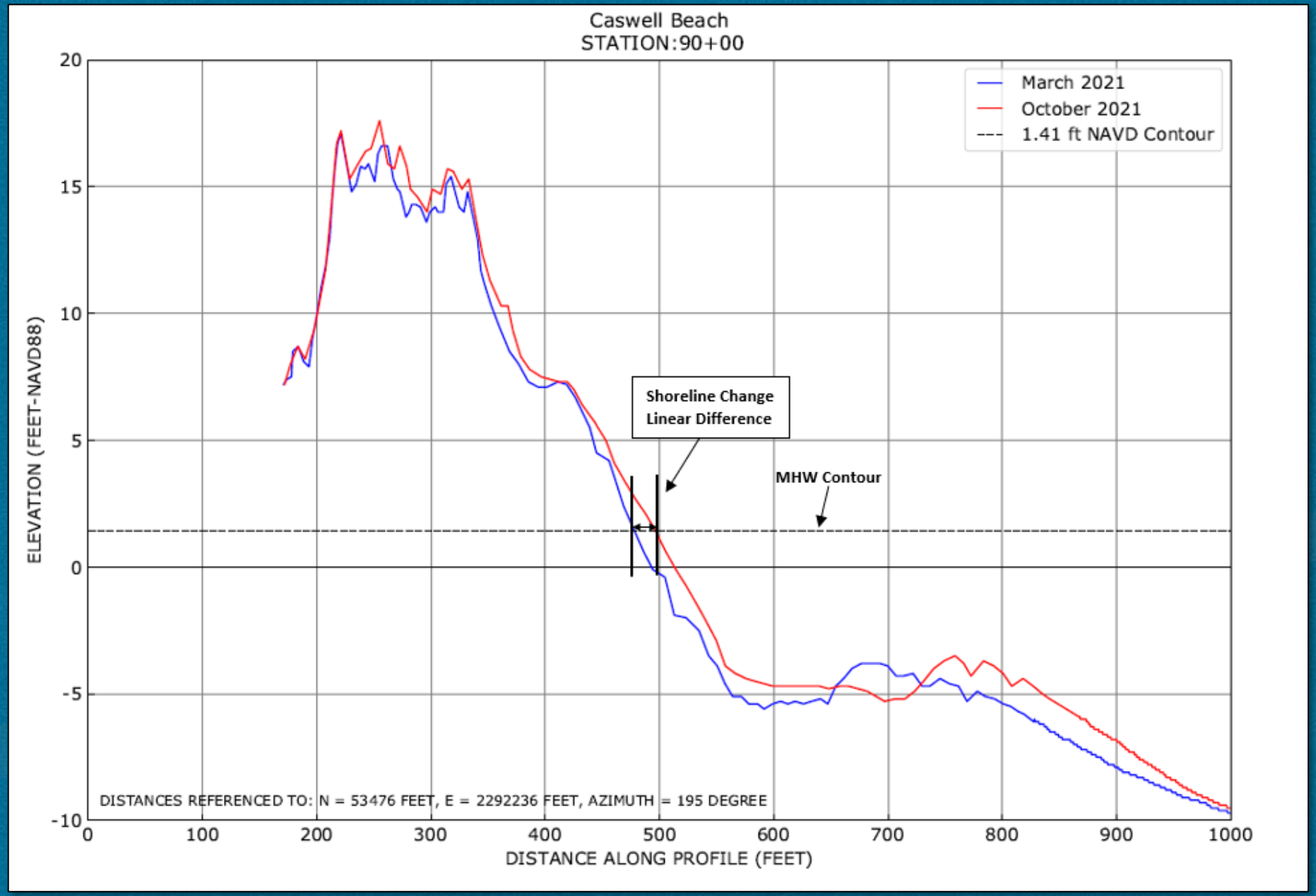
Shoreline Change:



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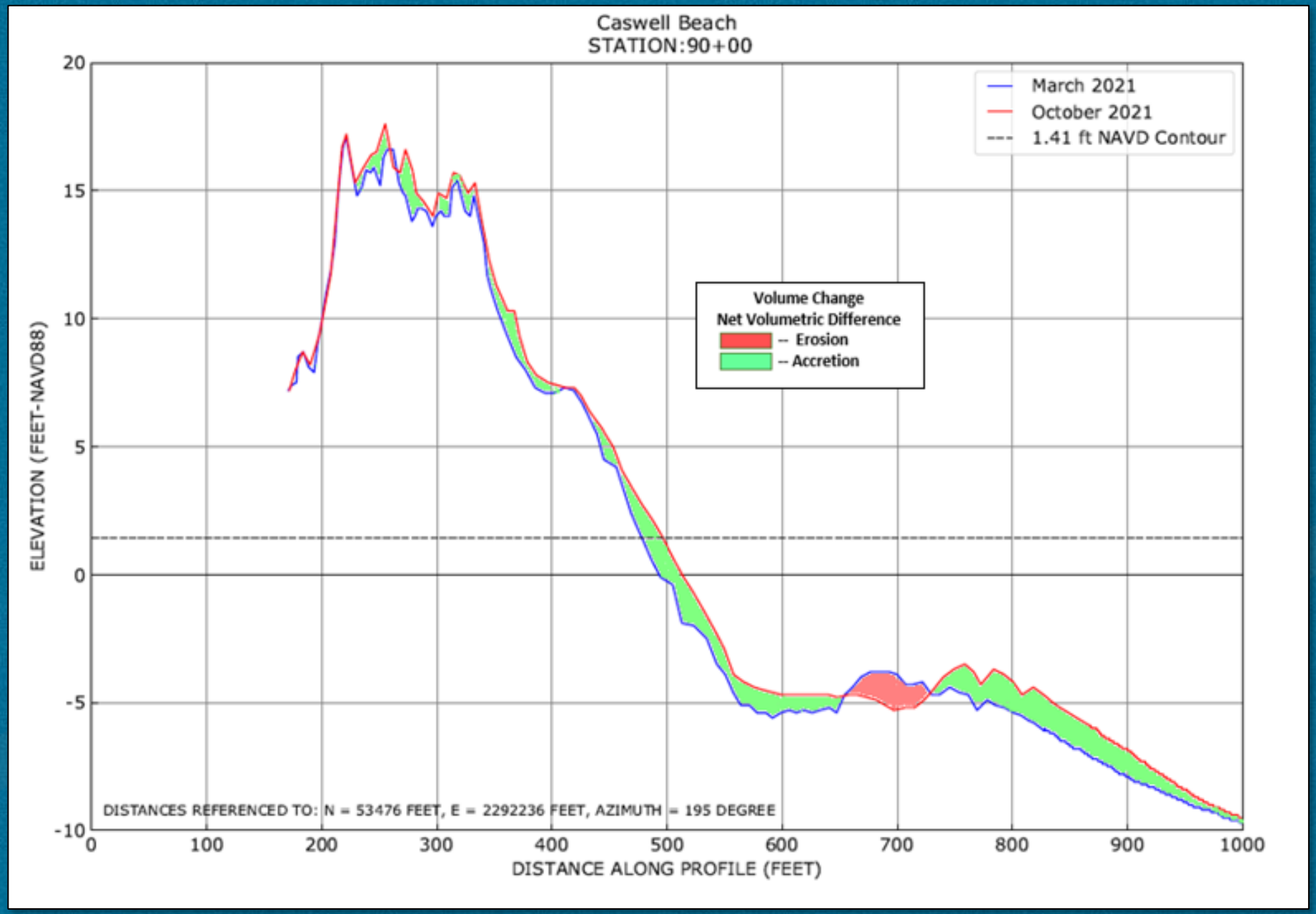
Volume Change:



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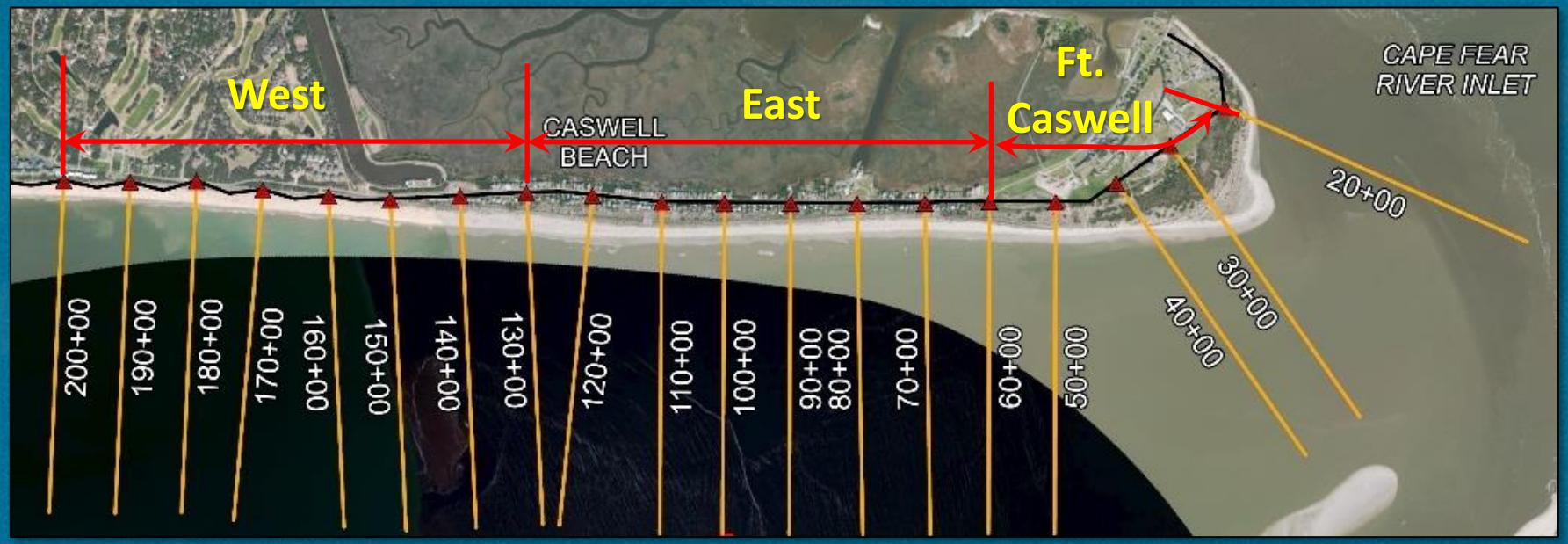
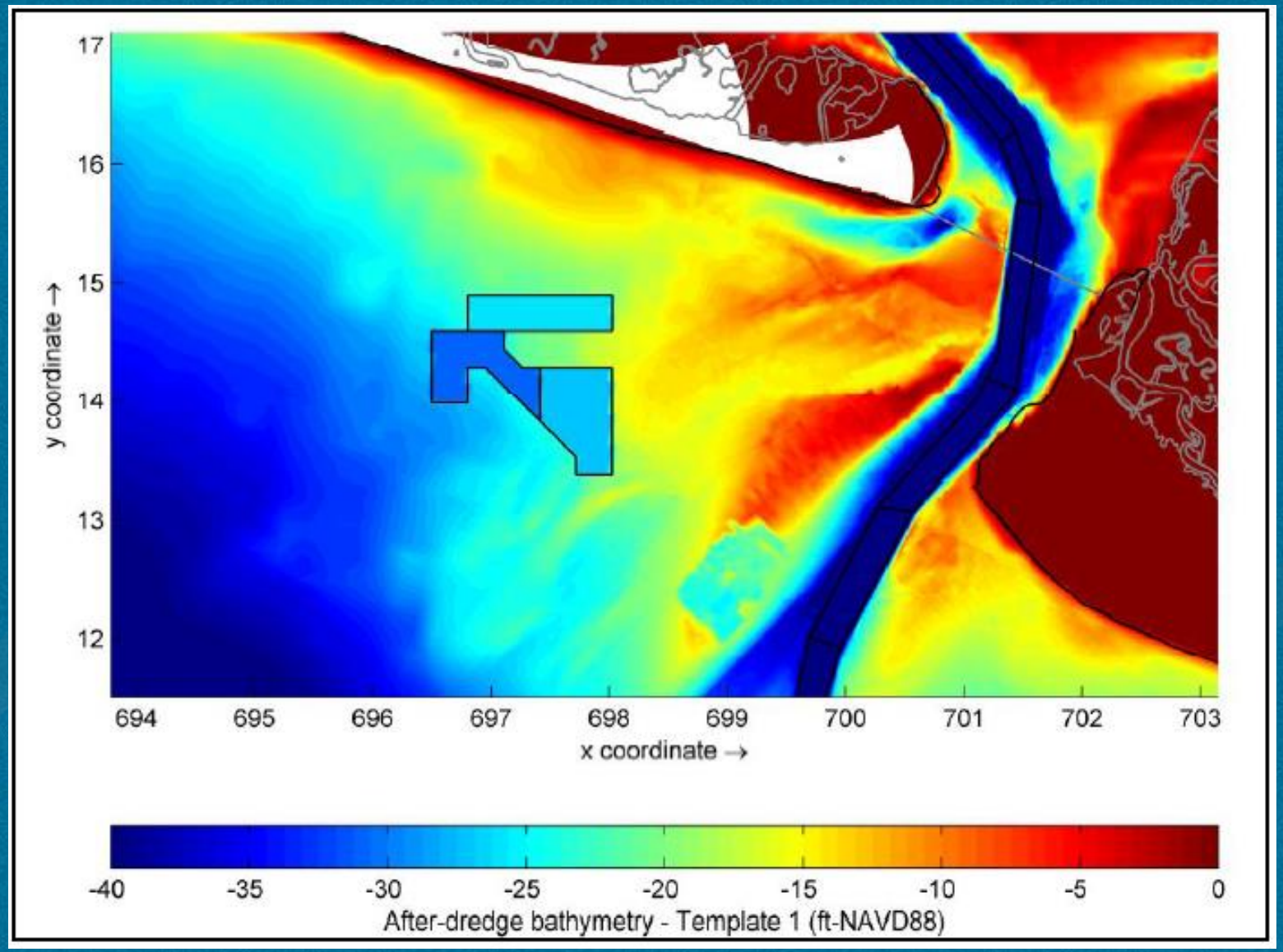
Shoreline / Volume Change:

- Three (3) Sections Referenced:
  - West Caswell Beach – 638 Caswell Beach Road to 200 feet west of Yaupon Way
  - East Caswell Beach – Entrance of Fort Caswell to 638 Caswell Beach Road
  - Fort Caswell – The shoreline along Fort Caswell
- For Each Section – Changes between March 2021 and May 2023
- Fort Caswell and East Caswell Beach – Since 2021 and Historic Rates



Bathymetry Chart (Moffatt & Nichol, 2019)



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Shoreline Change

	March 2021 – May 2023 (Change / Change Rate)	May 2022 – March 2023 (Change / Change Rate)
West Caswell Beach	-28.1 FT. / -13.0 FT./YR.	-13.3 FT./YR.
East Caswell Beach	-4.1 FT. / -1.9 FT./YR.	-7.6 FT./YR.
Fort Caswell	-39.4 FT. / -18.2 FT./YR.	-10.4 FT./YR.

- **Comparison of Historic Rates and Recent Rates**
  - East Caswell Beach (Stations 60+00 to 120+00)
    - Historic Rate (Dec. 2014 to March 2021): +0.8 ft./yr.
    - Recent Rate (Mar. 2021 to May 2023): -1.2 ft./yr.
  - Fort Caswell (Stations 20+00 to 60+00)
    - Historic Rate (Dec. 2014 to March 2021): -12.9 ft./yr.
    - Recent Rate (Mar. 2021 to May 2023): -18.2 ft./yr.

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Volume Change Rate

- **March 2021 – May 2023 Average Change Rate (14 Months)**
  - West Caswell Beach: +127,600 cy/yr.
  - East Caswell Beach: +41,800 cy/yr. between 60+00 and 130+00
  - Fort Caswell: -95,400 cy/yr.
- **Comparison of Historic Rates and Recent Rates**
  - Eastern Caswell Beach (Stations 60+00 to 120+00)
    - Historic Rate (Dec. 2014 to Mar. 2021): +5,600 cy/yr.
    - Recent Rate (Mar. 2021 to May 2023): +14,500 cy/yr.
  - Fort Caswell (Stations 20+00 to 60+00)
    - Historic Rate (Dec. 2014 to Mar. 2021): -36,900 cy/yr.
    - Recent Rate (Mar. 2021 to May 2023): -44,000 cy/yr.

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Historic Change Analysis (Moffat & Nichol):

Oak Island Permit Conditions:

- Evaluate historic datasets and calculate shoreline and volume changes
- Survey Caswell Beach annually for three years after dredging JBS
- If the average values over a 3 transect section of shoreline exceed the mean values by one standard deviation, Oak Island will convene a Technical Advisory Committee (TAC)
- If the TAC agrees that using JBS is causing unintentional effects on Caswell Beach, Town of Oak Island will be responsible for mitigation.

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Historic Change Analysis (Moffat & Nichol):

- Evaluated historic datasets and calculate shoreline and volume changes (February 2003 – March 2021)
- 1 set of calculations using all data available
- 1 set of calculations excludes Wilmington Harbor Maintenance Projects and surveys associated with Hurricane Matthew and Florence.
- Computed mean shoreline and volume changes for both scenarios and computed the standard deviation
- Compared the historic changes and standard deviation with measured changes between May 2022 and May 2023

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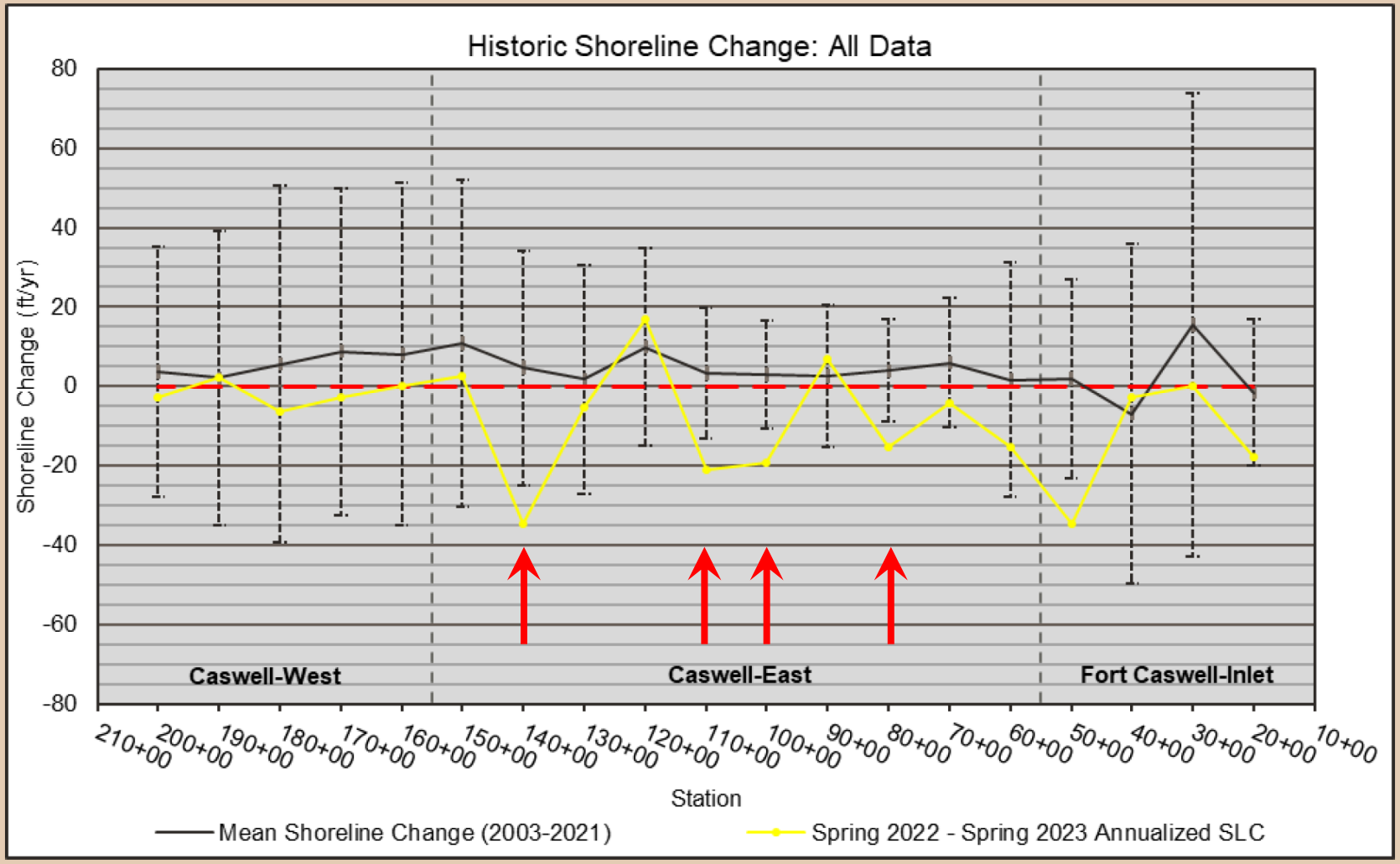
Historic Change Analysis (Moffat & Nichol):

Historical Analysis – Results (All Data)



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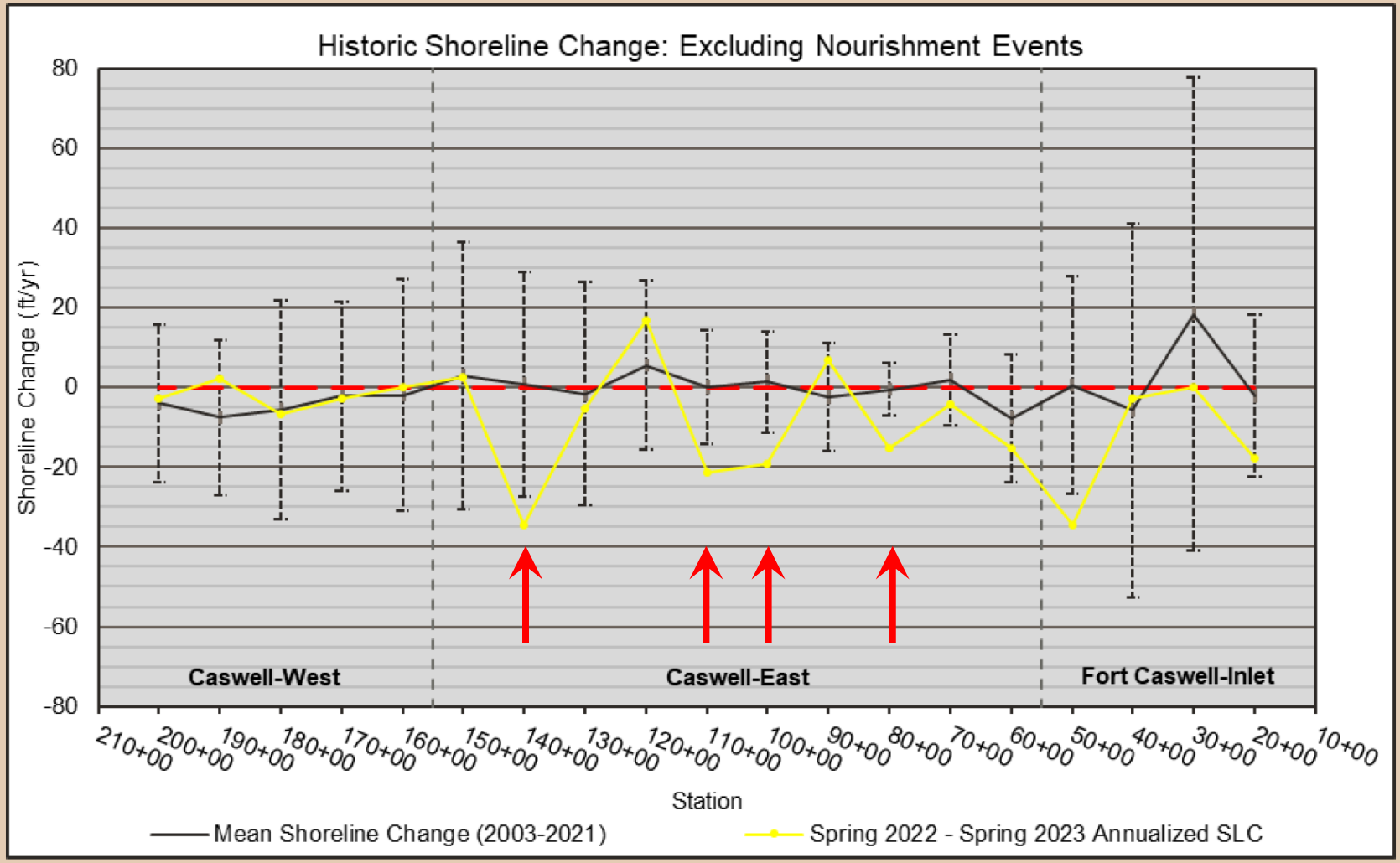
Historic Change Analysis (Moffat & Nichol):

Historical Analysis – Results (Excluding Nourishment Projects)



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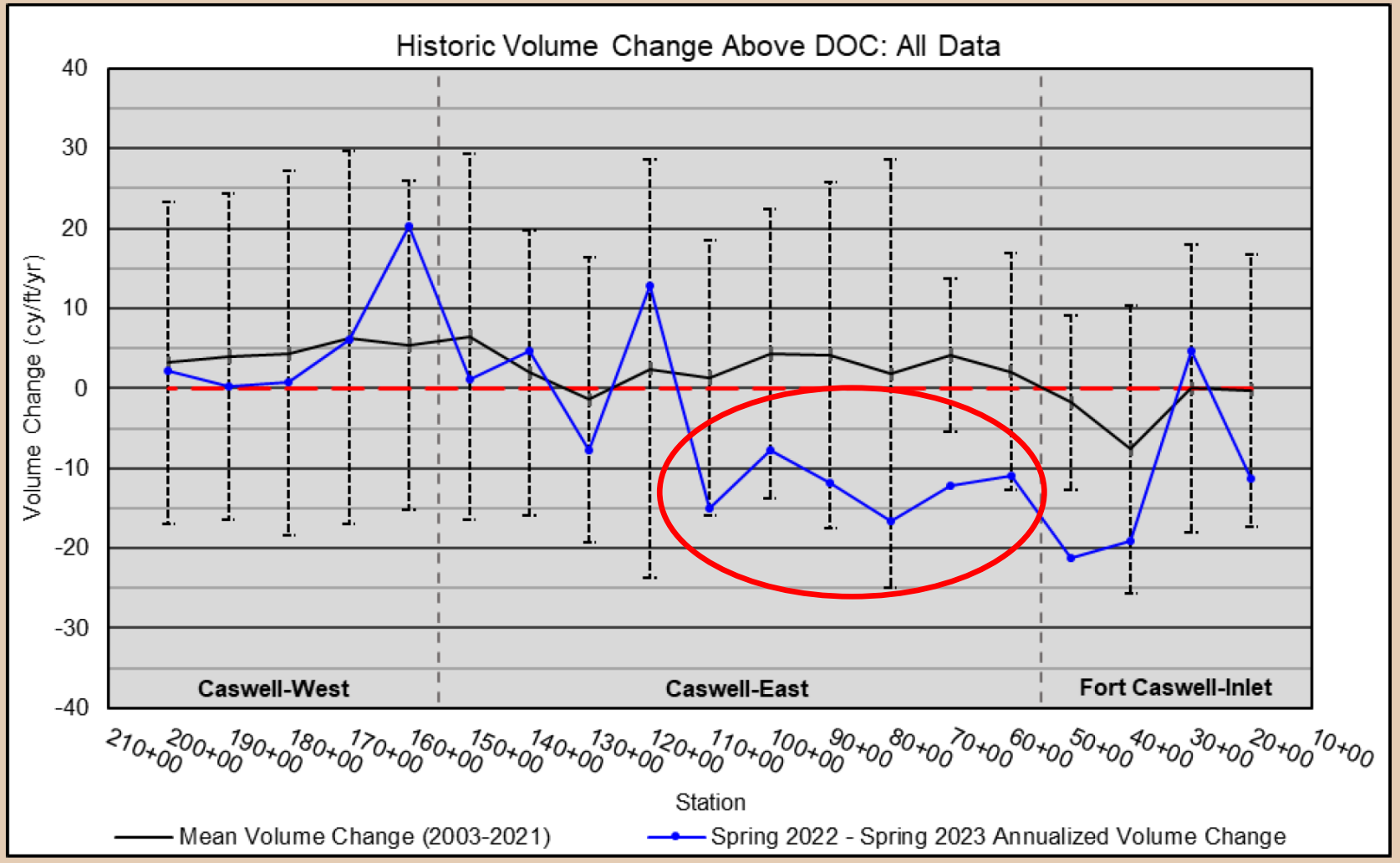

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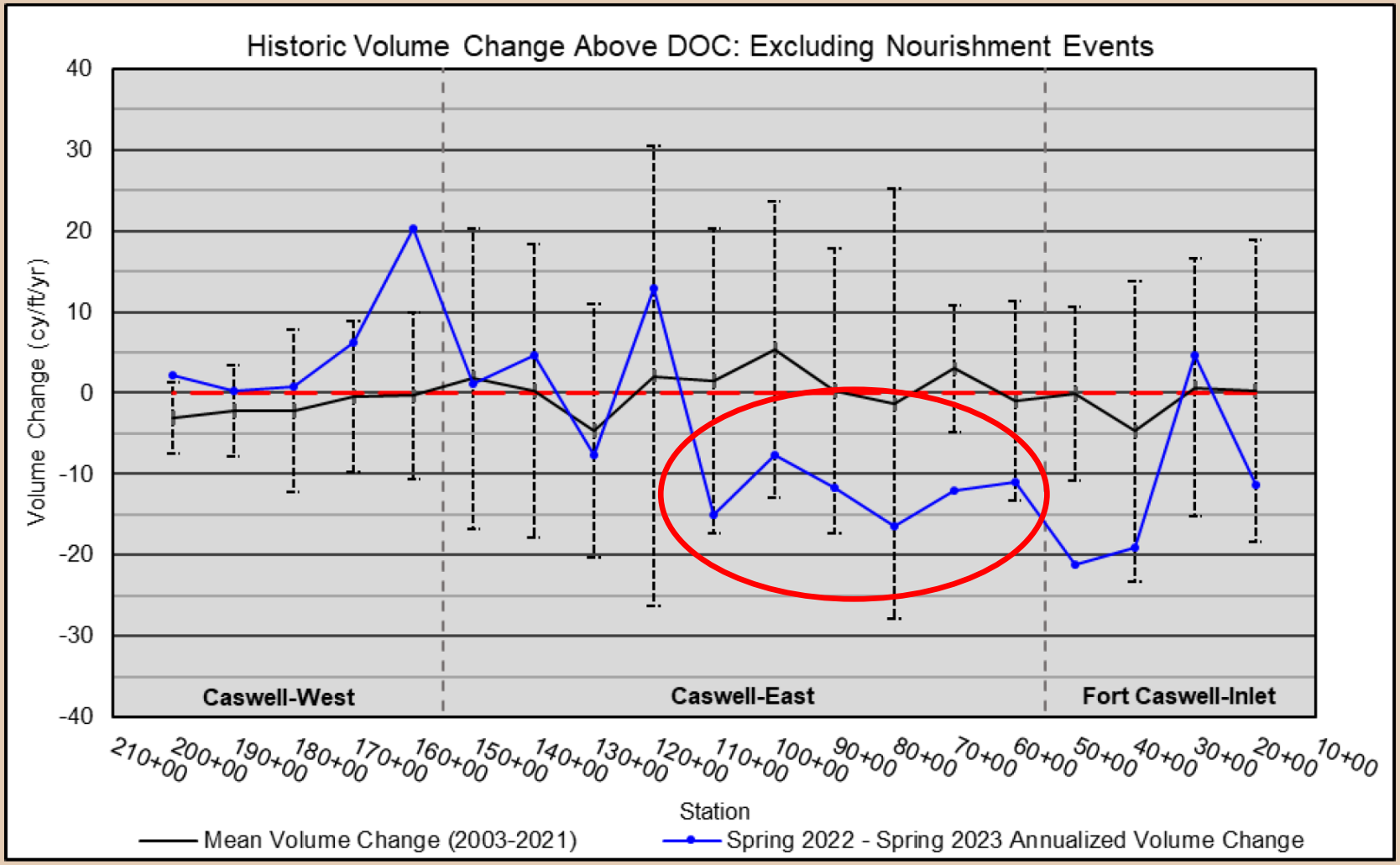

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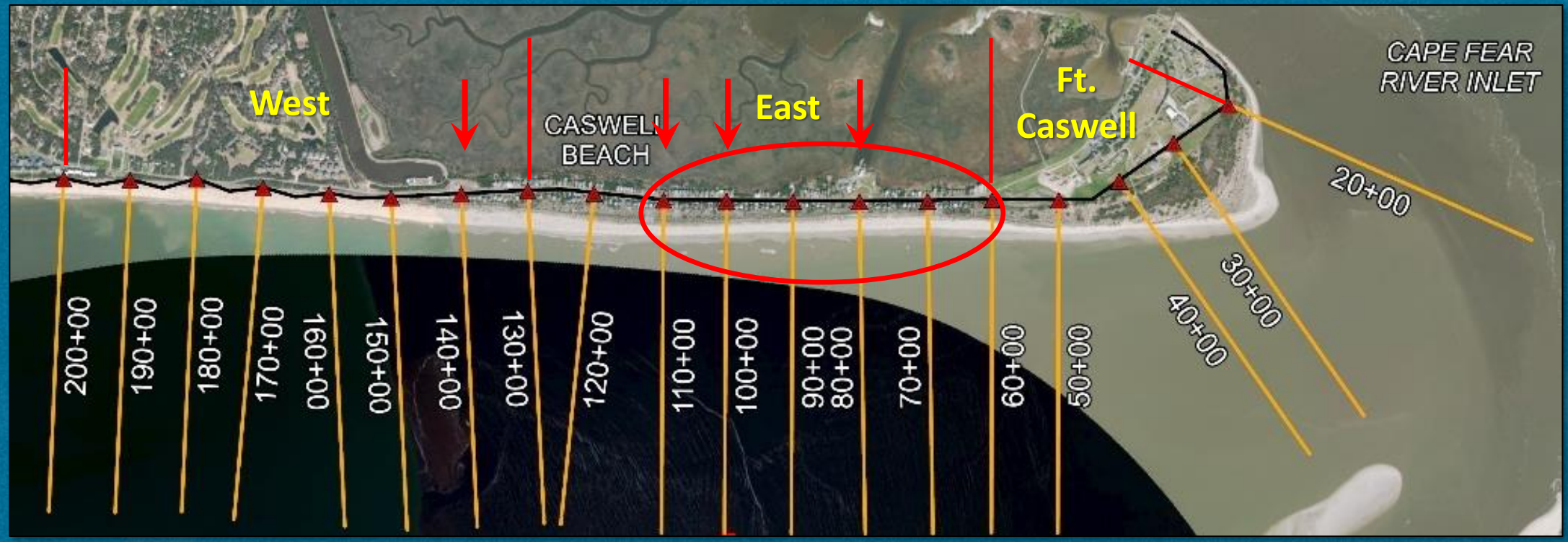

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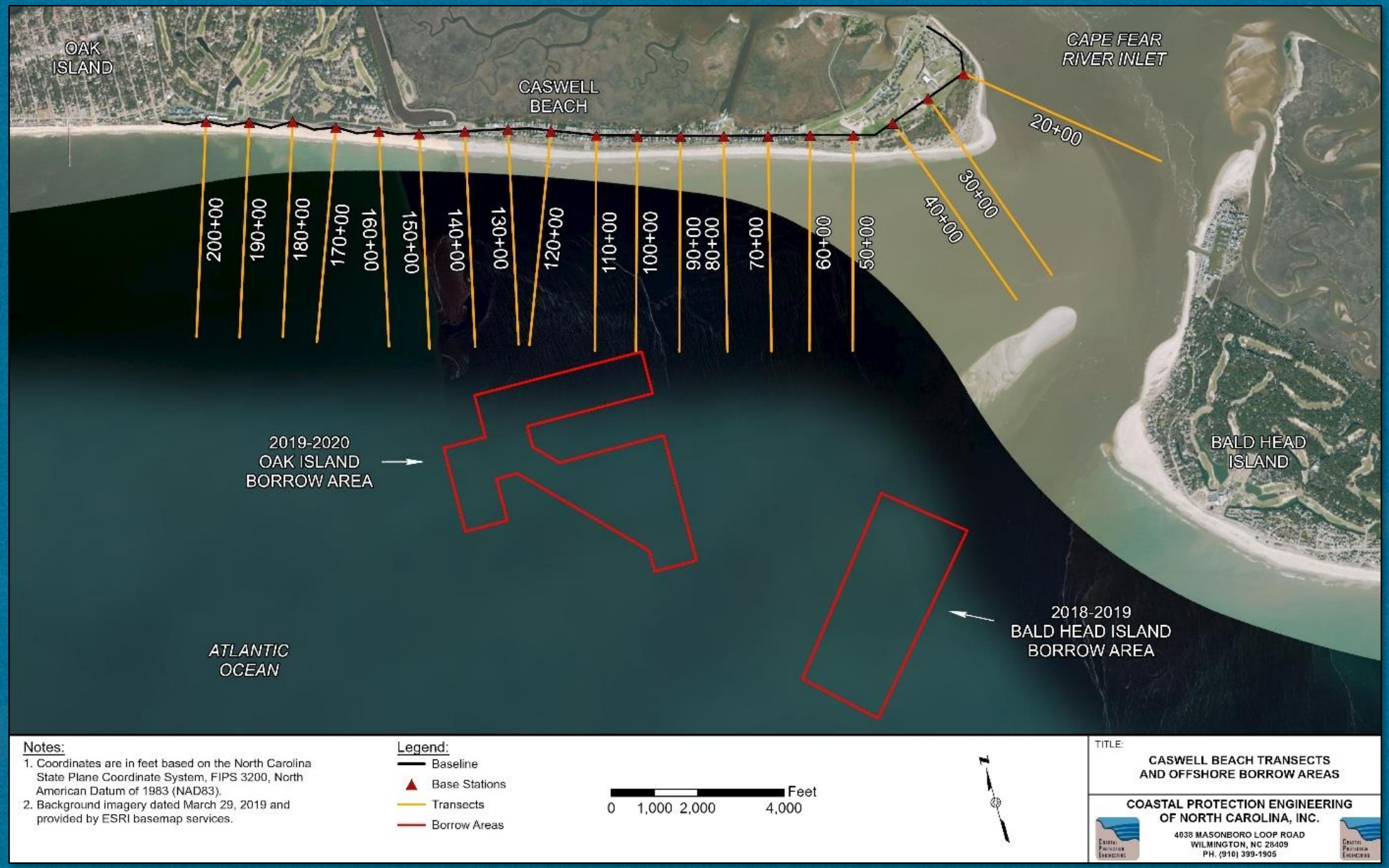

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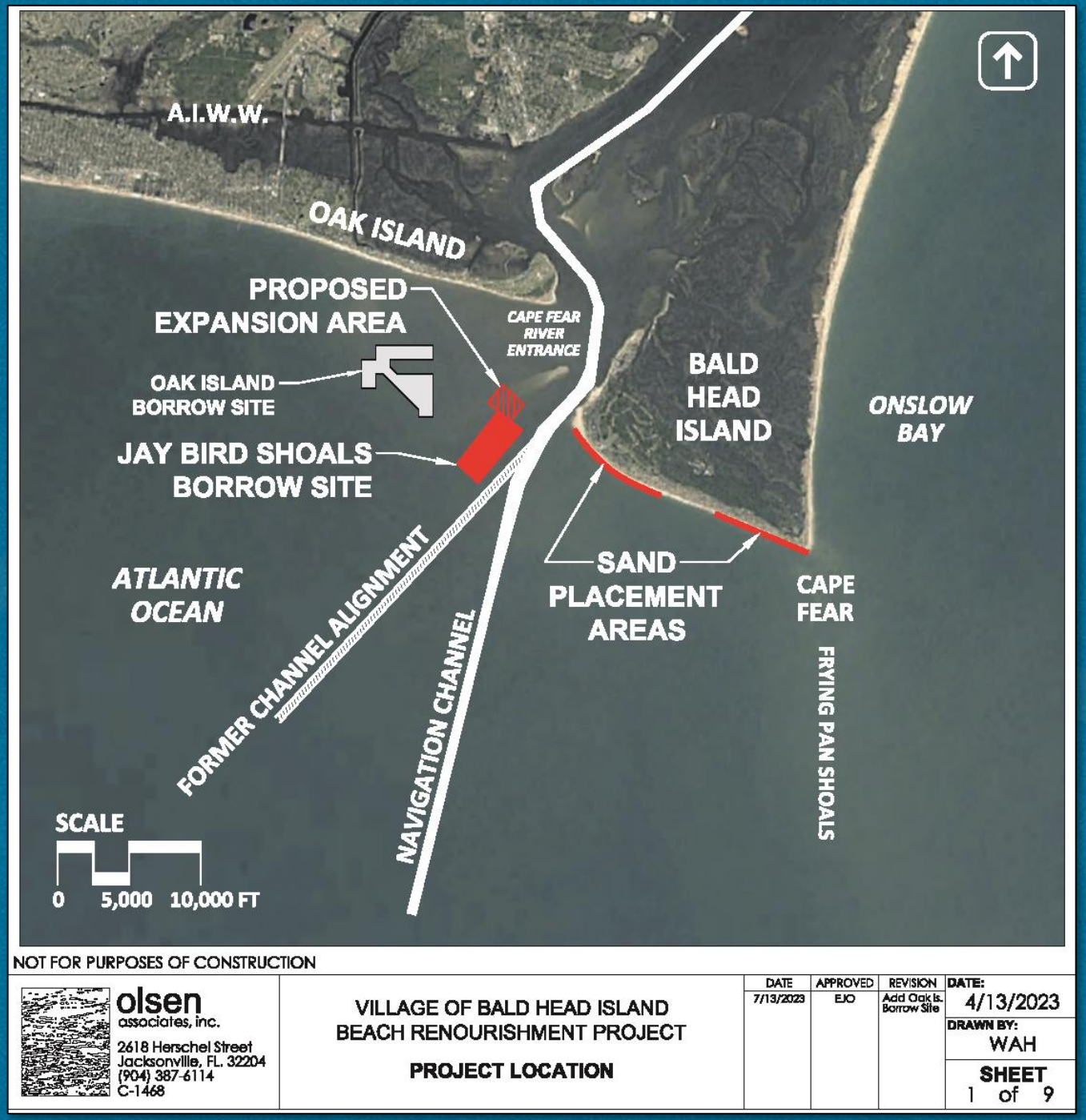
2024/2025 Bald Head Island Project:

Dredging of ~ 1,000,000 cy from the Expansion Area



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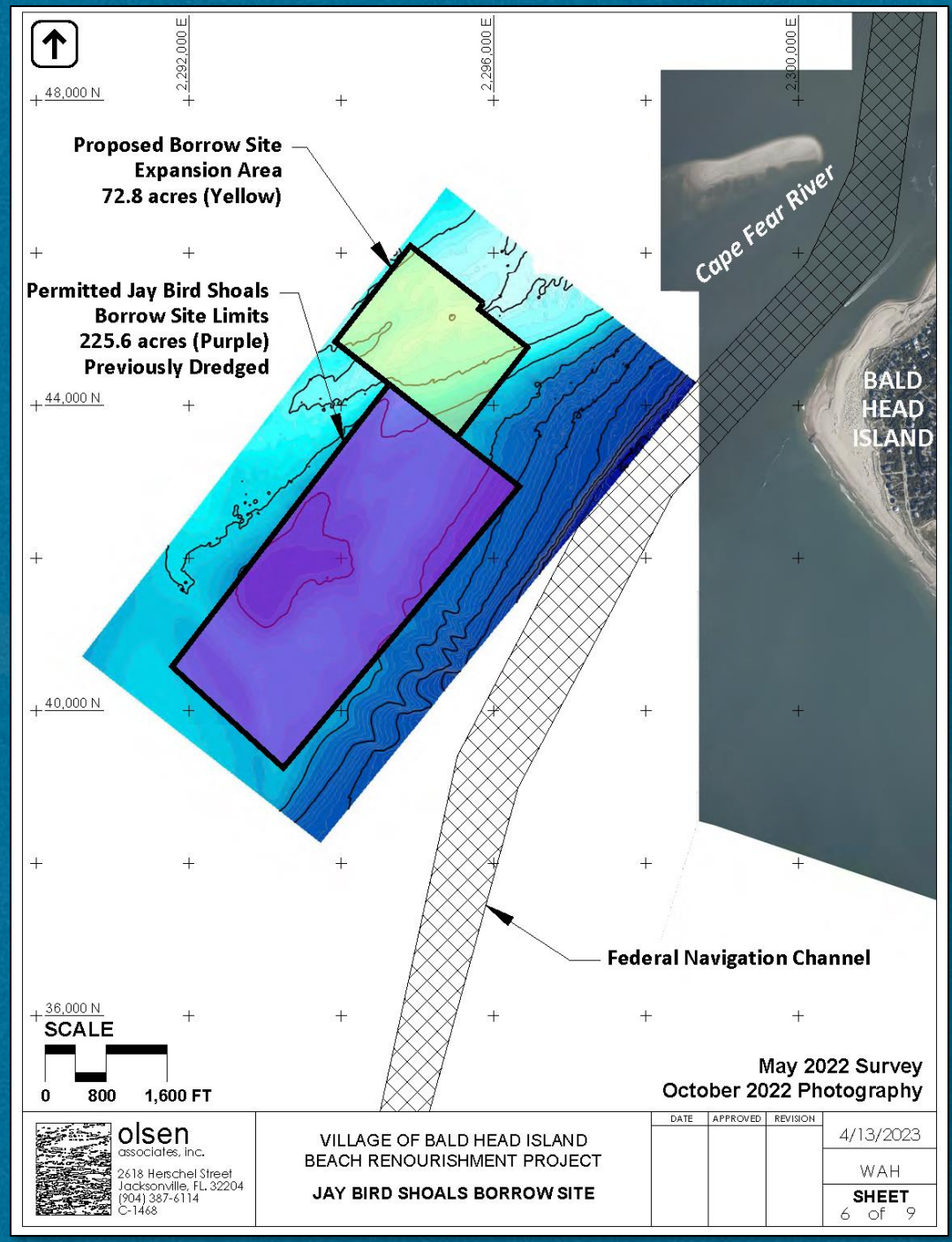

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Conclusions

- Negative shoreline change measured along Caswell Beach between March 2021 and May 2023 (Since Dredging) and May 2022 and May 2023 (Short-Term)
- Positive volume changes measured along Caswell Beach between March 2021 and May 2023. However negative volume changes measured along East Caswell between May 2022 and May 2023.
- Volume changes between March 2021 and May 2023 generally align with historic rates.
- Recent volumetric change trend (May 2022 to May 2023) show net volume loss along East Caswell and lower rates of gain along West Caswell compared to March 2021 to May 2022.

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Other Considerations

- Additional monitoring is necessary to evaluate longer-term impacts
- The Town of Oak Island is required to monitor Caswell Beach through Spring 2025.
- Statistical Analysis of recent changes compared to historic changes showing some areas in East Caswell Beach approaching or exceeding historic rates of loss.
- Additional dredging of Jay Bird Shoals by Bald Head Island proposed for 2024/2025 project
- Oak Island Potential to add on to the 2024/2025 federal project

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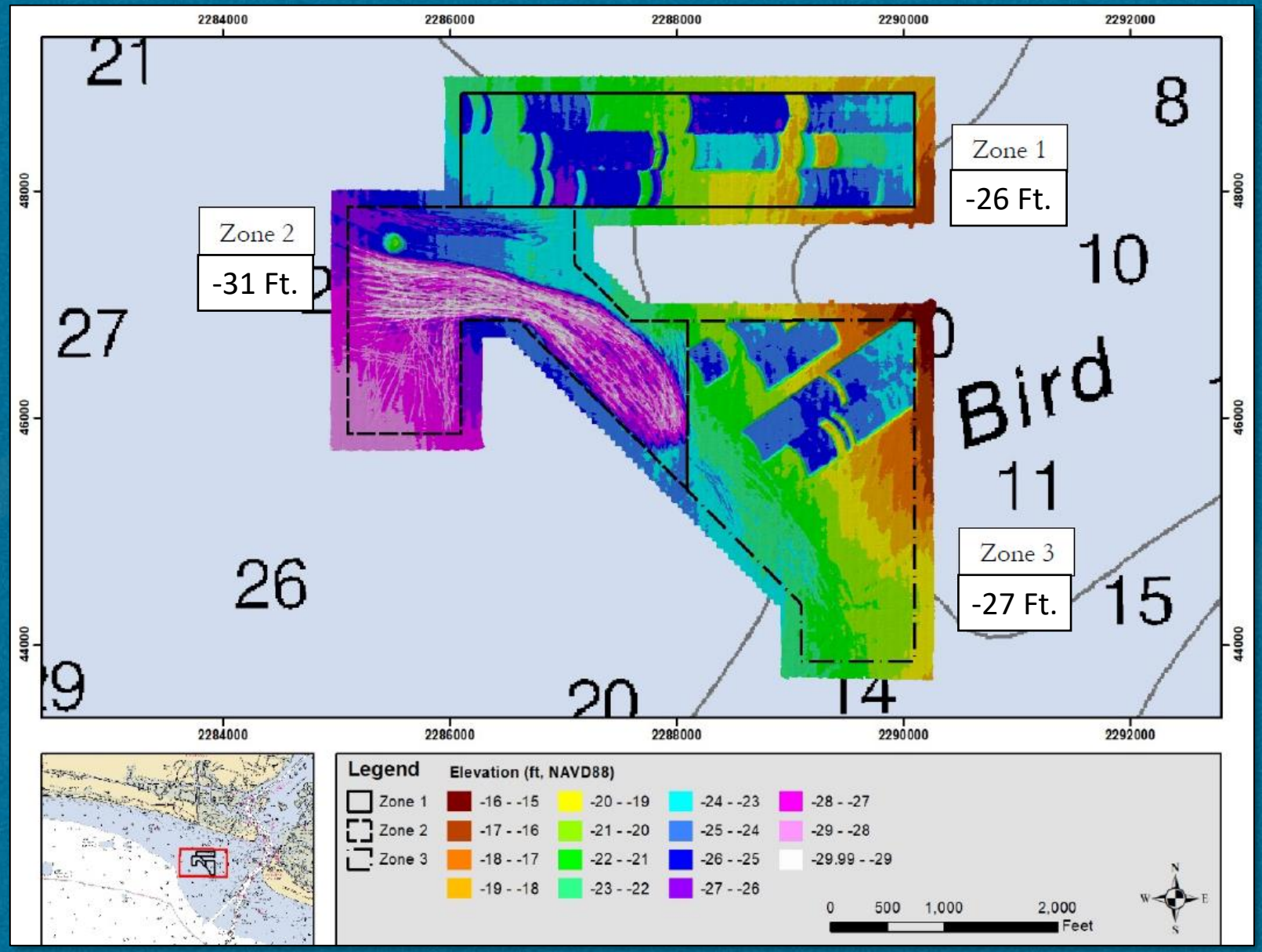
Jay Bird Shoals Post-Project

From: Moffatt & Nichol Memo to USACE June 22, 2021



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