

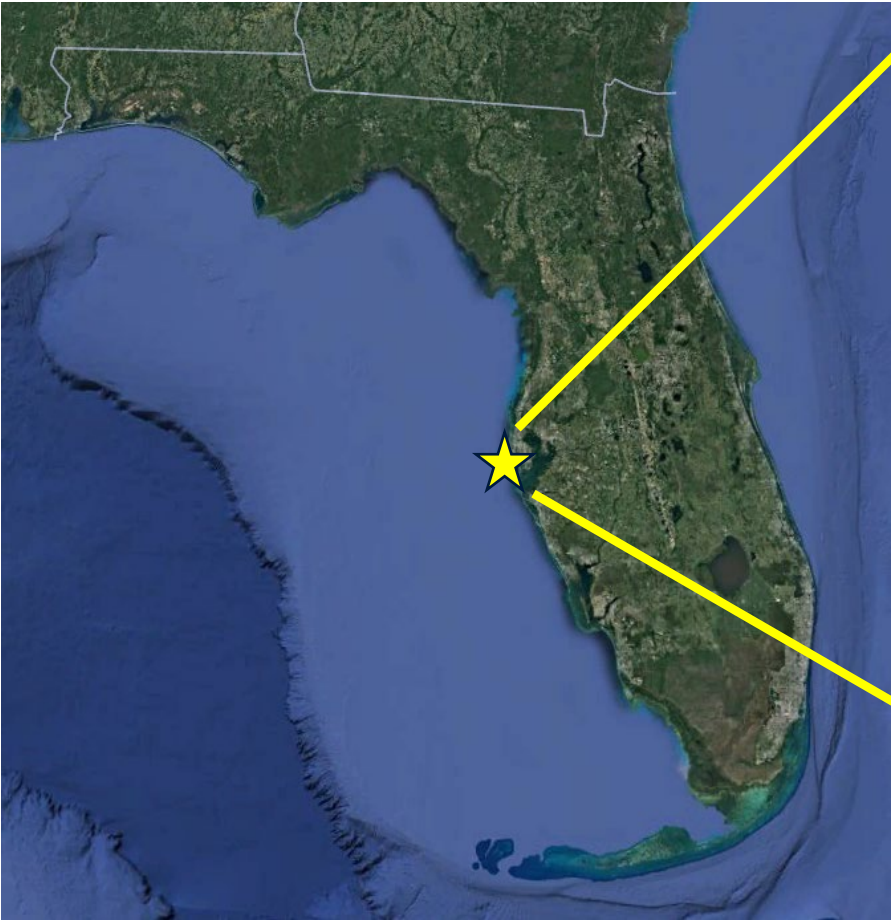


Sunset Beach Groin Study

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Pinellas County: John Bishop, Ph.D.,
Zachary Westfall

PROJECT LOCATION



GROIN HISTORY

- Constructed in 1976
- Part of the Pinellas County Beach Erosion Control Project (USACE, 1968)



SUNSET BEACH GROIN TODAY



RECENT NOURISHMENT HISTORY

Treasure Island

- USACE Project
 - 2018: 239,000 CY between R-136A to R-142
 - Current Period of participation ends in 2031
 - Feasibility study in progress to nourish TI over next 50 years
 - Pinellas County is the non-federal partner
- Countywide Emergency Dune Project
 - Winter 2023/24: 32,000 CY between R-137 to R-142



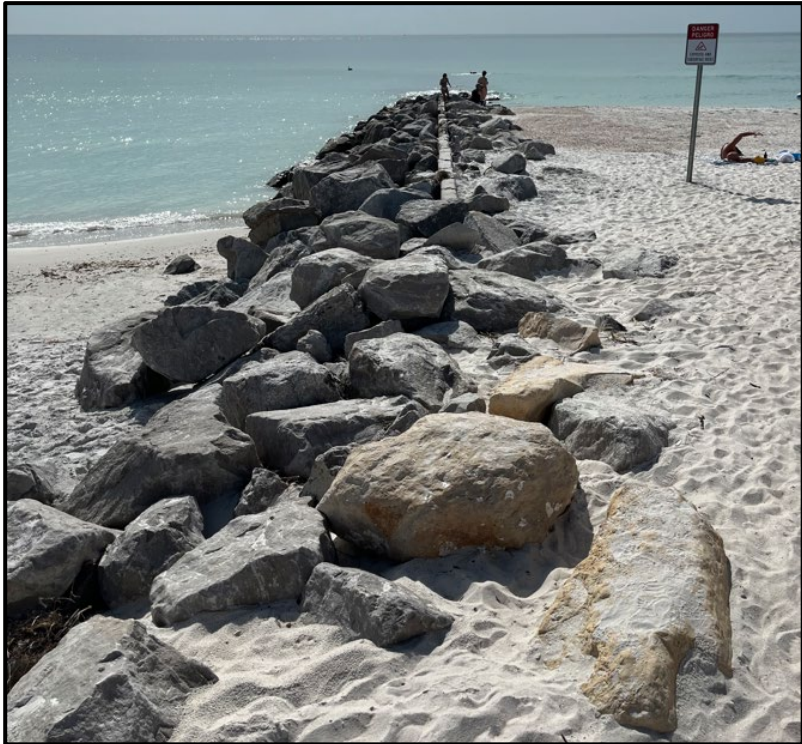
RECENT NOURISHMENT HISTORY CONT.

- Reconstruction of dune at Sunset Beach following 2024 hurricane season
- Upcoming Pinellas County Beach Nourishment Project
 - Emergency permitting is underway
 - 364,000 CY on TI



GROIN OBSERVATIONS

- Composed of granite armor stone and concrete sheet pile
- Approximately 270 feet of exposed groin
- Slopes into water and buried on the seaward end



SEDIMENT TRANSPORTS

- Sediment moves north to south through the study area from wind driven waves and currents
- Majority of sediment transport at Sunset Beach assumed to occur at MHW line
- Small amount of transport occurs in the bar



BEACH OBSERVATIONS



BEACH OBSERVATIONS CONT.



ENGINEERING CHALLENGES

- Structure is trapping sediment on the north side causing erosion to the south
- South side erosion is severe
- Beach nourishment alone has been inadequate



NUMERICAL MODELING

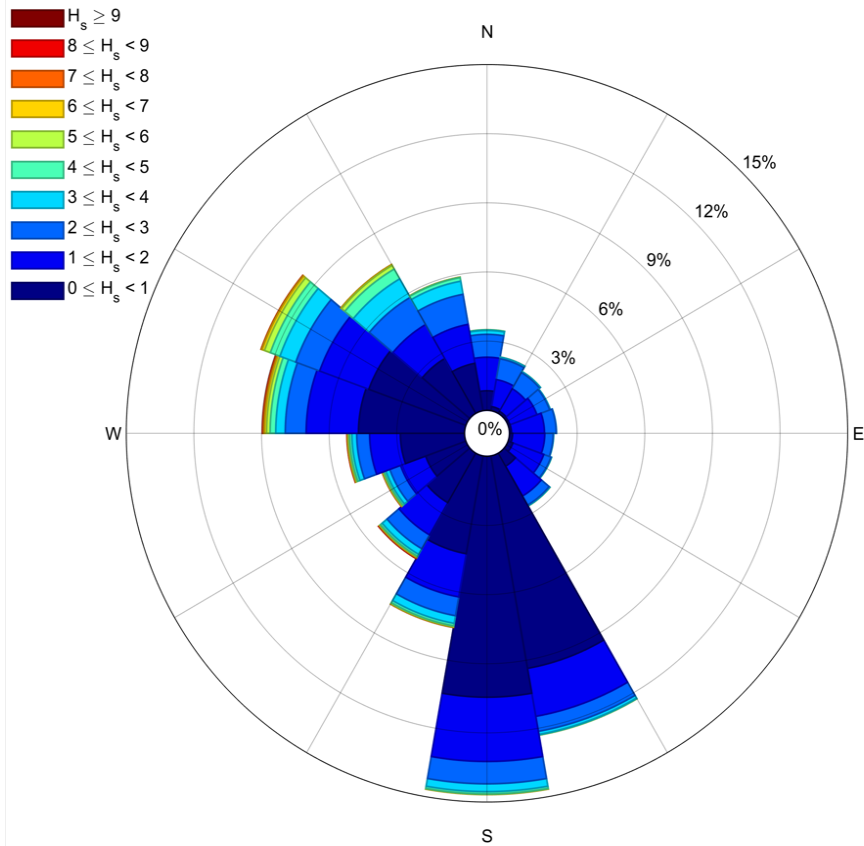
Of Selected Engineering Alternatives

- Delft-3D numerical model
- Calibrated and Validated using measured wave climates and sediment transport
- The model's greatest strength is in comparison between different cases

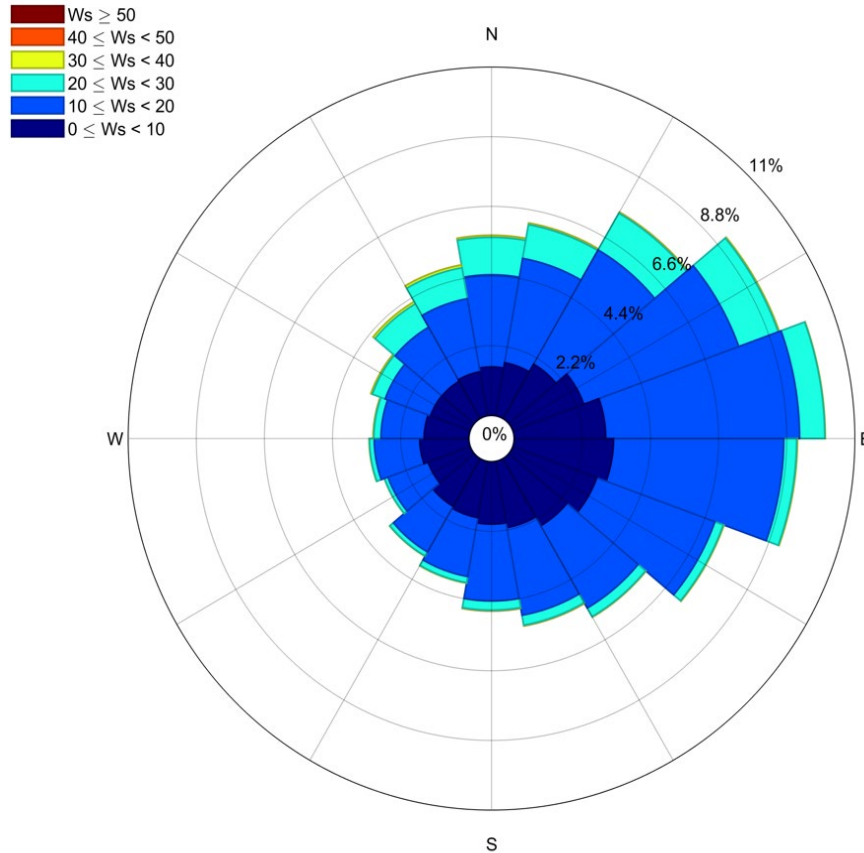
WIND AND WAVE DATA



Wave Rose WIS Station ST73268
1980 to 2023. Units in feet



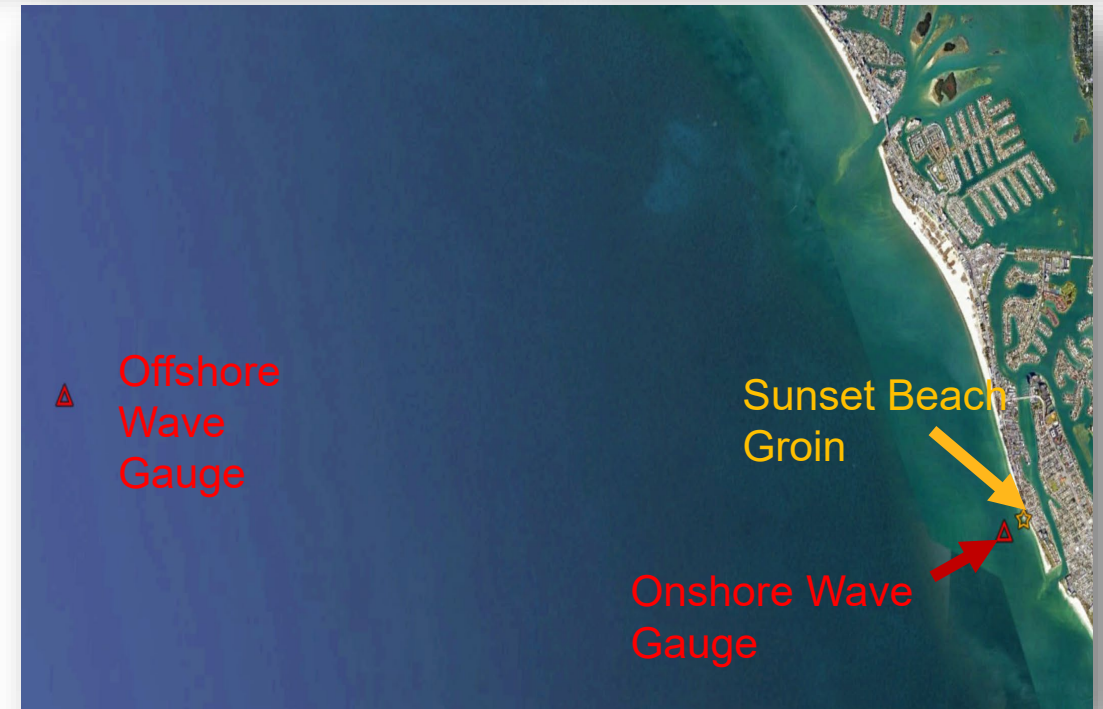
Wind Rose WIS Station ST73268
1980 to 2023. Units in miles per hour



MODEL CALIBRATION

ADCP Deployment

- Two wave gauges were deployed by APTIM divers to measure currents and wave heights.
 - Offshore wave gauge depth = 32 ft
 - Onshore wave gauge depth = 15 ft



ALTERNATIVES

8 Total Alternatives

Alternative 1

- USACE Equilibrated Advanced Nourishment Template

Alternative 2

- Cut a 16' Weir

Alternative 3

- Cut a 33' Weir

Alternative 4

- Shorten the Groin

ALTERNATIVES CONT.

Alternative 5

- Add a Tapered Groin Field

Alternative 5.1

- Add a Long Tapered Groin Field

Alternative 6

- Update Advance Nourishment Volumes

Alternative 7

- Nourishment of 10 CY/FT after 3 Years

COMPARISON OF ALTERNATIVES

Step 01

- Simulate coastal morphodynamics for a period of 5 years using the reduced wave climate

Step 02

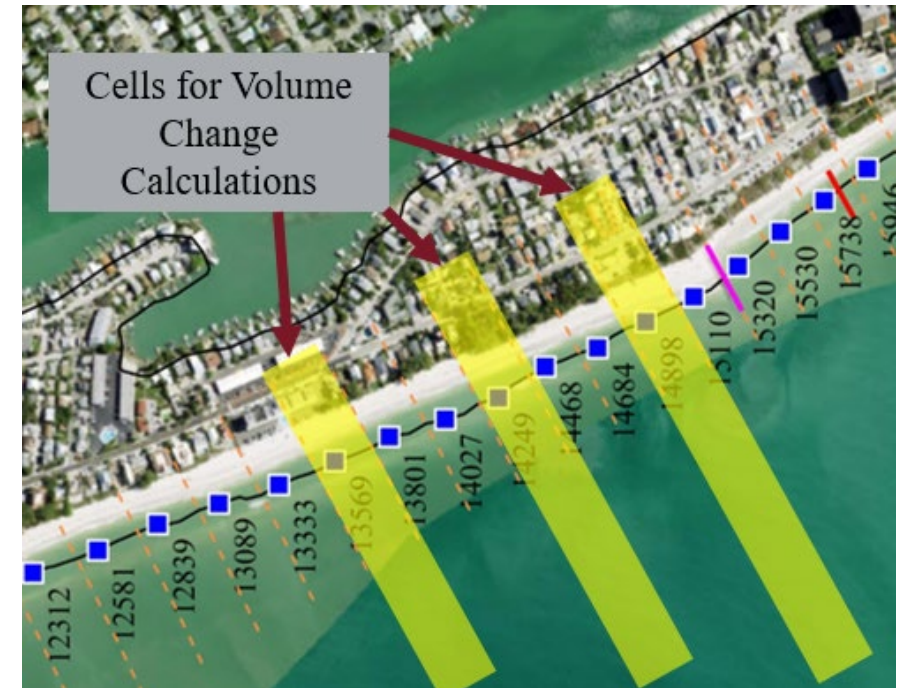
- Calculate sediment volume change in cells along the beach
- $\Delta vol = \text{bed level at the end of 5 years} - \text{Initial bed level}$

Step 03

- Compute Δvol per *year* per *alongshore foot*
- ($\Delta vol / \text{year} / \text{ft}$)

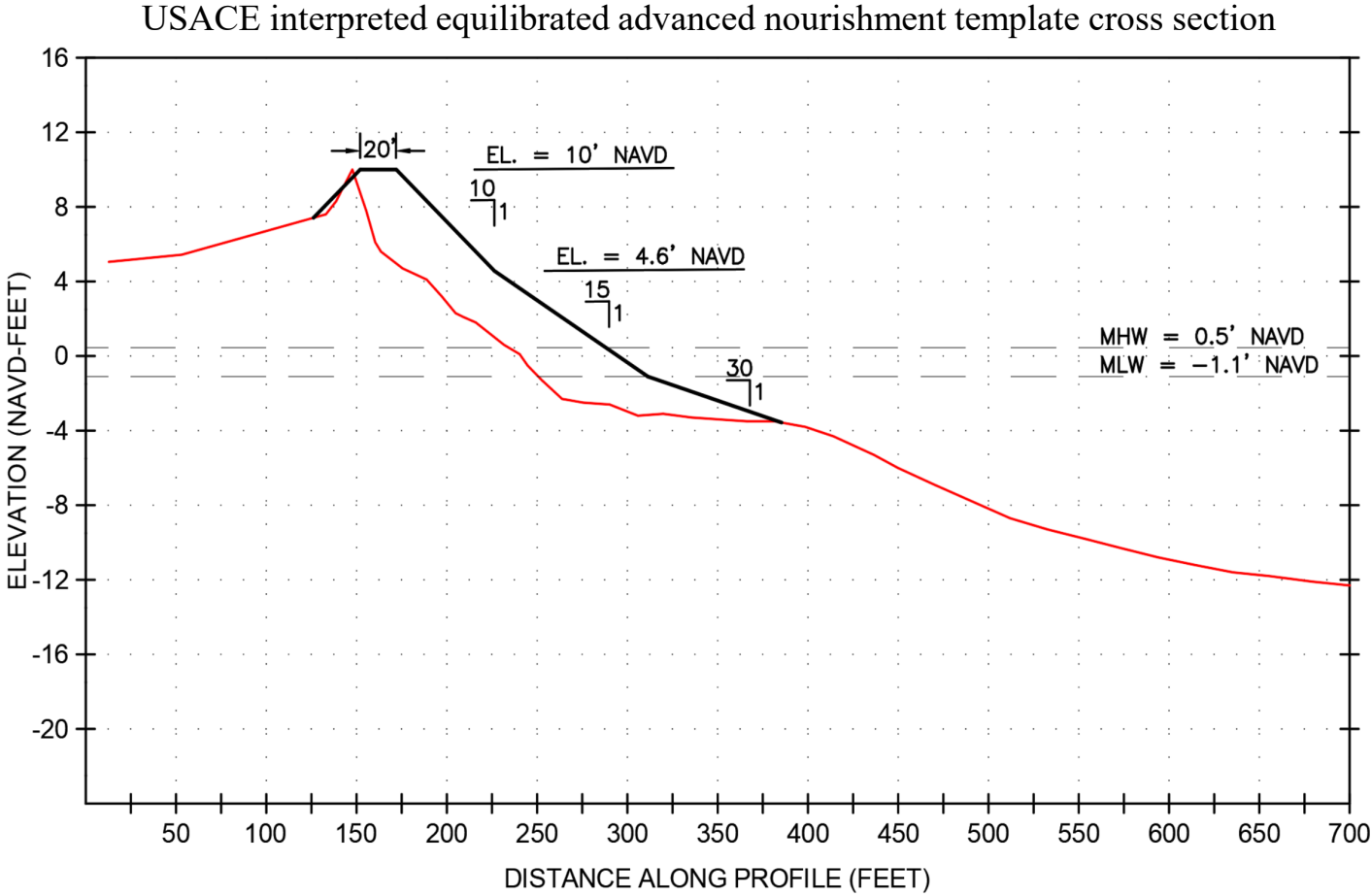
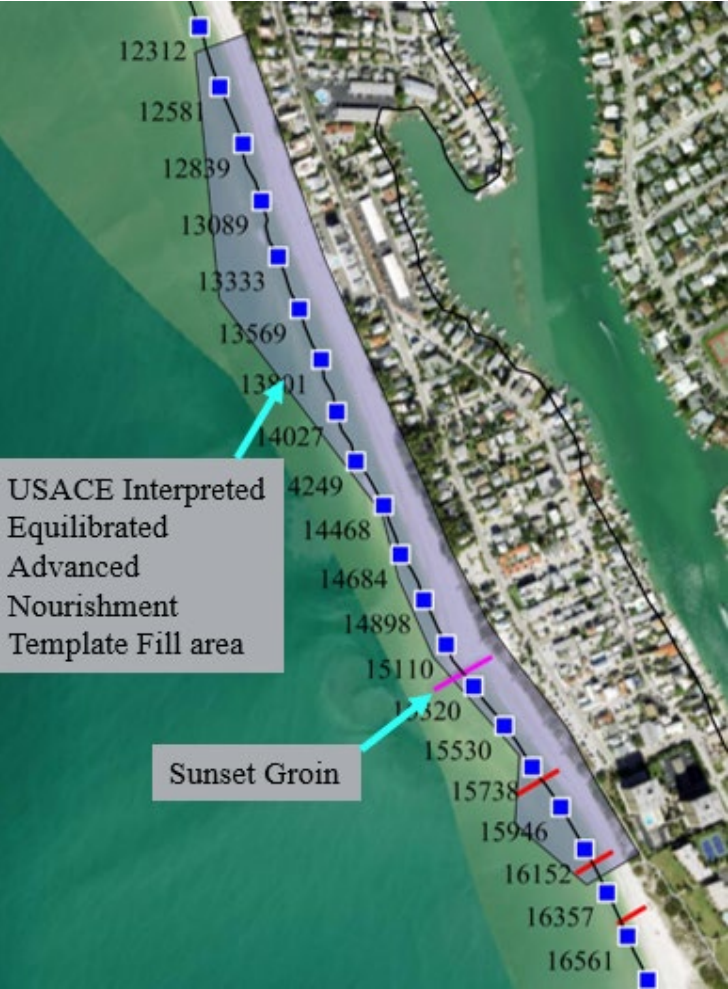
Step 04

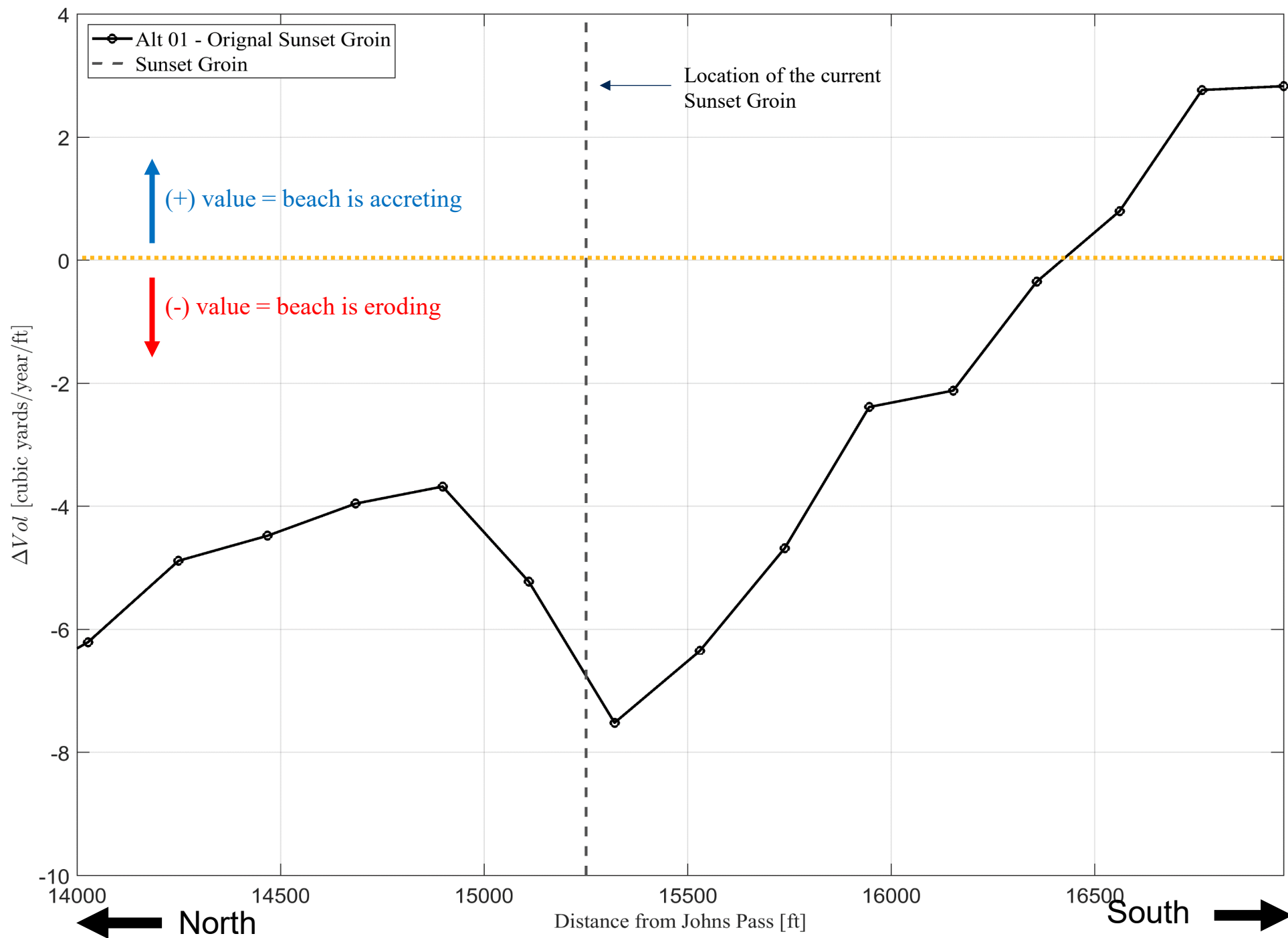
- Compute the volume change for all alternatives



ALTERNATIVE 01 : NO ACTION

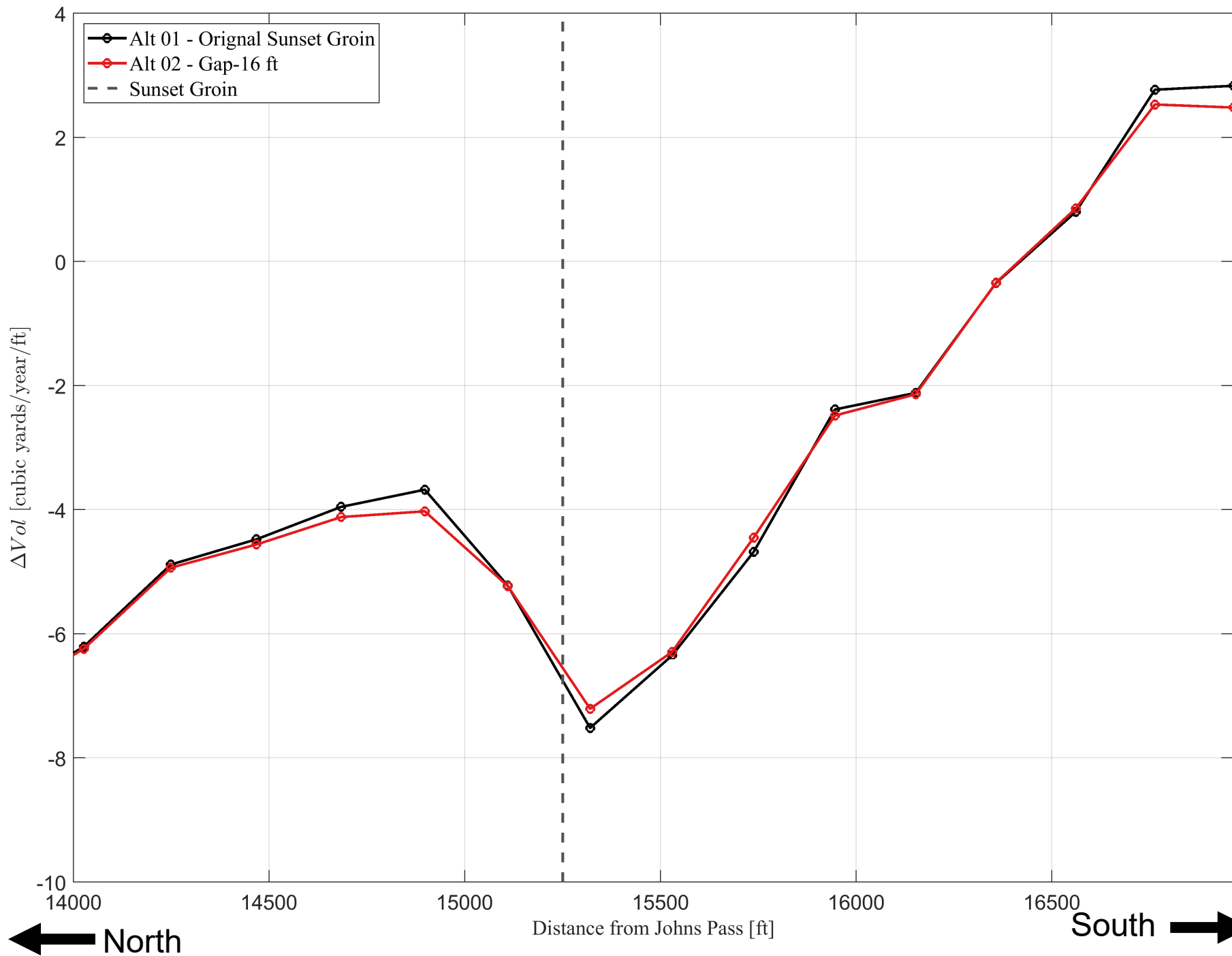
USACE Nourishment Template





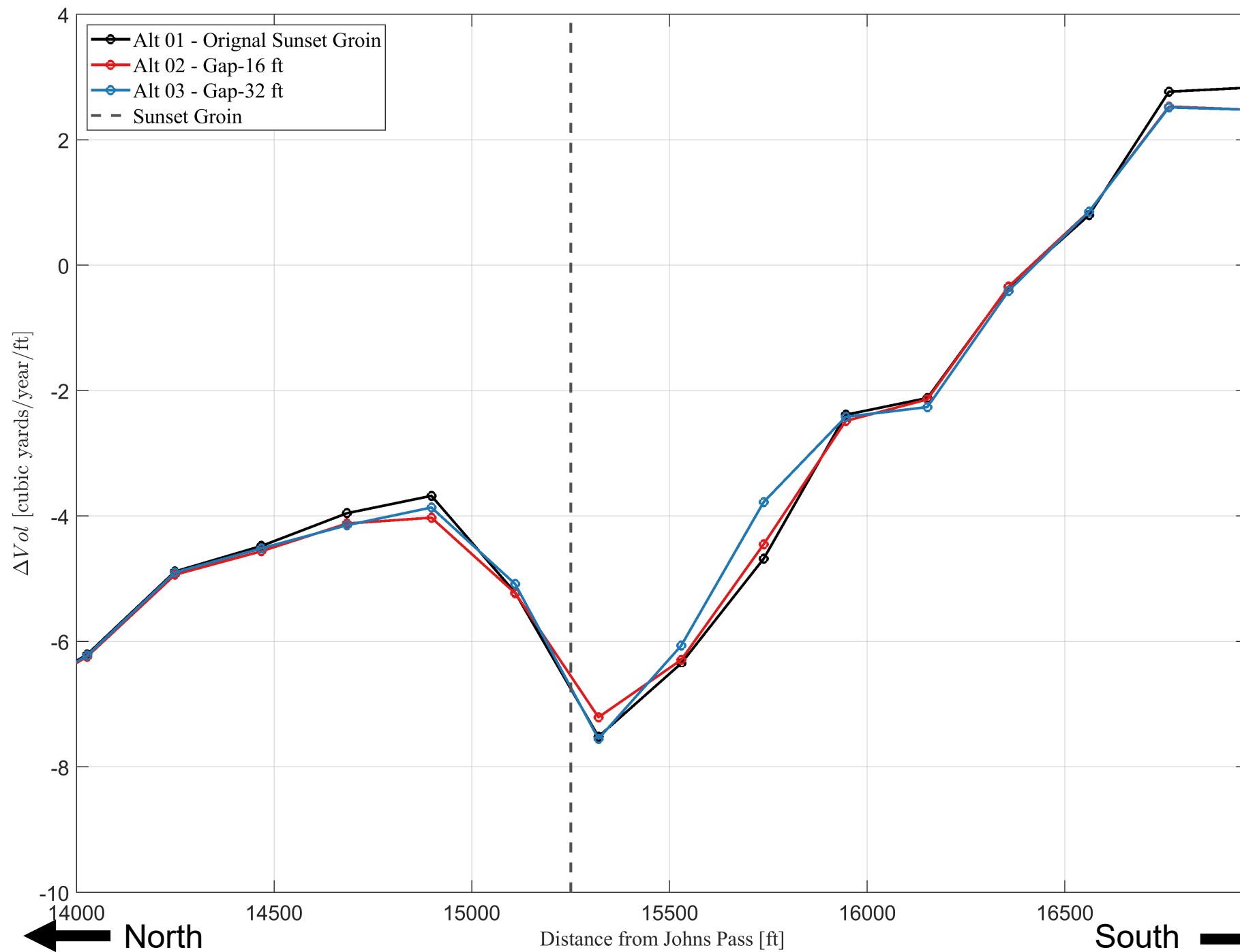
ALTERNATIVE 2: CUT A 16' WEIR CENTERED ON THE MHWL





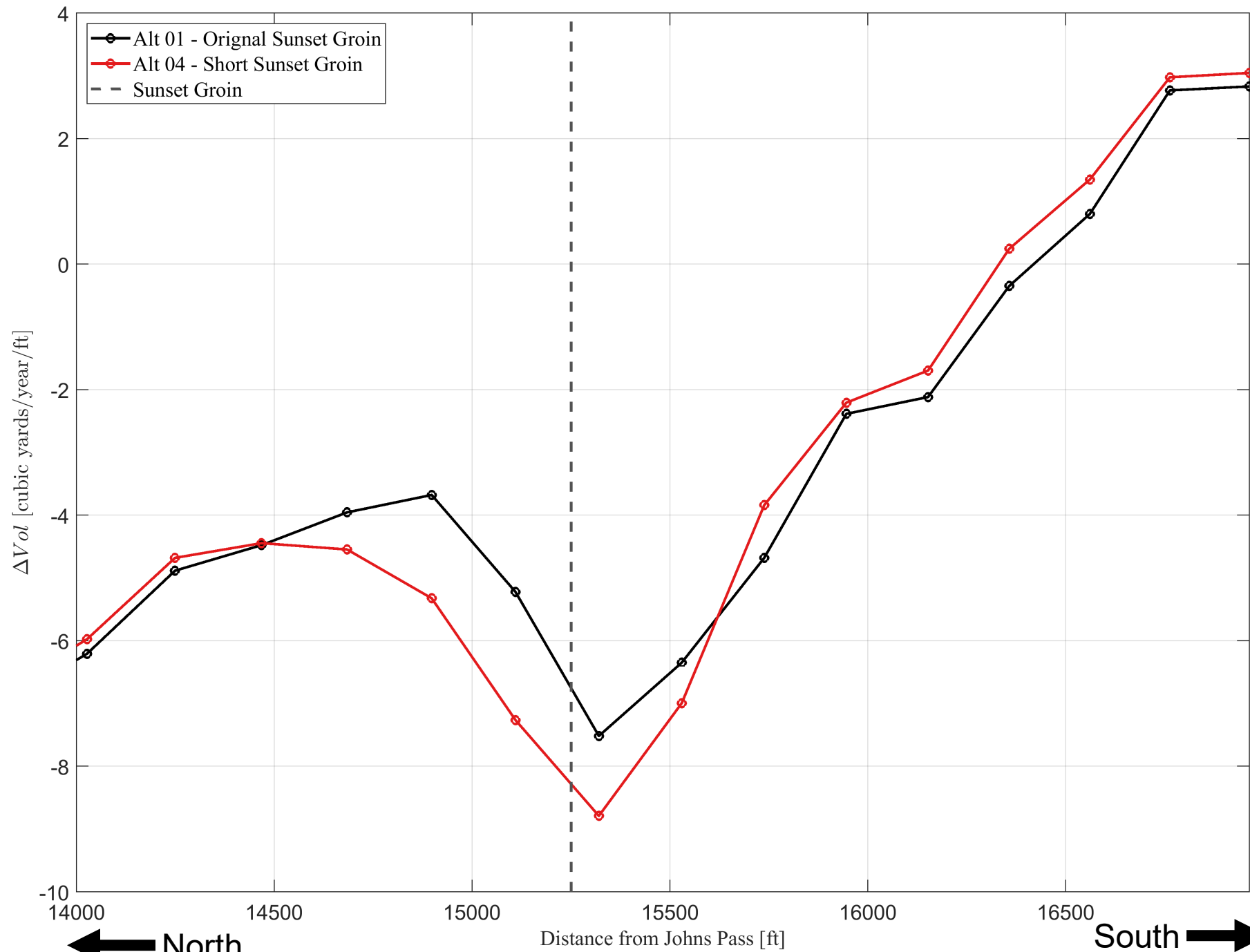
ALTERNATIVE 3: CUT A 33' WEIR CENTERED ON THE MHW LINE





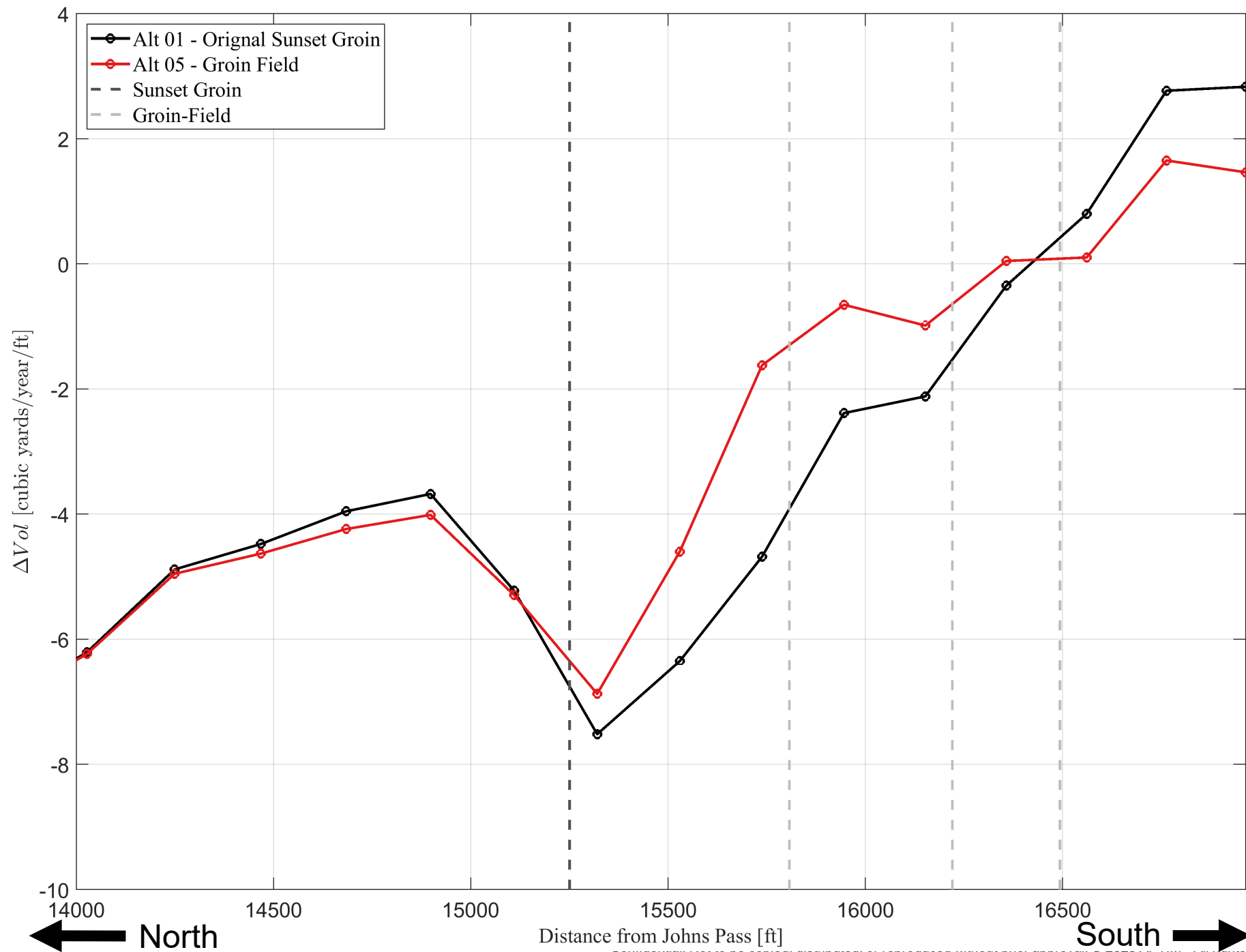
ALTERNATIVE 4: SHORTEN THE GROIN





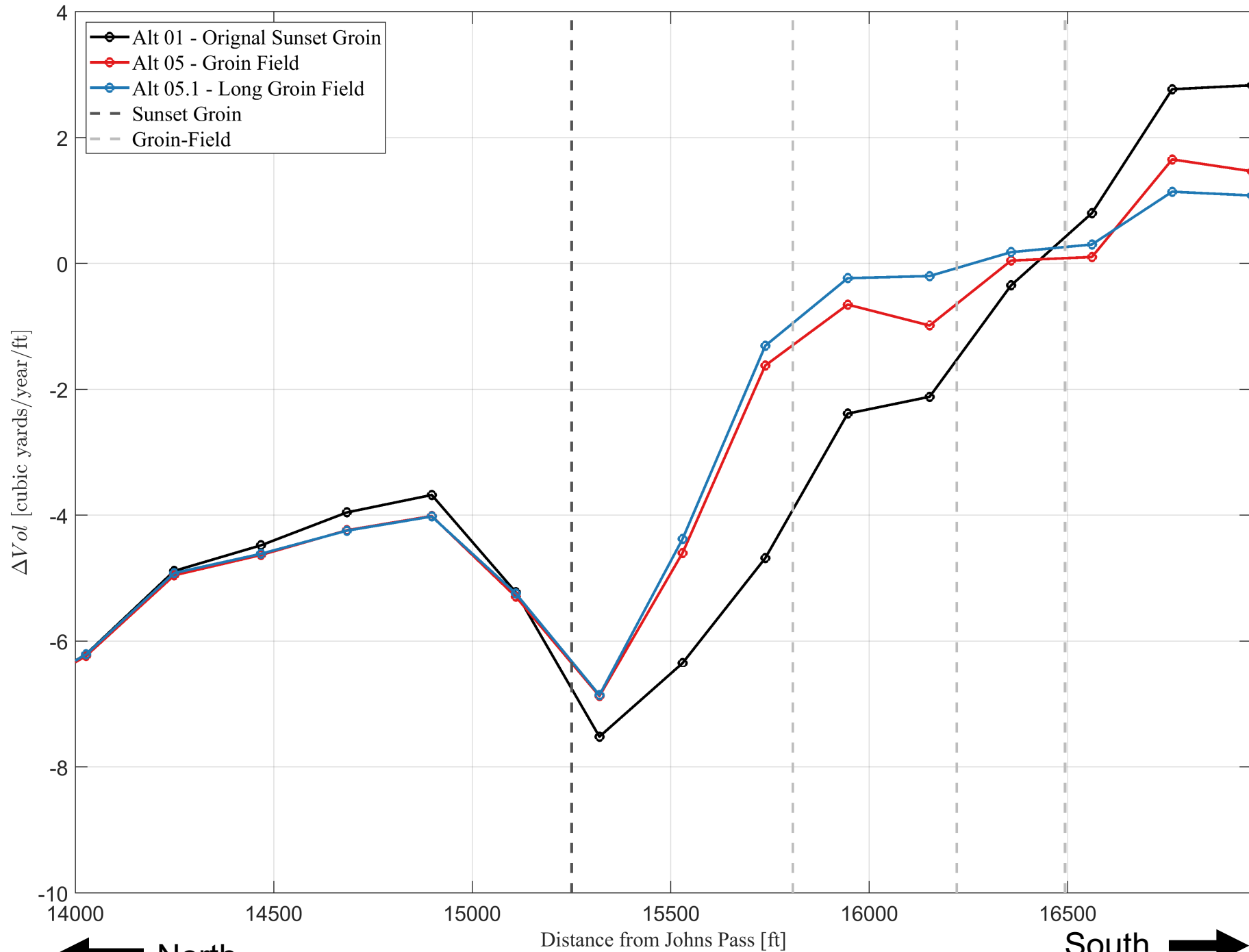
ALTERNATIVE 5: ADD A TAPERED GROIN FIELD



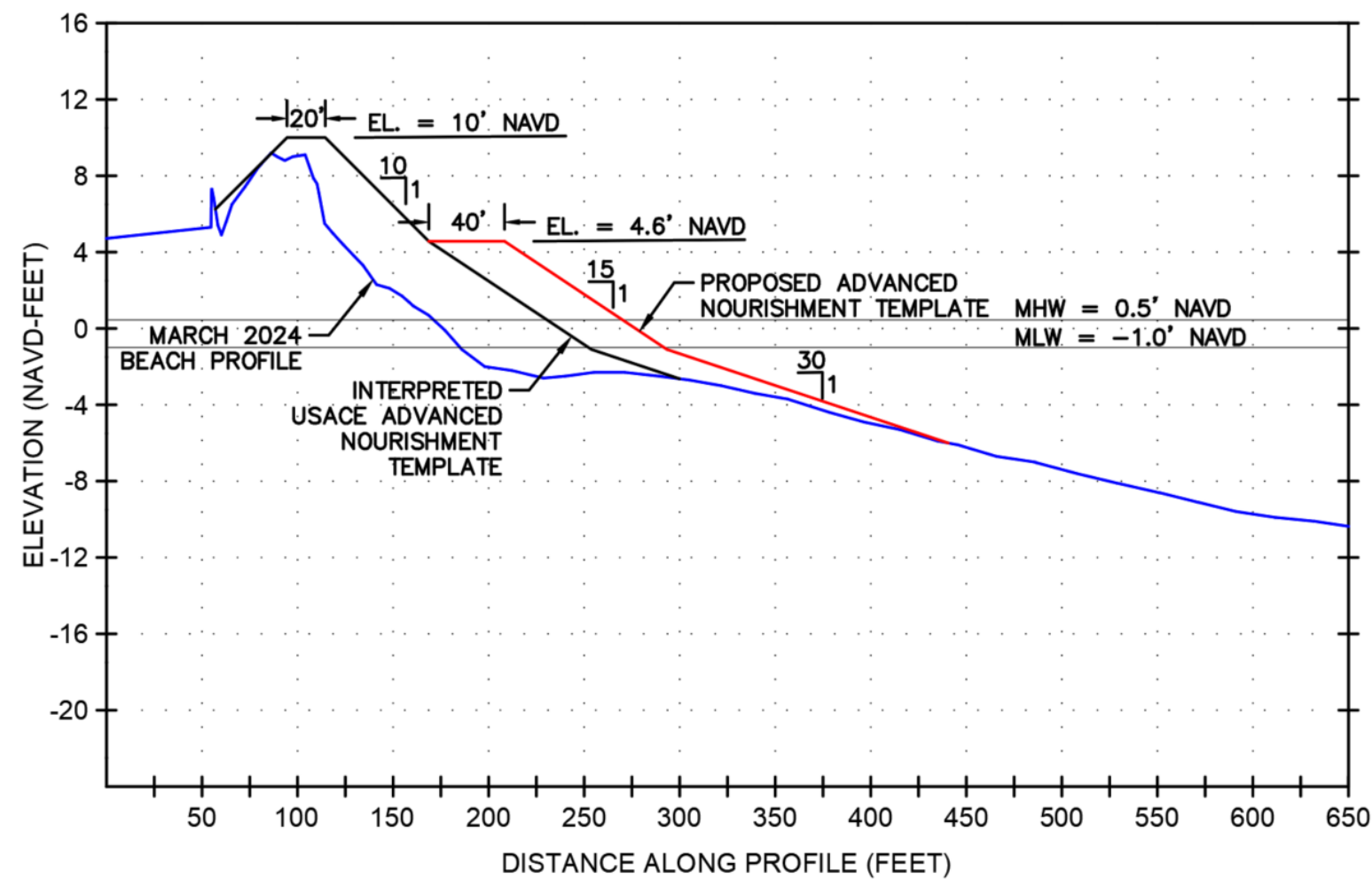


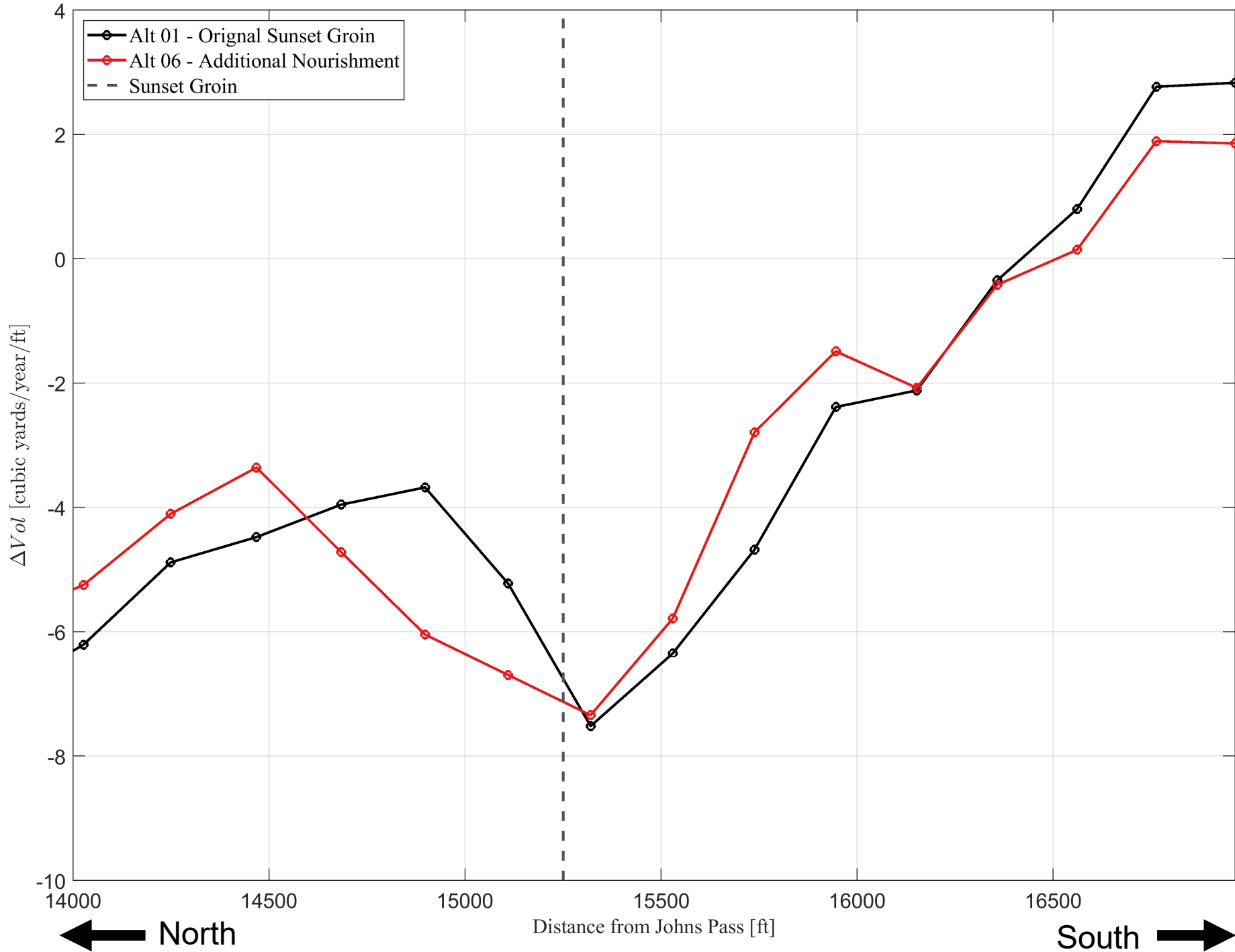
ALTERNATIVE 5.1: ADD A TAPERED LONGER GROIN FIELD





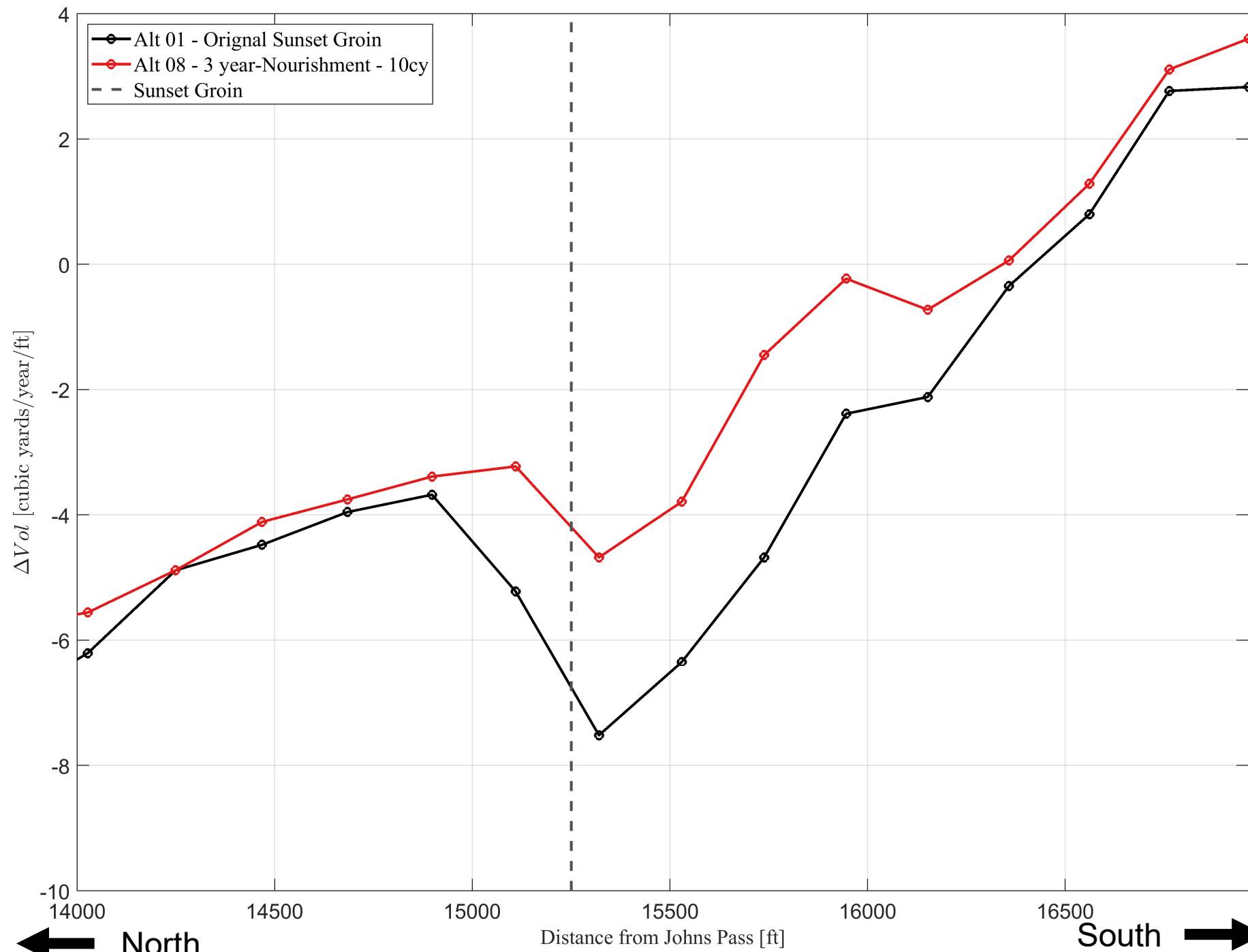
ALTERNATIVE 6: UPDATE ADVANCE NOURISHMENT VOLUMES





ALTERNATIVE 8: NOURISHMENT OF 10 CUBIC YARDS/FT AFTER 3 YEARS

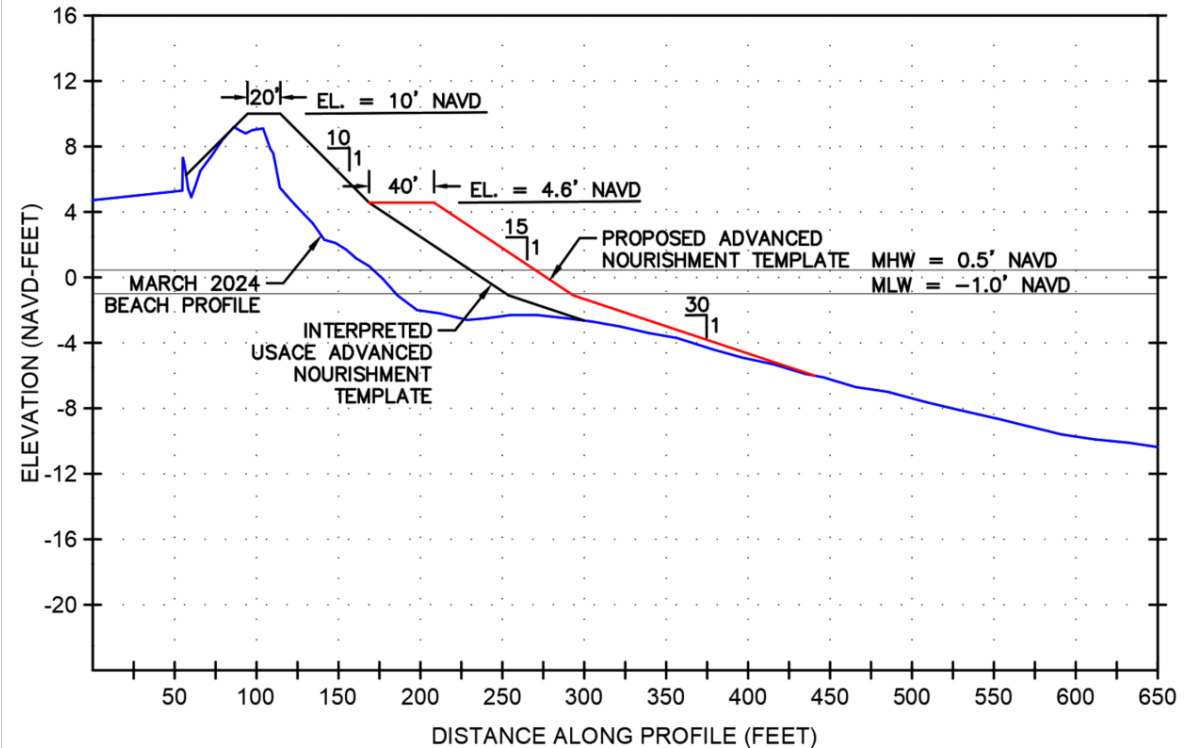




RECOMMENDATIONS

Increase Advanced Nourishment

- Increase the USACE nourishment to 53 CY/FT
- Compatible with federal shore protection design
- Can be implemented with federal project



RECOMMENDATIONS

Interim Nourishment

- Perform interim truck haul nourishment of approximately 38,000 cy after 3 years
- On as needed basis
- Compatible with federal shore protection design
- Funding likely limited to State and local sources



RECOMMENDATIONS

Tapered Groin Field

- Construct a tapered groin field south of the existing groin
- May be difficult to incorporate into the federal nourishment
- Further coordination with stakeholders is recommended



CONCLUSIONS

Two beach nourishment modifications and a groin field addition yield incremental improvements

- Increase the advanced nourishment to 53 CY/FT
- Perform interim truck haul nourishments of approximately 38,000 cy every 3 years
- Construct a tapered groin field

QUESTIONS?



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An aerial photograph of a beach scene. The top half of the image shows the ocean with waves breaking onto a sandy shore. The bottom half shows a row of houses with swimming pools, partially obscured by trees and vegetation. The text "THANK YOU" is overlaid in large white letters on the left side of the image.

THANK YOU

APPENDIX

