



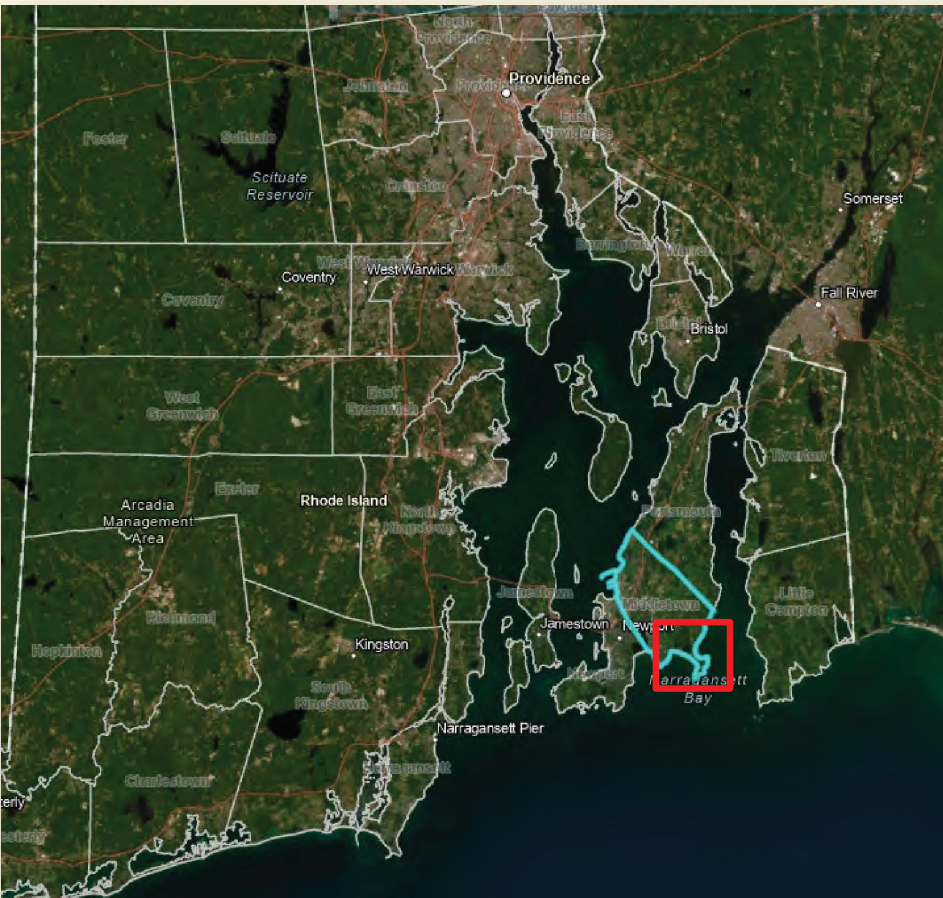
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RESEARCH & PLANNING

# Assessment of Shoreline Conditions at Second and Third Beaches

*Town of Middletown, Rhode Island*

Review of Historical Shoreline Change,  
and  
Hydrodynamic & Morphologic Modeling

# Assessment of Shoreline Conditions at Second and Third Beaches: Middletown, RI



# *Tasks*

- Shoreline change assessment
- Regional hydrodynamic model
- Local hydrodynamic and morphologic model at Second and Third
- Morphological modeling of shoreline management alternatives at Second and Third Beaches.



# Overview

- Second Beach and Third Beach:

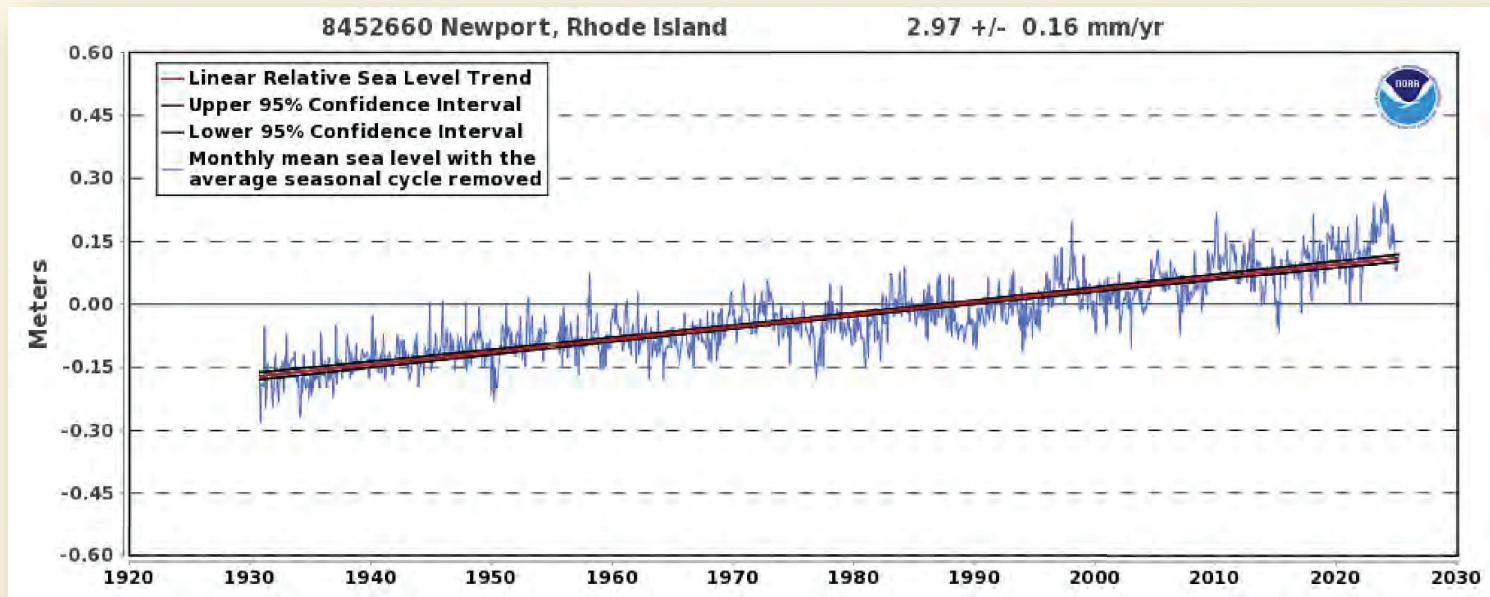


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# Overview

- Sea Level Rise @ Newport:  $2.97 \pm 0.16$  mm/yr
- Approximate 0.97 feet in 100 years

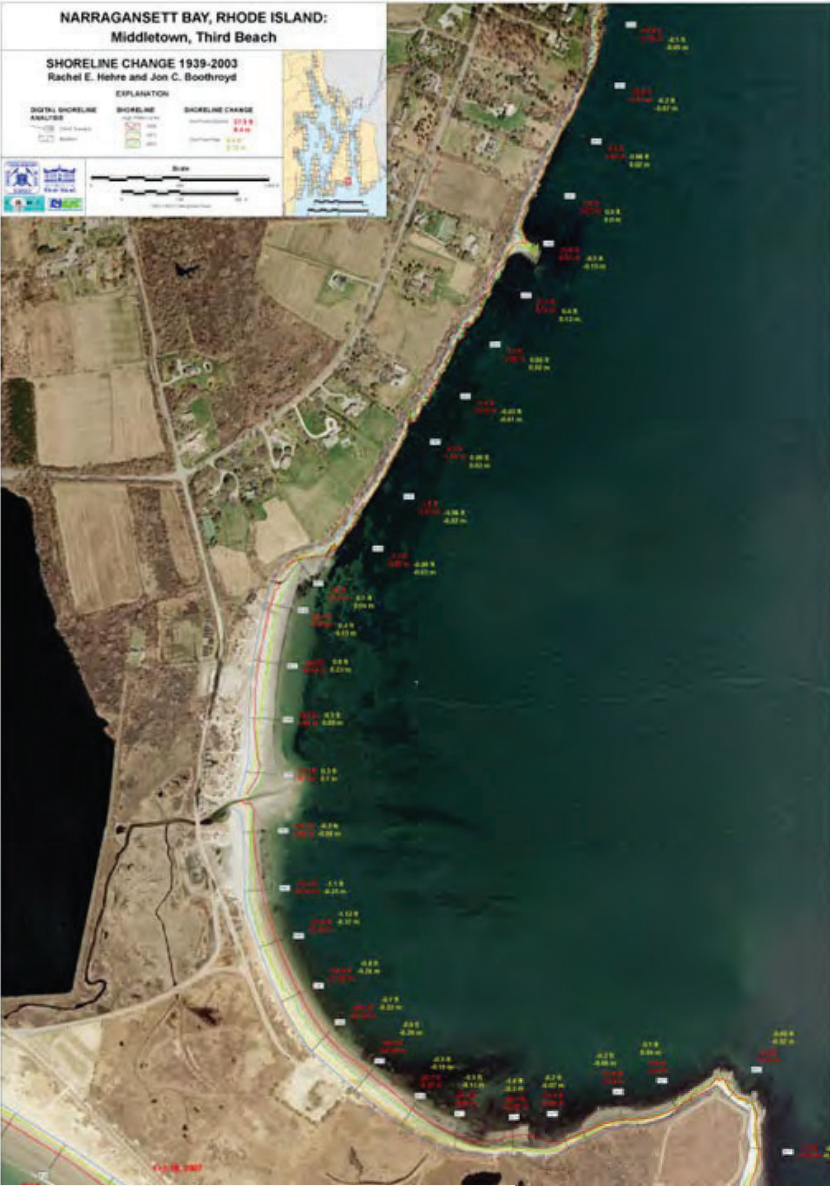
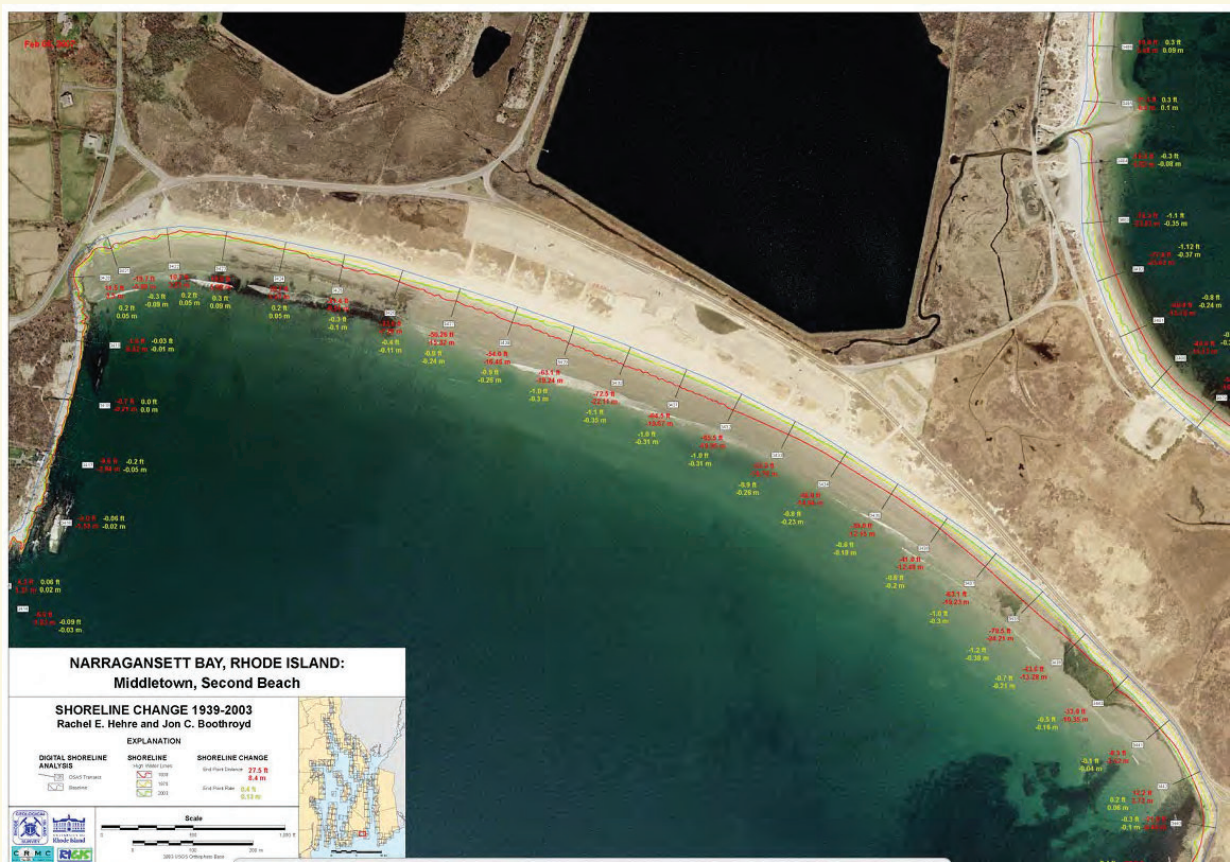


Source: NOAA Tides & Currents



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# Previous Shoreline Change Analysis



# *Shoreline Change Assessment*

- Digital Shoreline Analysis System (DSAS)
  - Developed by USGS
  - Geographic Information Systems (GIS) based analysis quantifying shoreline change at shore-normal transects





# *Shoreline Change Assessment*

- Nine (9) Shorelines extracted from Publicly Available Aerial Photographs in GIS including:
  - 1939, 1952, 1962, 1972, 1988, 1995, 2003, 2018, 2024
- 52, 100-Meter Spaced Transects
  - 32 Transects @ 2<sup>nd</sup> Beach
  - 20 Transects @ 3<sup>rd</sup> Beach



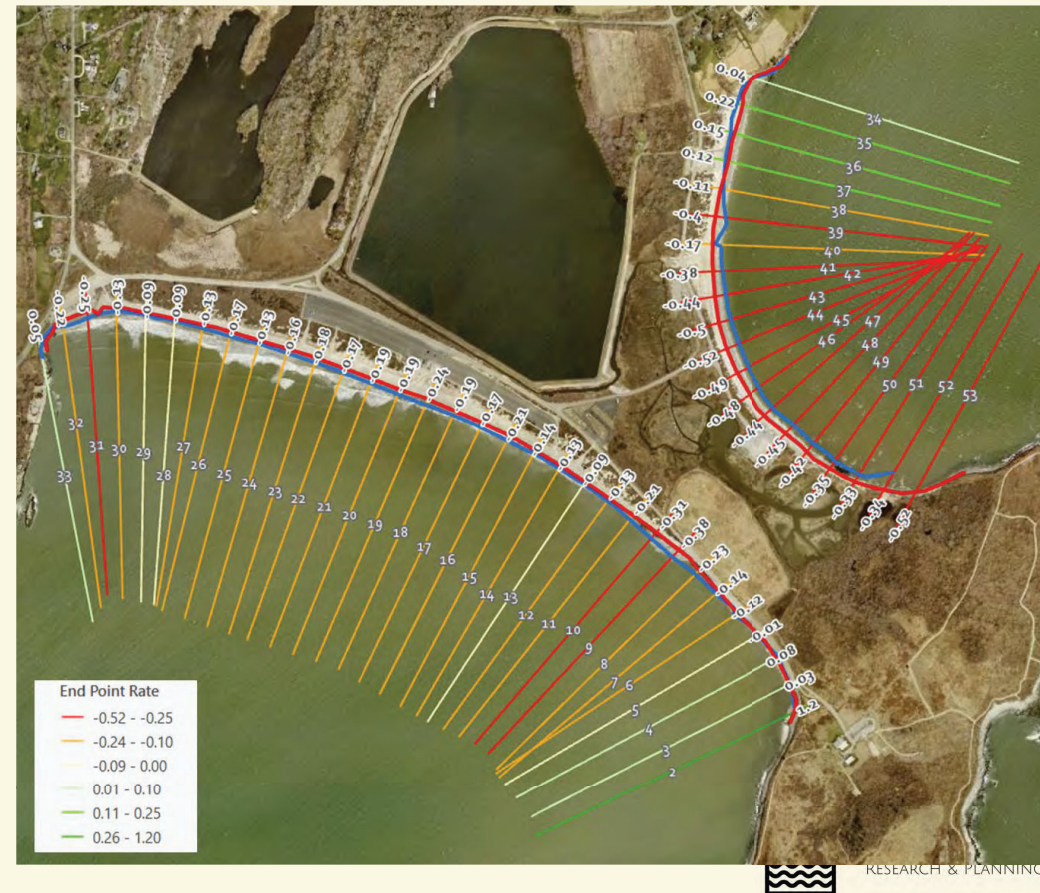


# *Shoreline Change Assessment*

- Number of Erosional Transects:
  - 42 (80.77%)
  - Transects with statistically significant erosion: **13.46%**
- LRR OVERALL AVERAGES:

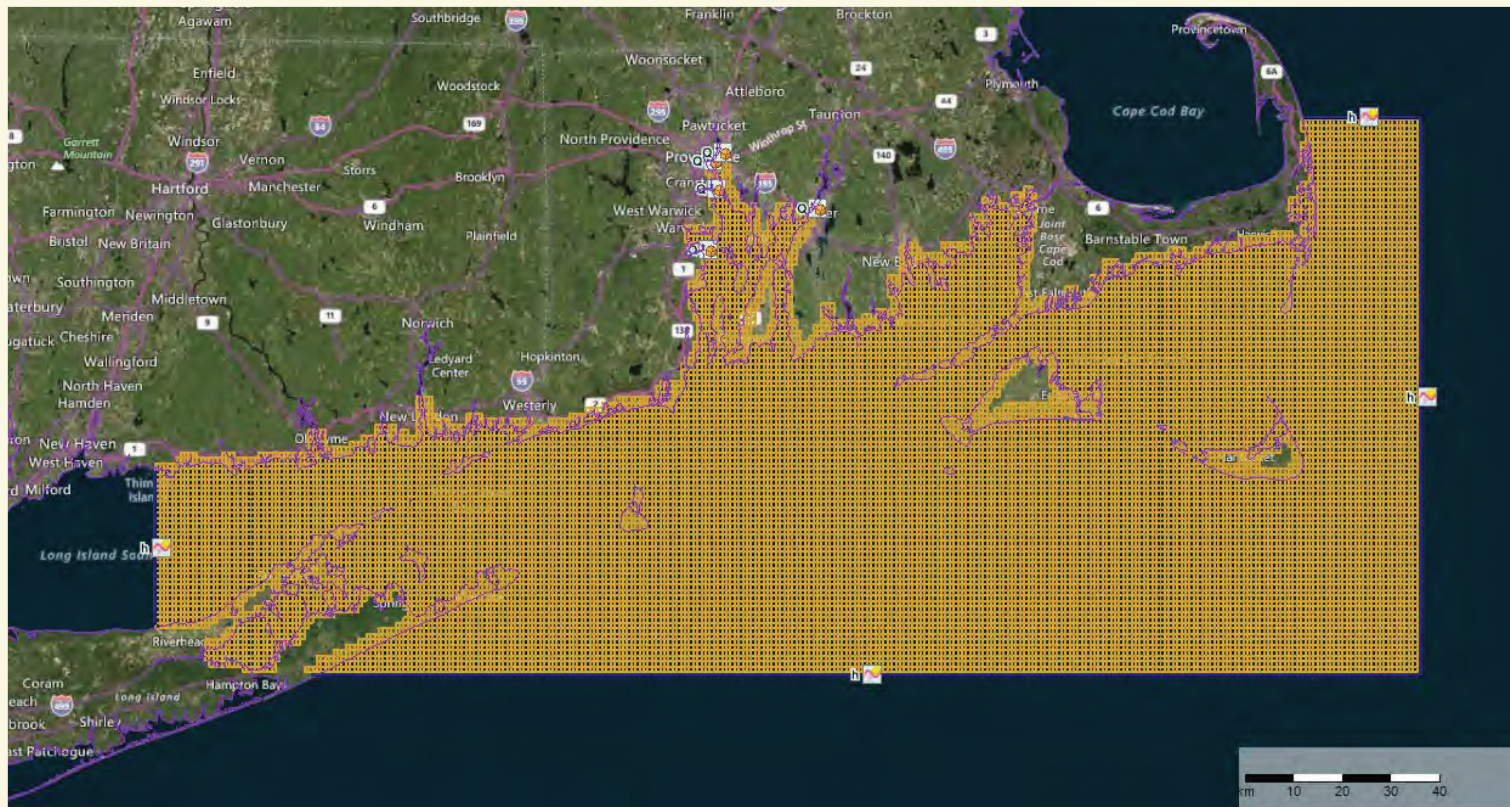
Average Rate: -0.10

Average rate with reduced n uncertainty: -0.10 +/- 0.37



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## *Regional Hydrodynamic Model*

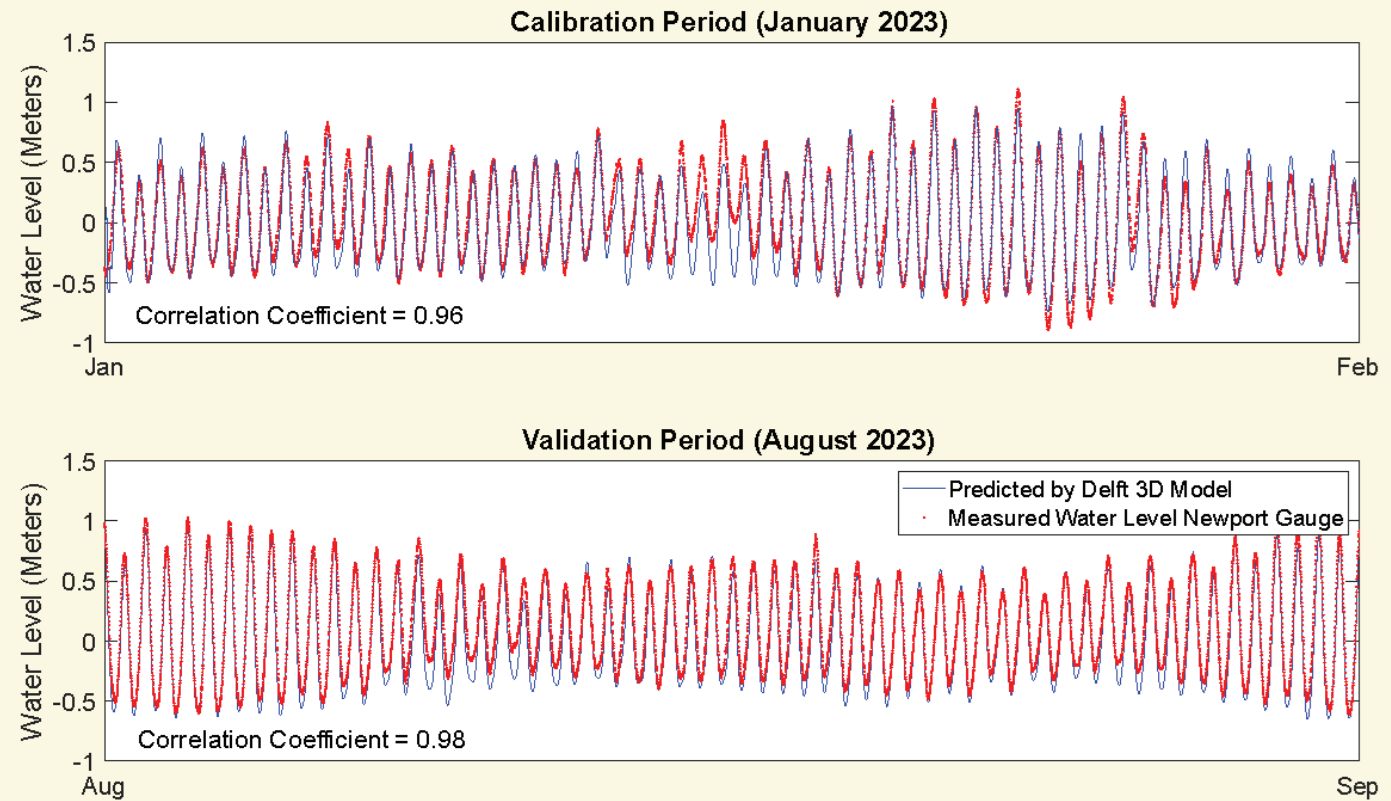
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# *Regional Hydrodynamic Model*



Measurements used for calibration were collected by the NOAA Newport, RI - Station ID: 8452660

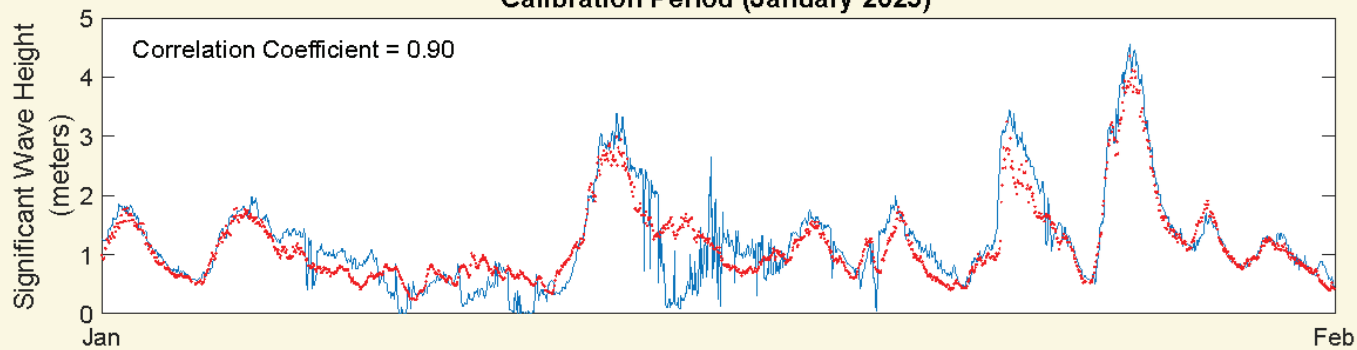


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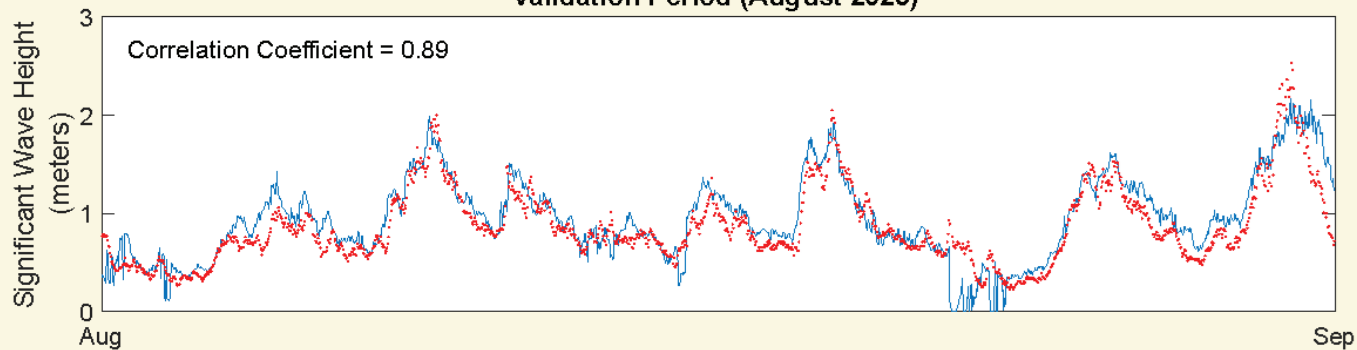


# *Regional Hydrodynamic Model*

Calibration Period (January 2023)



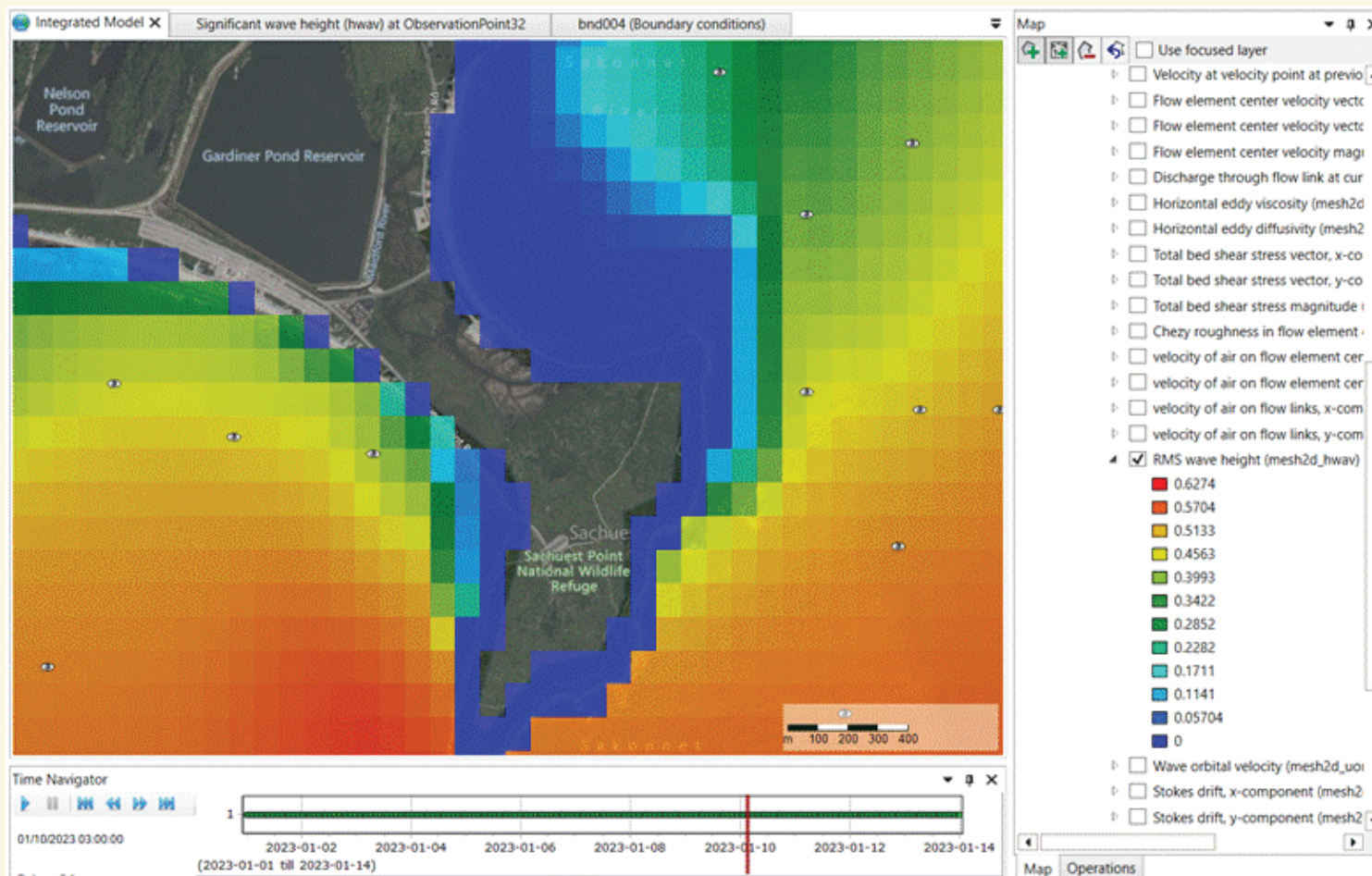
Validation Period (August 2023)



**Measurements used for calibration were collected by the NOAA National Buoy Center Station 44085 - Buzzards Bay, MA (260)**



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Wave  
Heights at  
Second and  
Third  
Beaches



## Simulation of Second Beach Currents



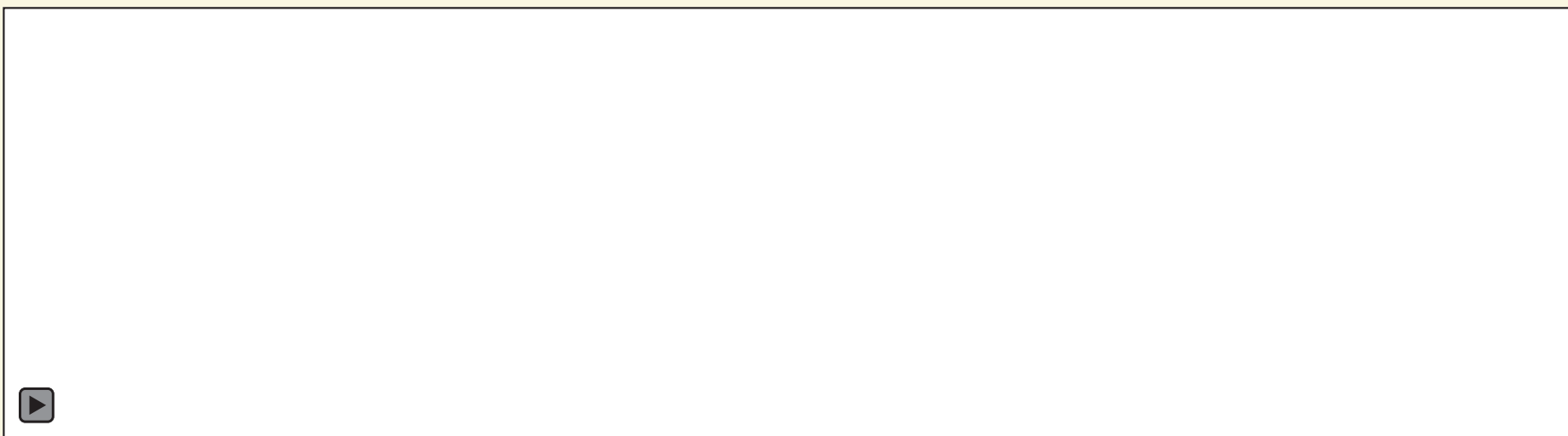
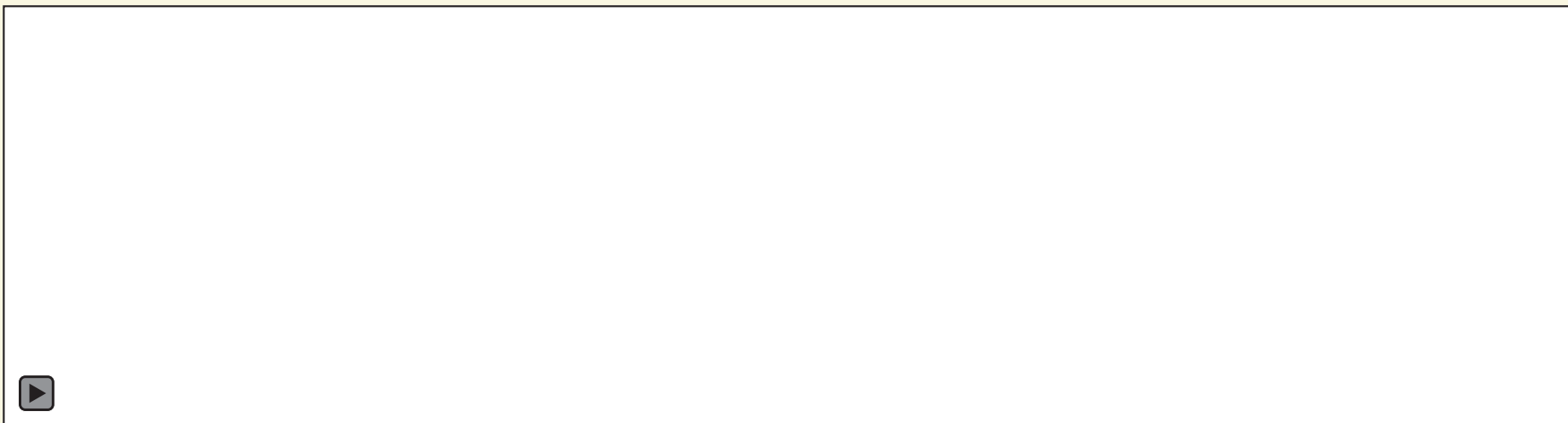


## Simulation of Third Beach Currents



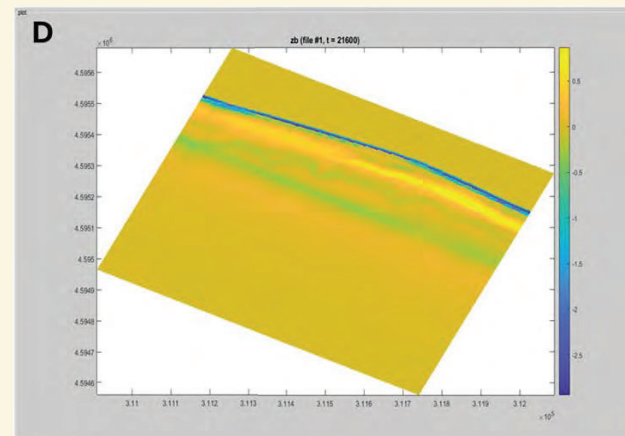
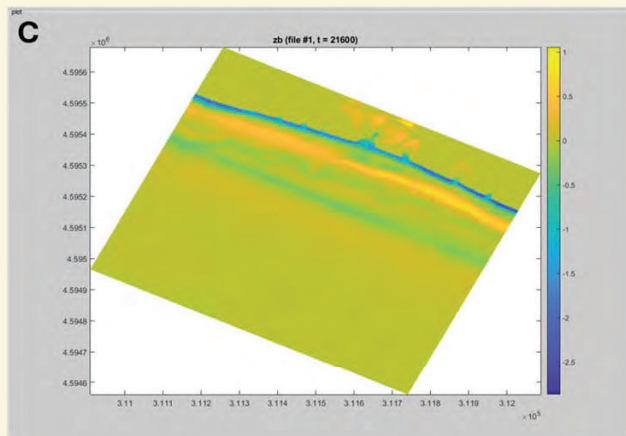
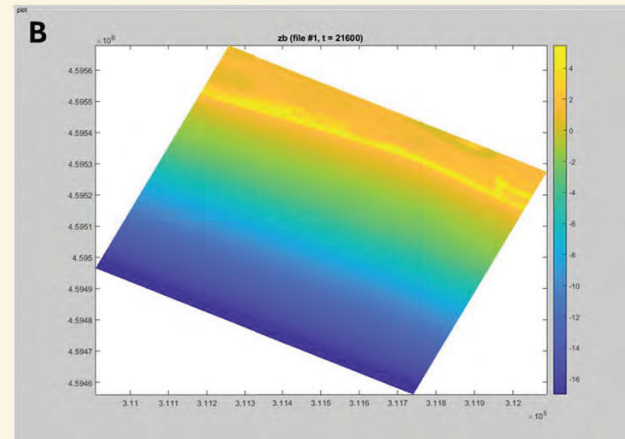
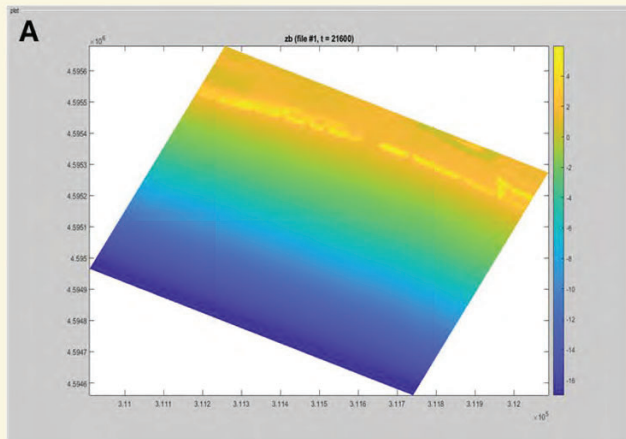
Simulation of  
Alongshore  
Sediment  
Transport Using  
a Feeder Beach



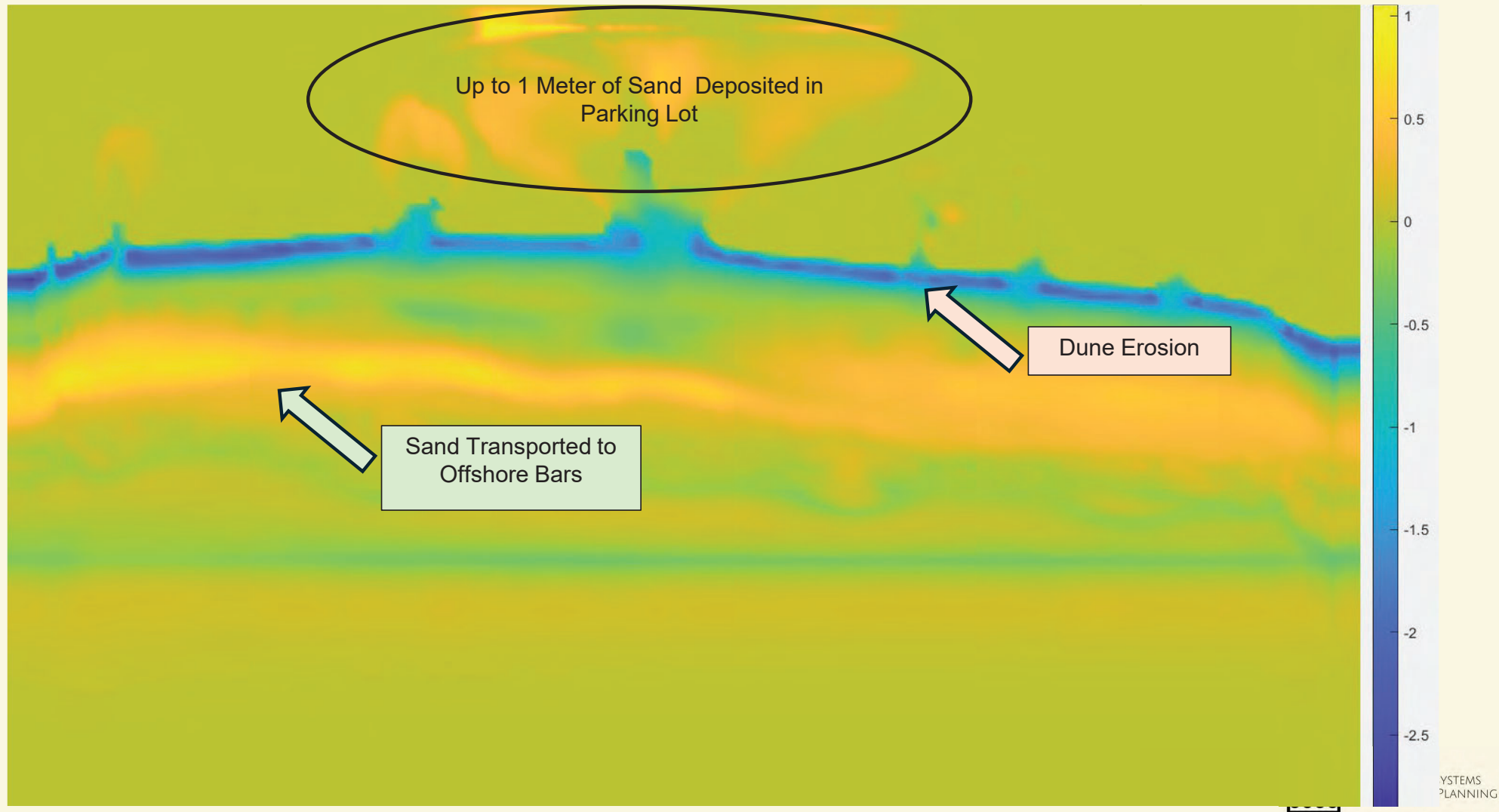




# *Dune Storm Management*



## Sand Redistribution during storm event



# *Summary*

- Erosional Trend Over Time, Limited In Scale and Location
- 2<sup>nd</sup> Beach Has Consistent Sediment Transport & Carries Sand From Headlands On Either Side Of The Beach Towards The Center
- Placement Of Sand Along Sachuest Point Road Could Address Potential Erosion For The Public Beach
- Sand transport simulations at 3<sup>rd</sup> Beach Indicate Insufficient Wave Energy to Mobilize Sand
- Model Shows Mobilization Of Sand Into Parking Lot During Storm Events





# *Recommendations*

- Raise Elevation of Dune Pathways During Winter Season
- Develop Shoreline Management and Inventory Analysis Program That Quantifies A Sediment Budget For 2<sup>nd</sup> & 3<sup>rd</sup> Beach,
- Place Sand At Strategic Locations To Feed The Beach & Investigate Benefits of Backpassing, A Sediment Redistribution Strategy Moving Sand From Areas of Accretion to Areas of Erosion.
- Collect Topographic & Hydrographic data During Fall and Spring To Refine Model
- Model Shows Mobilization Of Sand Into Parking Lot During Storm Events

