

Changes Across Saco Bay: Beaches, Marshes, and Sea Level Rise

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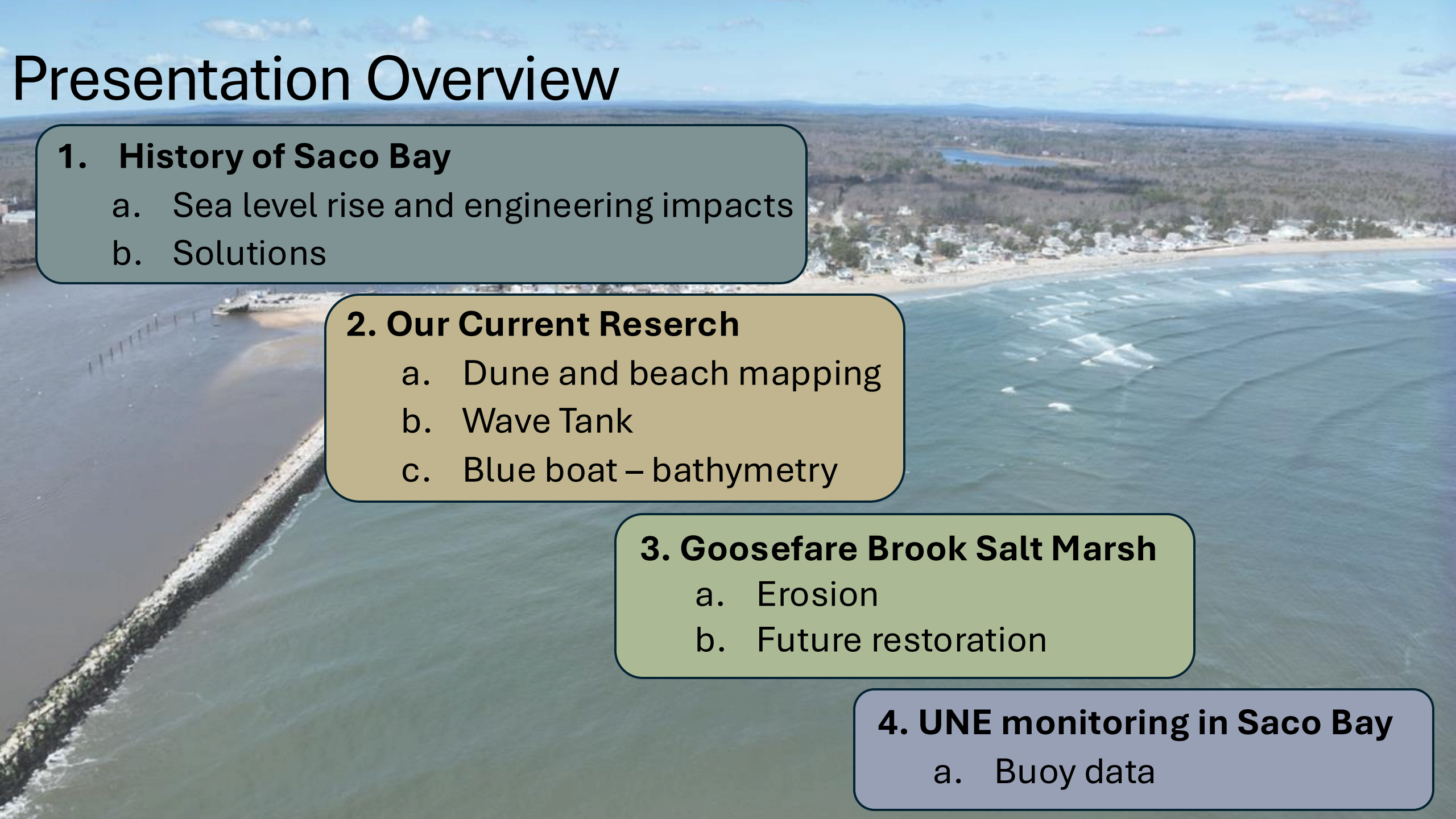
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Presentation Overview



1. History of Saco Bay

- a. Sea level rise and engineering impacts
- b. Solutions

2. Our Current Research

- a. Dune and beach mapping
- b. Wave Tank
- c. Blue boat – bathymetry

3. Goosefare Brook Salt Marsh

- a. Erosion
- b. Future restoration

4. UNE monitoring in Saco Bay

- a. Buoy data

Pressures on Saco Bay

Climate change

- Sea level rise
- Coastal storms

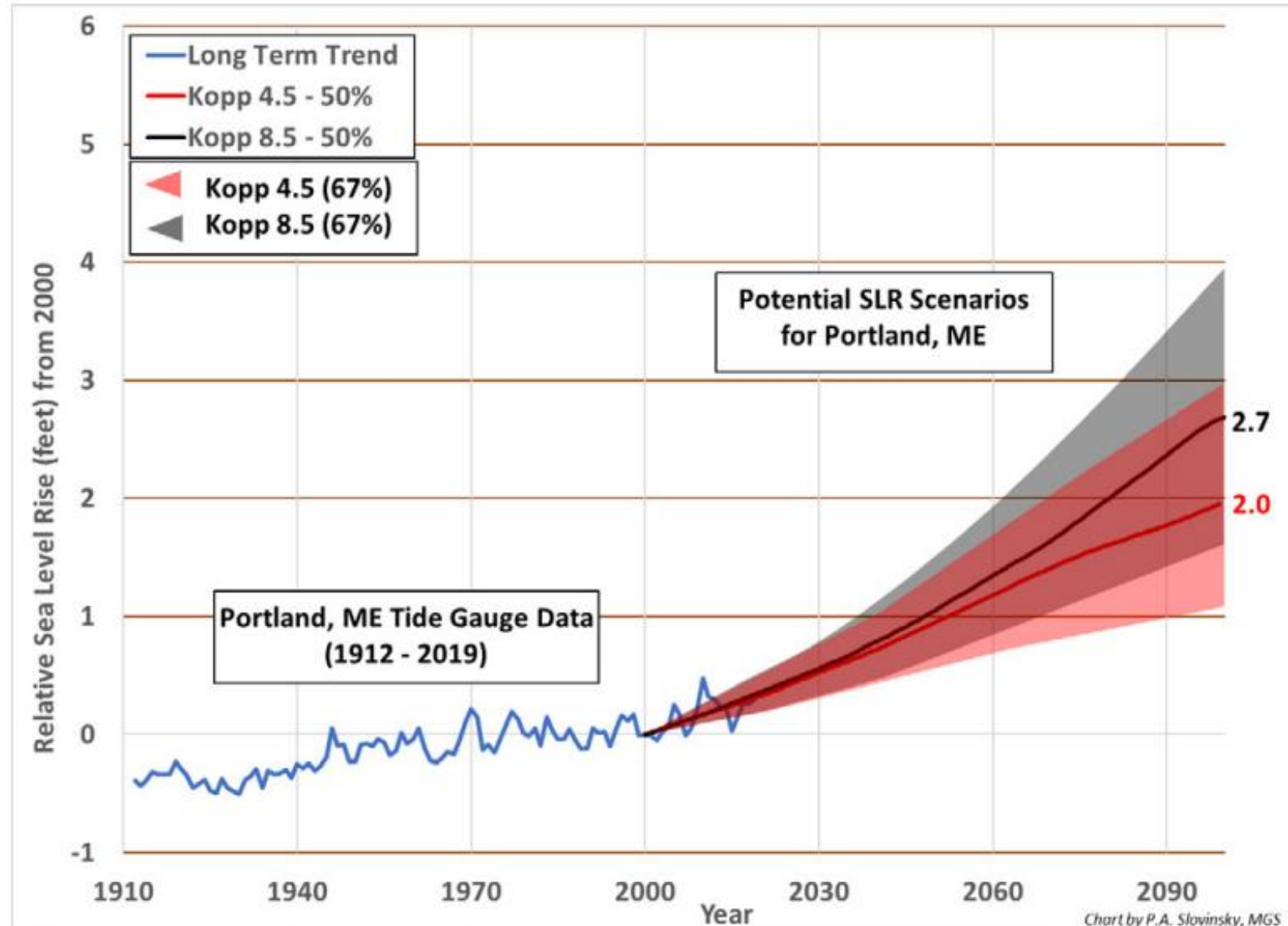
Human Activity

- Coastline engineering
- Agricultural ditching

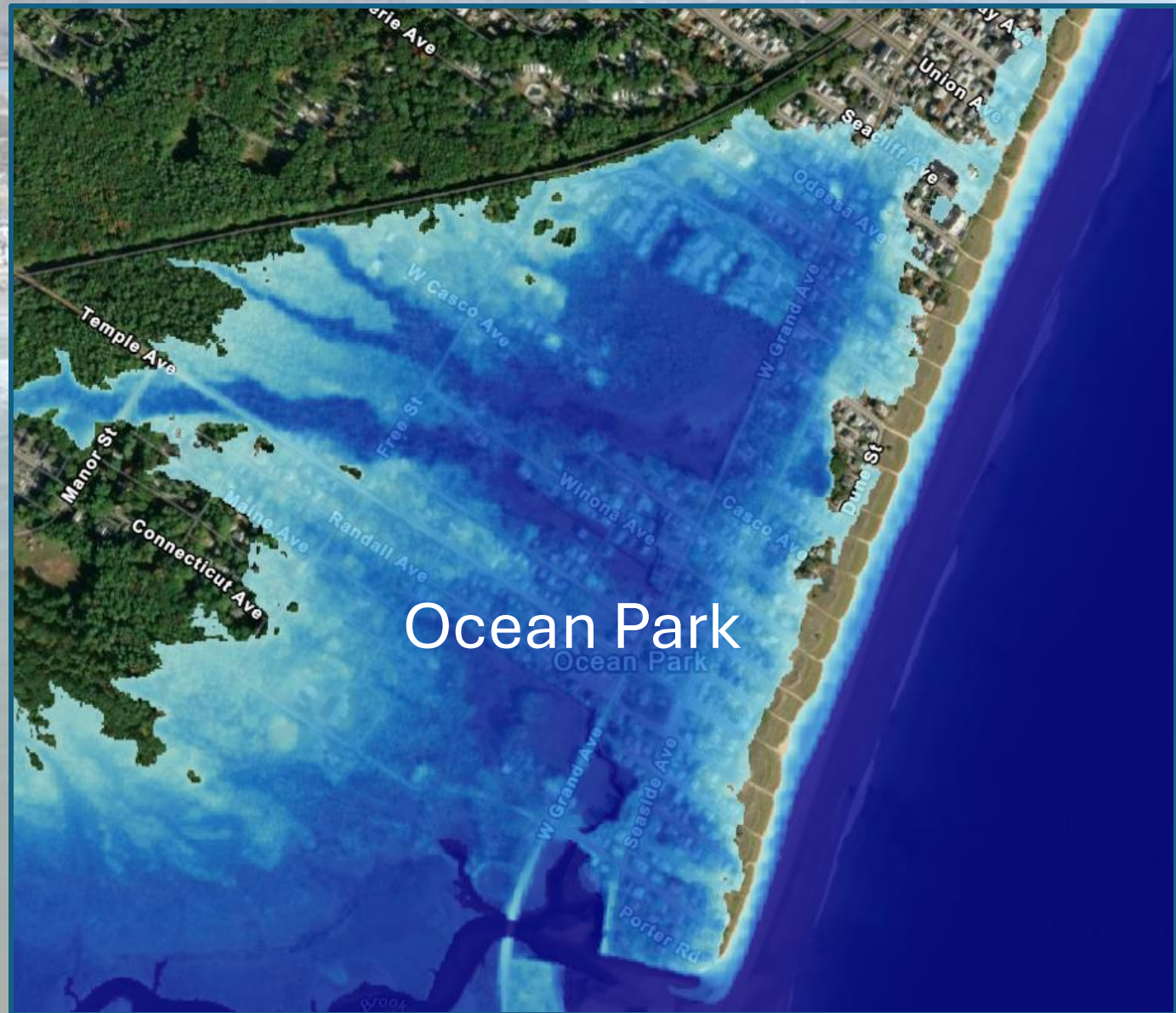


Erosion and flooding

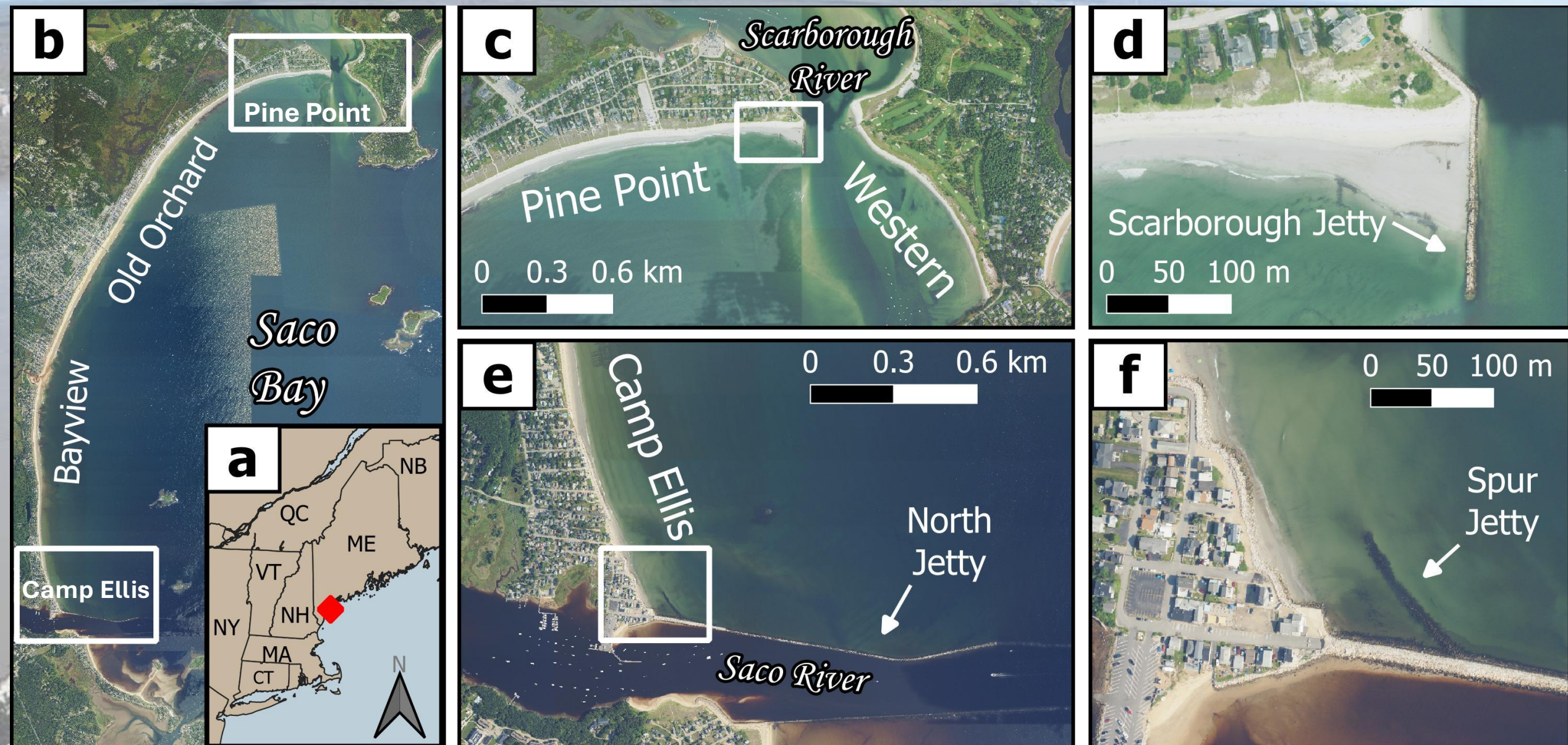
- Beaches
- Infrastructure
- Marshes



NOAA Sea Level Rise Viewer – 10ft



Map of Saco Bay



Camp Ellis – A long history of erosion

Jetty construction
in 1872

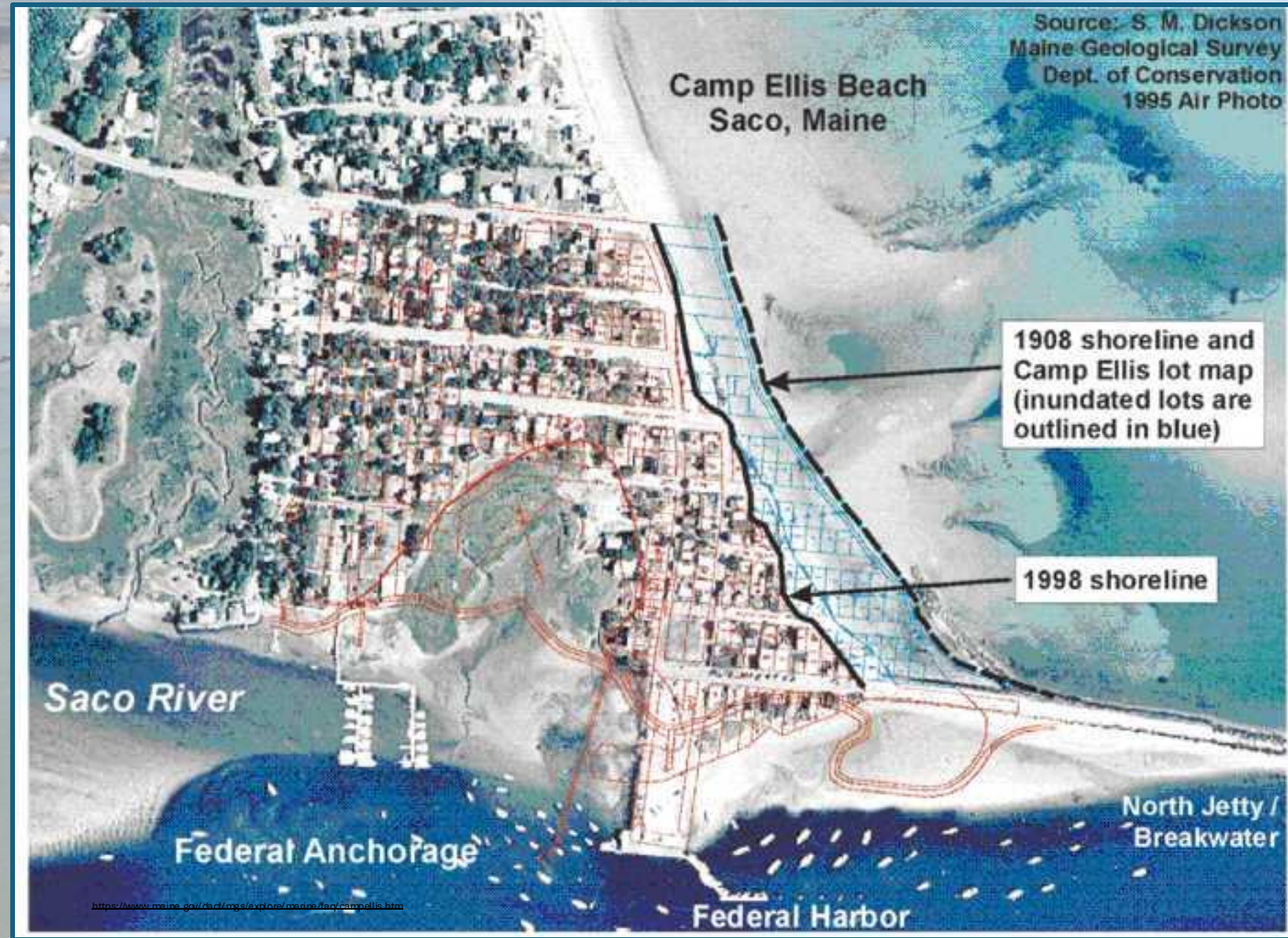


Sediment cutoff &
wave concentration



Loss of homes and
erosion

*38 homes have been
lost since 1908*



Goosefare brook and Little River Inlets



Little River Inlet

- 1875 - Little River Inlet closed
- 1877 - Railroad built

Goosefare Brook Inlet

- 1992 - Saco River dredge & Camp Ellis nourishment
- 1992/93 - Goosefare Brook Inlet closed
 - Reopened with heavy equipment

Pine Point – A long history of accretion

Eroded sediment
transported north



Pine point jetty built
from 1957 - 1962



Western beach
sediment starved



Temporary Solutions

Dredging & Nourishment



Beach Scraping



Dune Planting

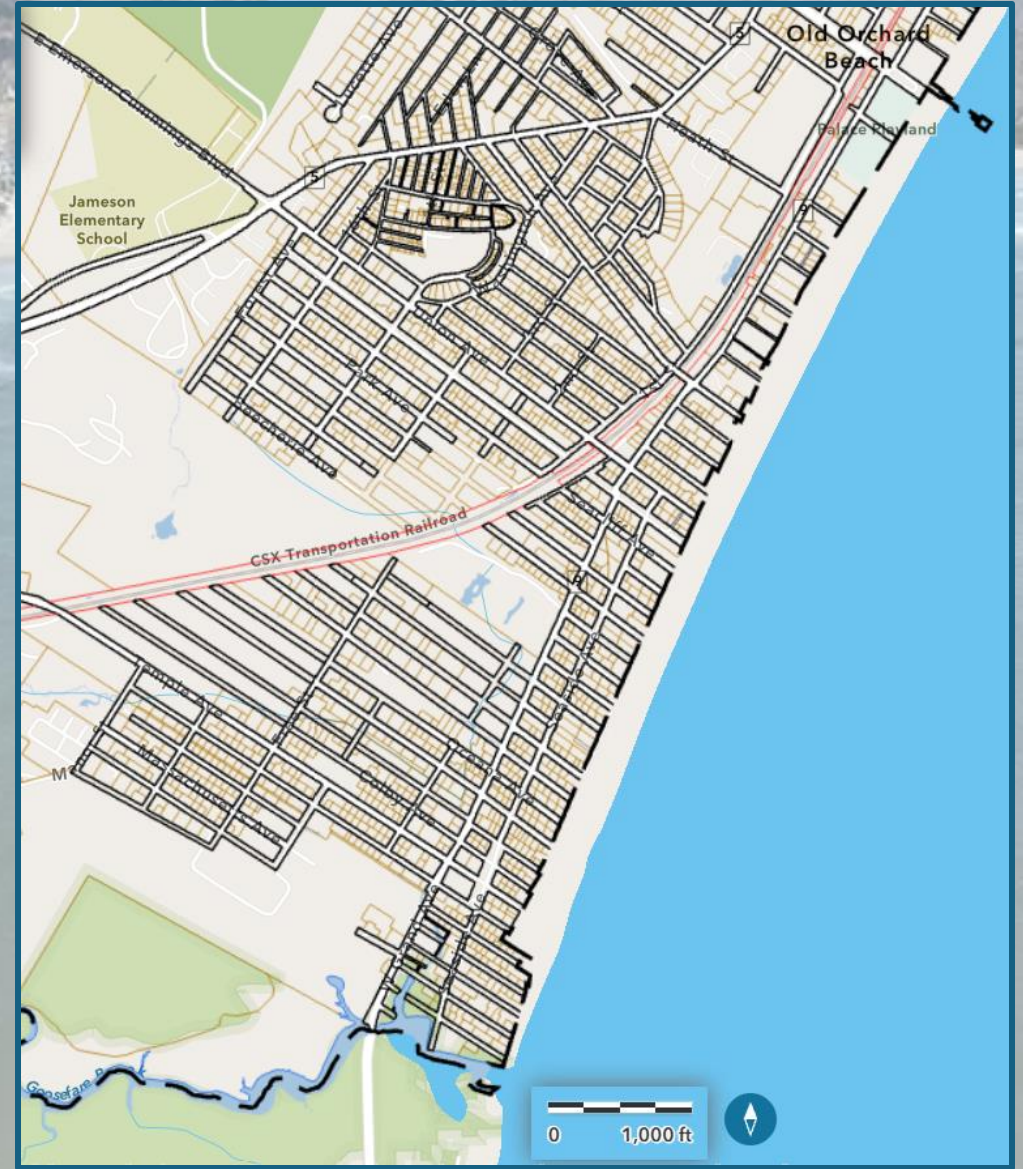


Private vs. Public

Ferry Beach



Old Orchard Beach



Camp Ellis Jetty Project

750 ft spur jetty

- Spring 2026 – Summer 2027
- First construction since 1969 - 1979
- \$45 million

10-year dredge/nourish cycle

400 ft 1912 spur jetty

750 ft 2027 spur jetty



400 ft 1912 spur jetty

Approximate site of construction

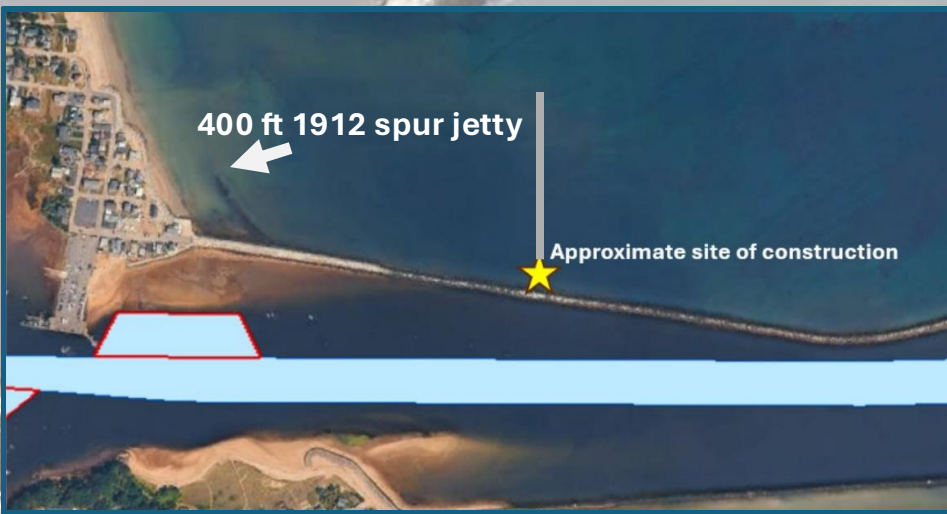
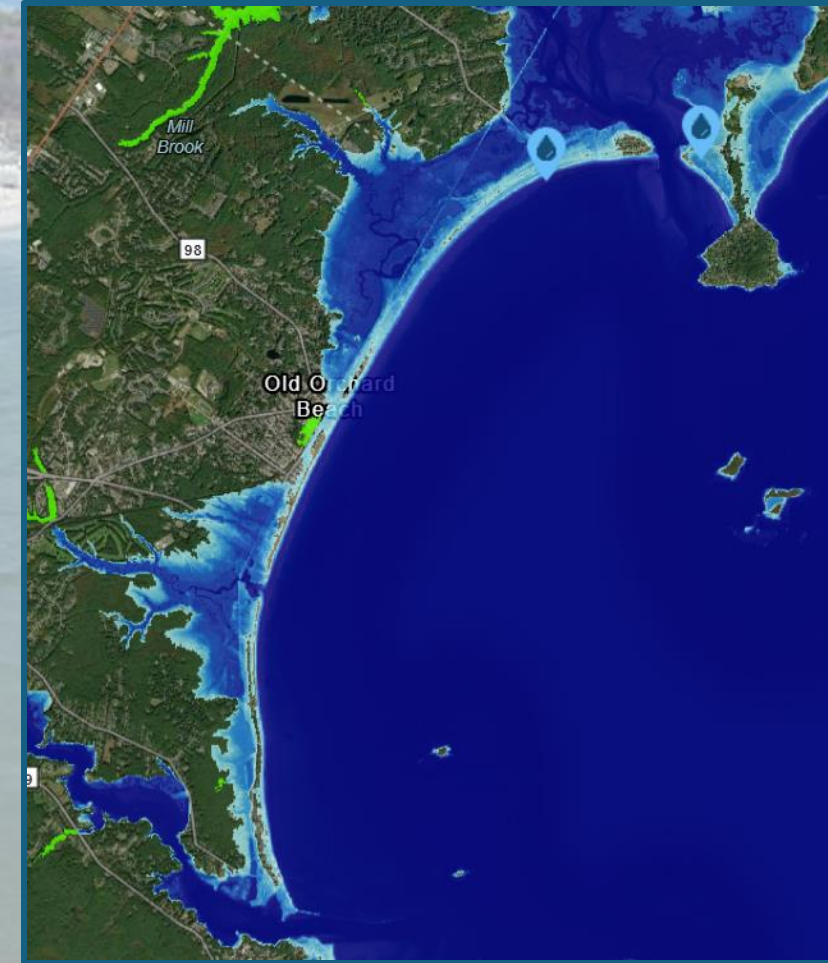
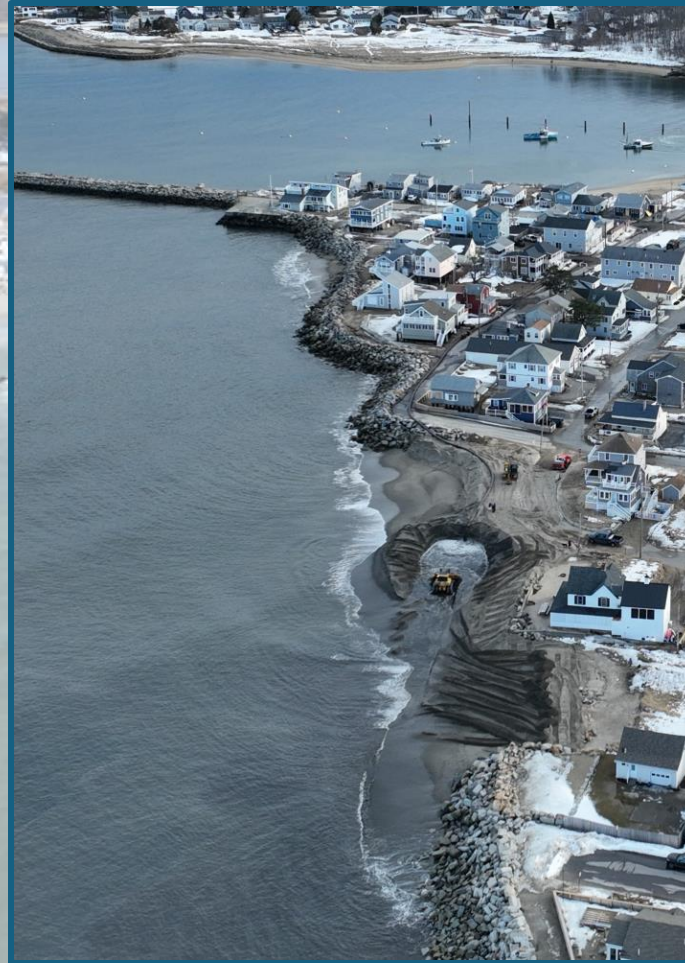
History of Saco Bay Takeaways

Sea level rise & Jetties

- Erosion & Accretion

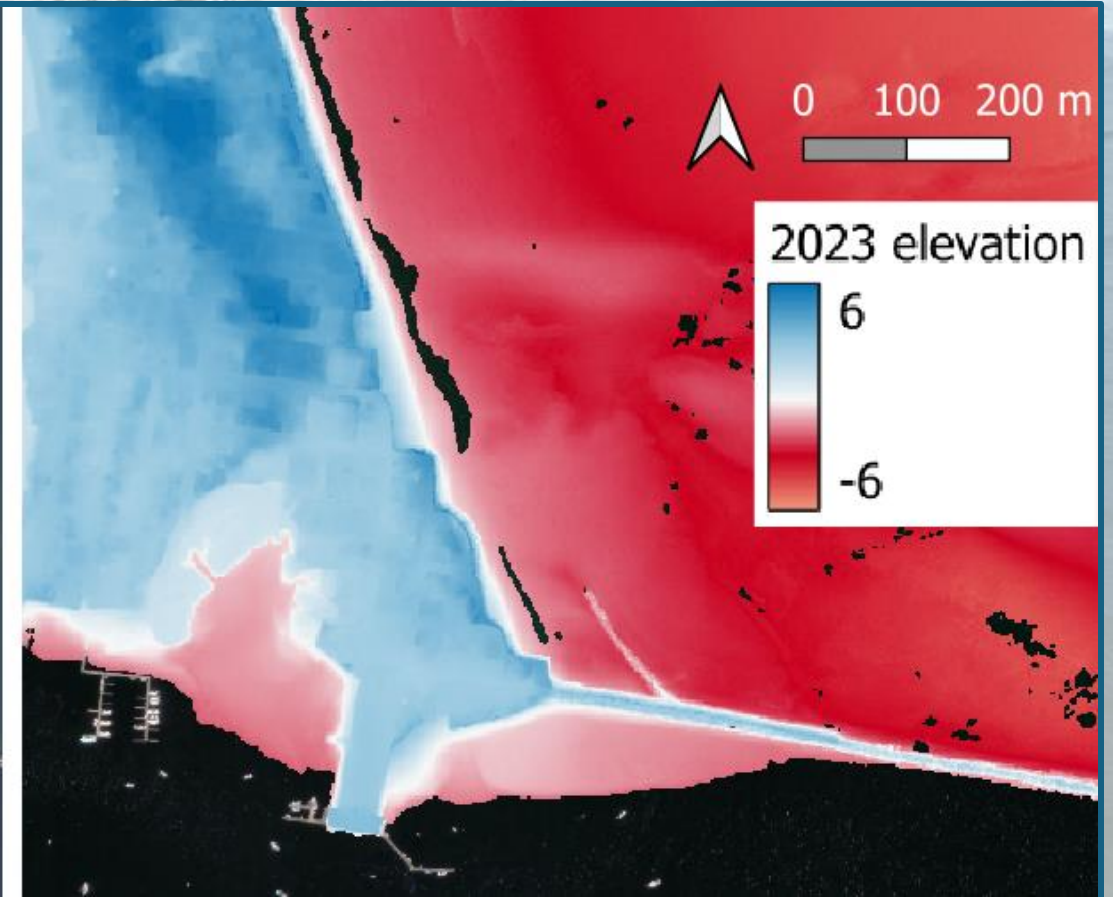
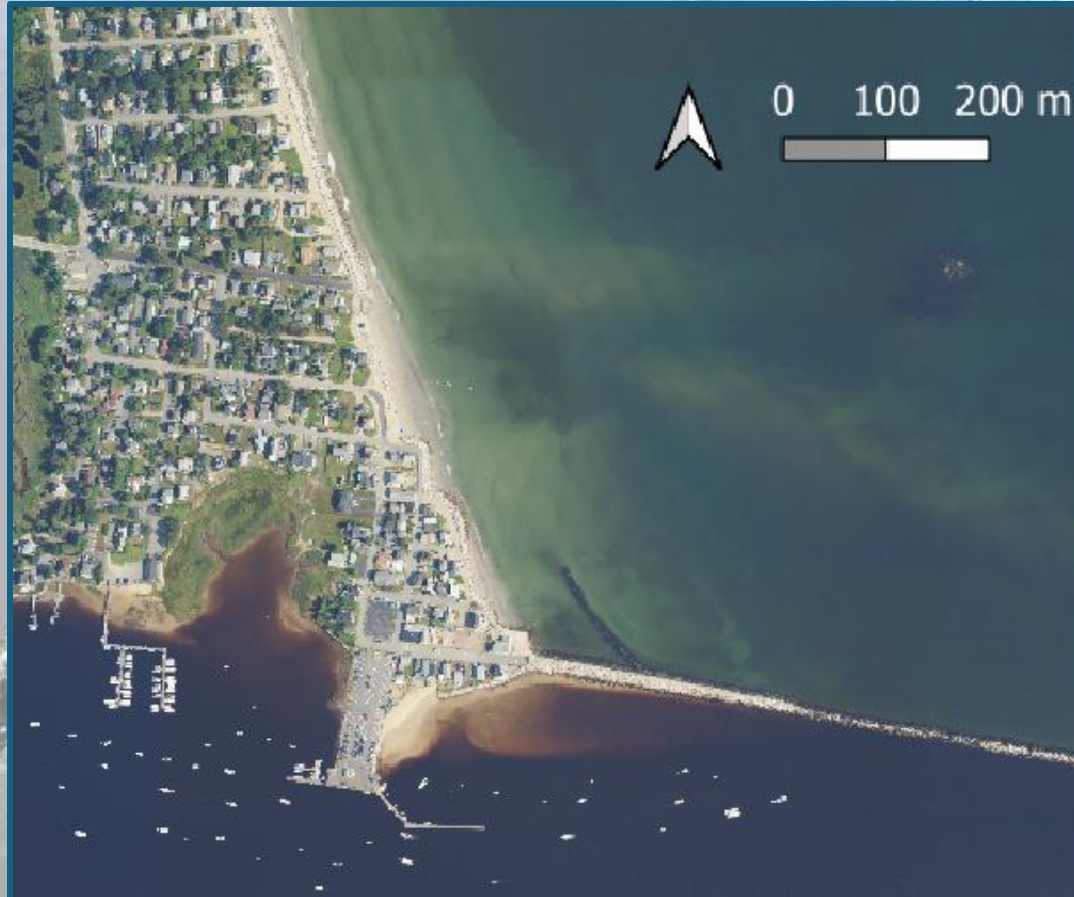
Solutions

- Dredge & Nourishment
- Beach Scraping & Dune Planting
- Jetty Extension Project



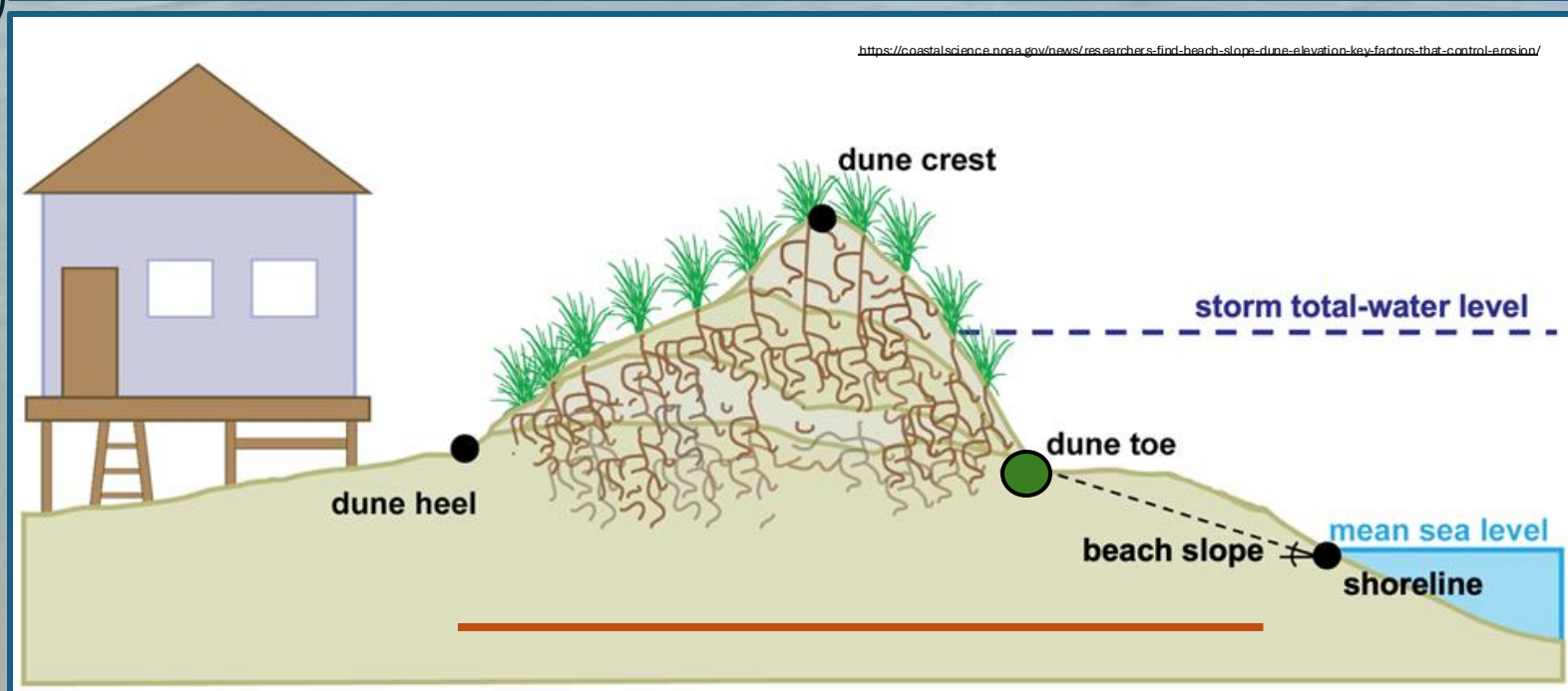
How do we quantify beach changes?

Air photos & elevation models



Beach Features

- Dune toe position/profiles
- Dry beach width



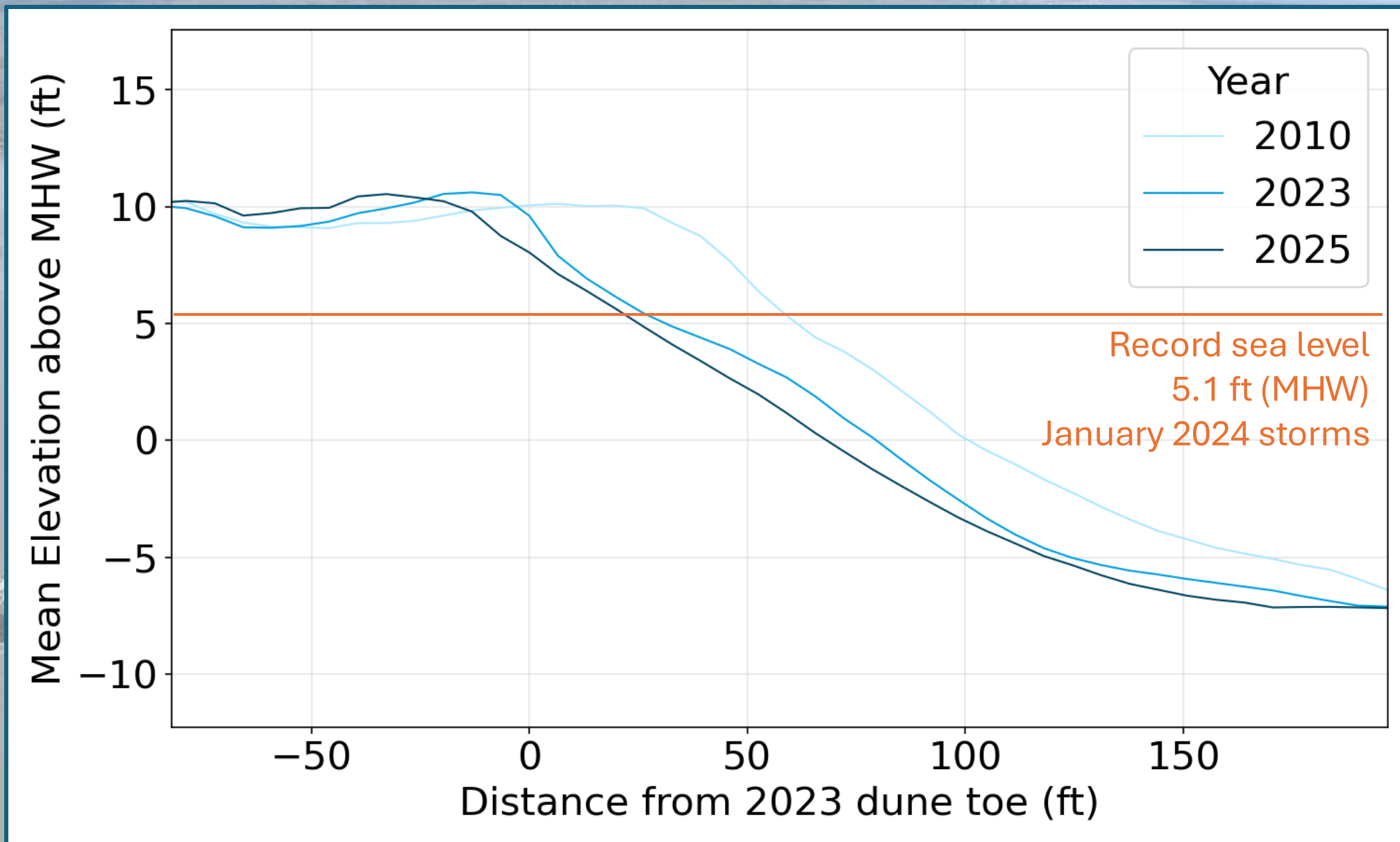
<https://coastalscience.noaa.gov/news/researchers-find-beach-slope-dune-elevation-key-factors-that-control-erosion/>

January 2024 Storm Study

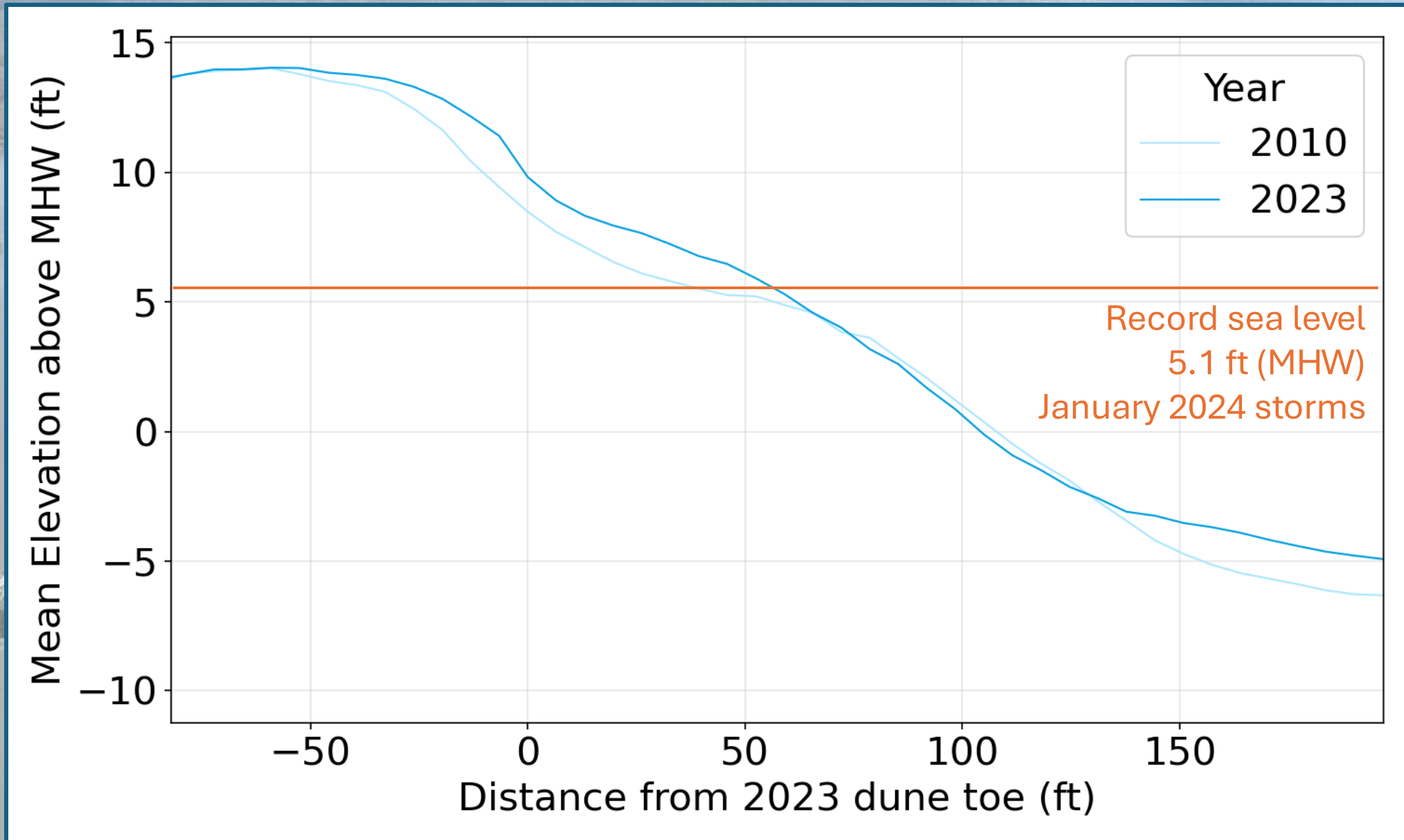
- **Dune shorelines eroded less** than hard shorelines by 30-50%
- **Dunes recover more slowly**
- Need to **support dune recovery** with increasing storm frequency
- What are the most effective and **long-term dune restoration strategies?**



Preliminary Results – Ferry Beach Profiles



Preliminary Results – Ocean Park Beach Profiles



Beach Features – Dry Beach Width

- Dune toe position/profiles
- Dry beach width

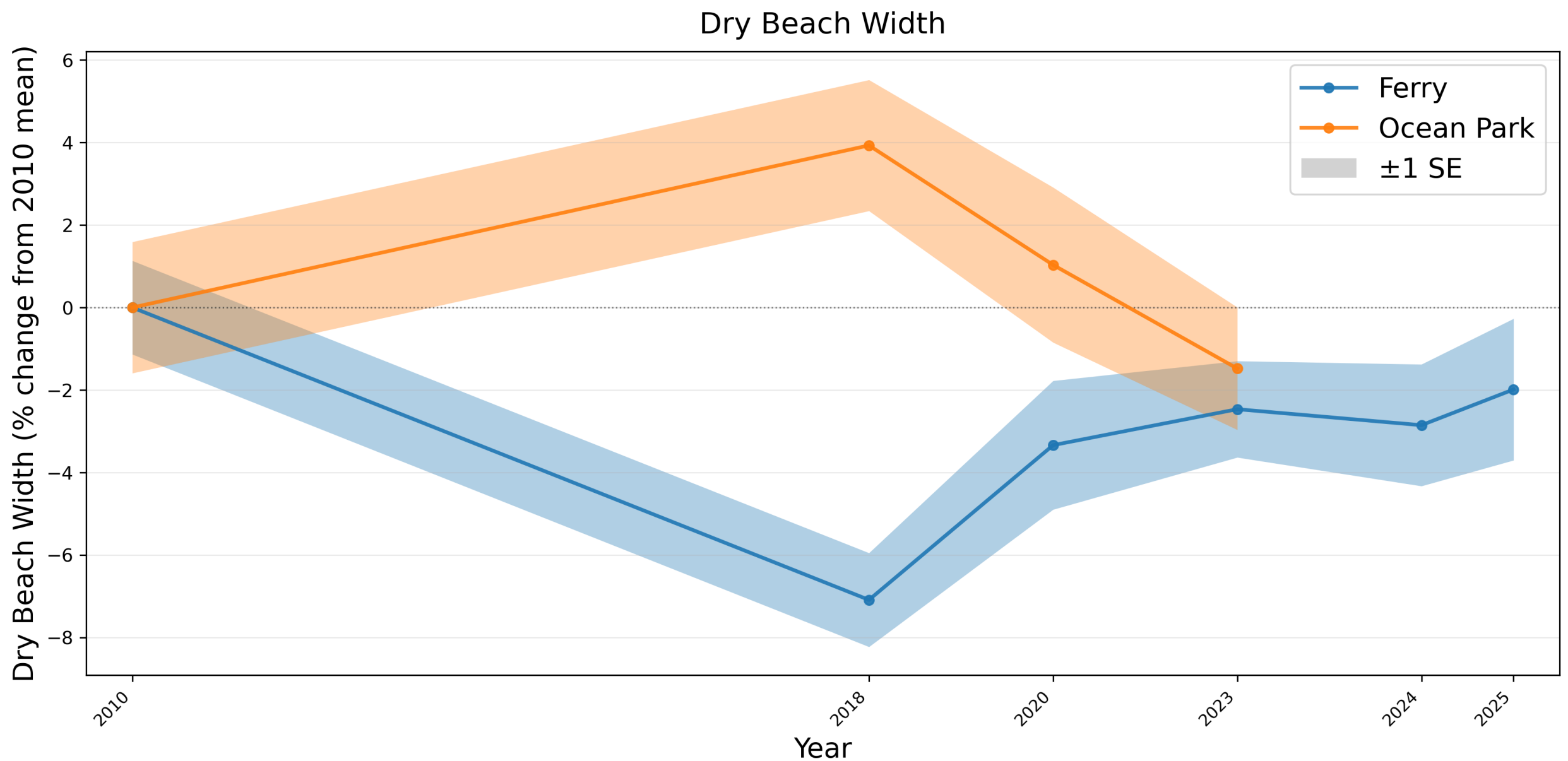
Mean High Water

Dry beach width

Landward Dune Edge



Preliminary results – Dry Beach Width



Wave Tank



The Wave Tank project located in UNE's Marine Science Center will be able to simulate the storm waves and erosion observed along the coast. It will include a flap-type wave generator that pushes waves towards a scaled model of a coastline.

Goals of the Wave Tank:

- Show local communities the technology used in UNE's coastal research
- Support the creation of a Beach Management Plan
- Experiment with erosion mitigation solutions
- Further coastal research and education for students at UNE

Blue Boat - Nicci



Current Research Takeaways

Dune & beach mapping

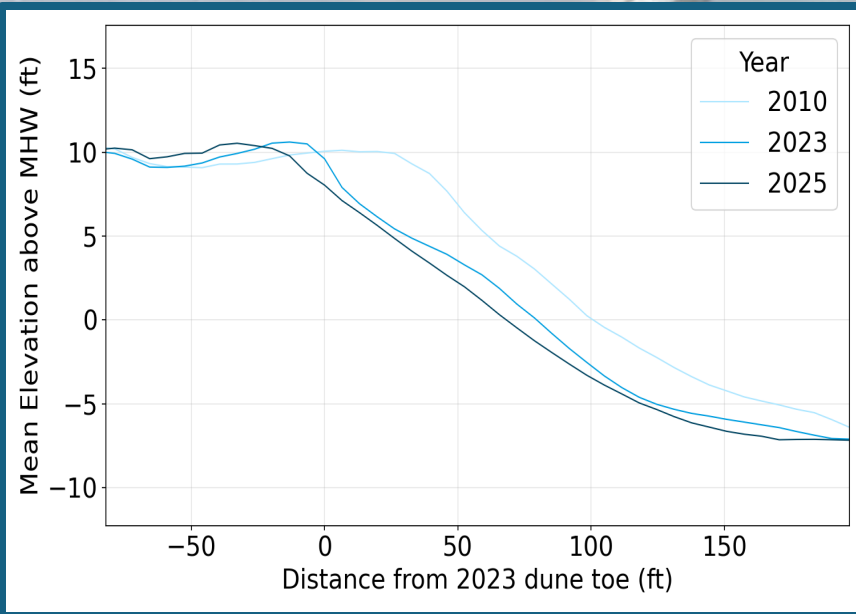
- Dune profiles
- Dry Beach Width

Wave Tank

- Experiment with restoration solutions

Blue Boat

- Bathymetry of Saco Bay



Salt Marshes – Goosefare Brook

- Flood protection
- Habitat
- Carbon storage

Need to **build elevation** to keep pace with **sea level rise**

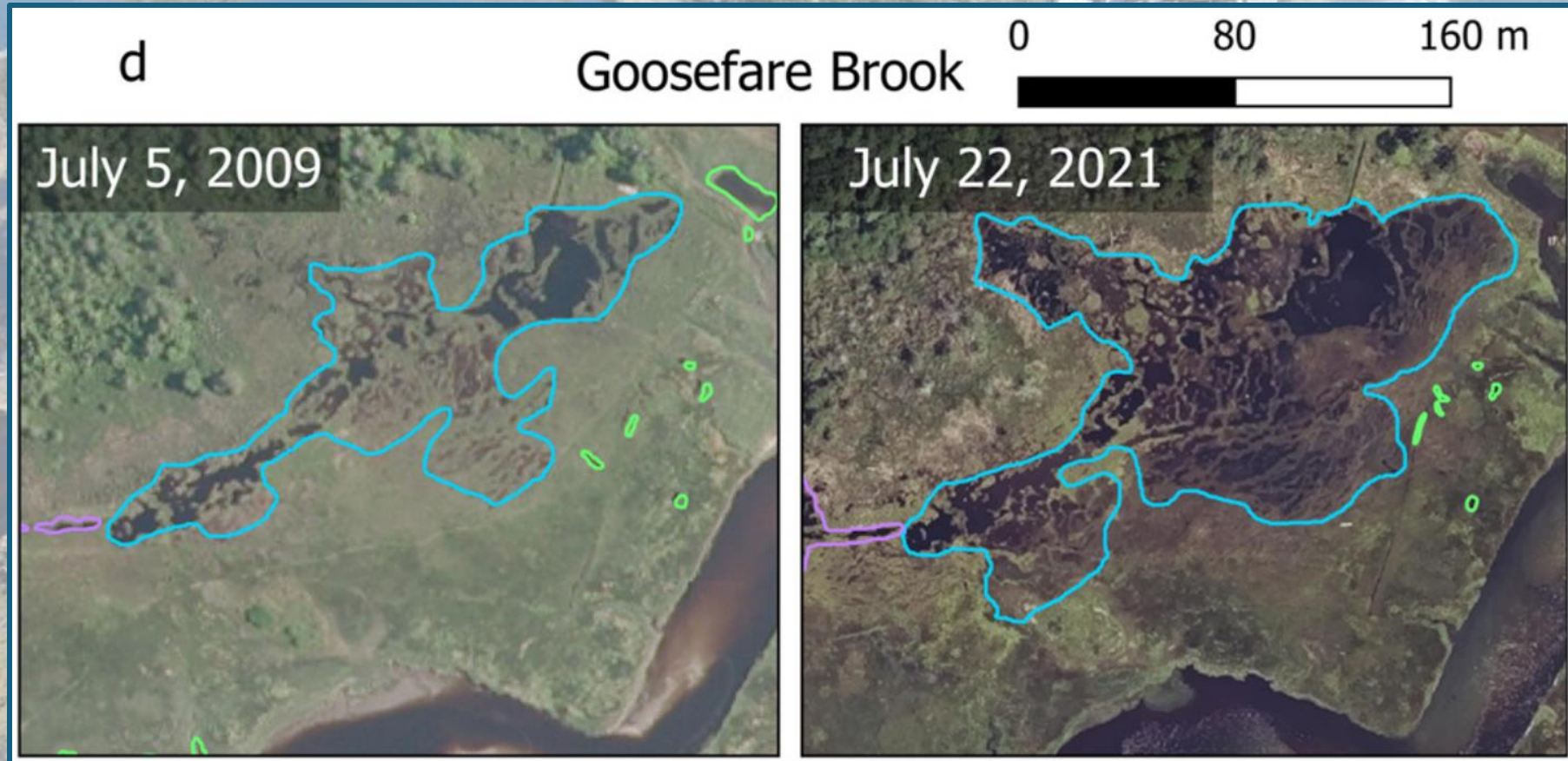


Salt Marsh Erosion

Struggle to keep pace with sea level rise

- Historic agricultural ditching
- Accelerating sea level rise

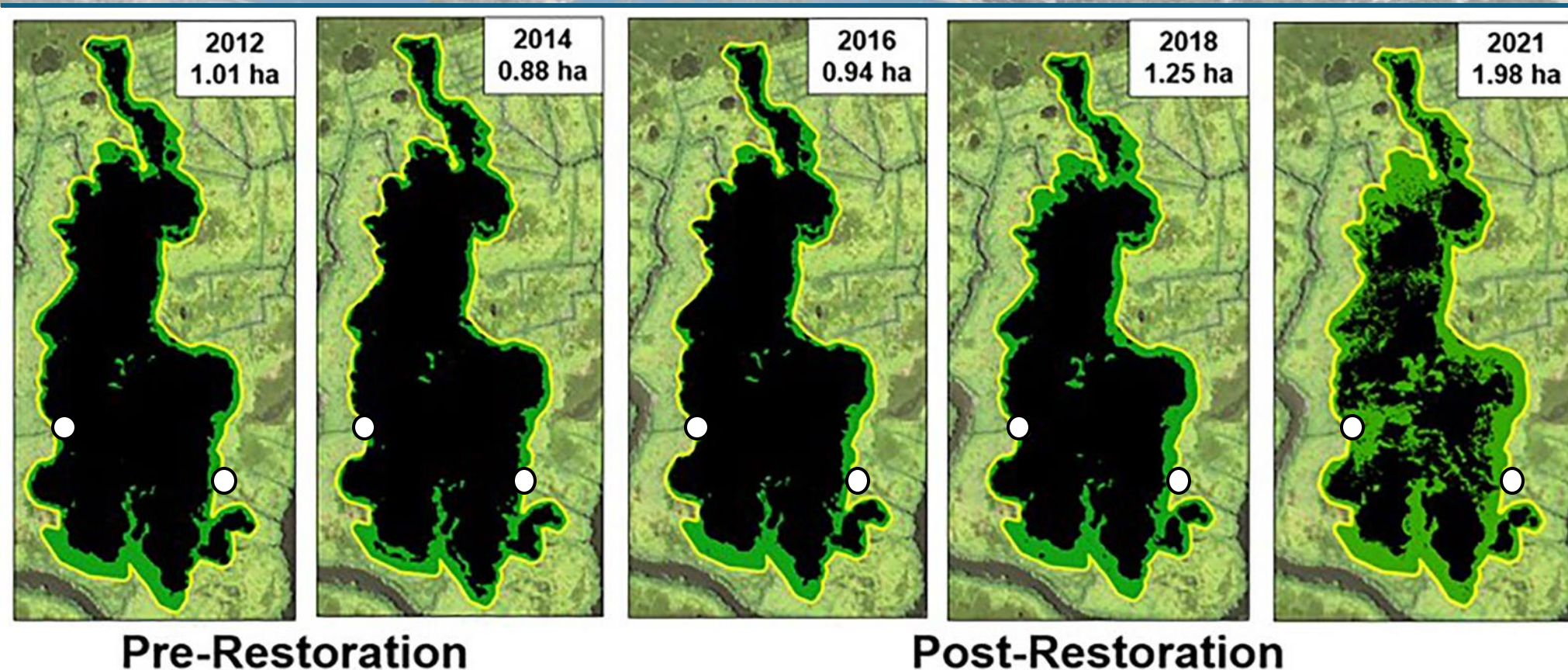
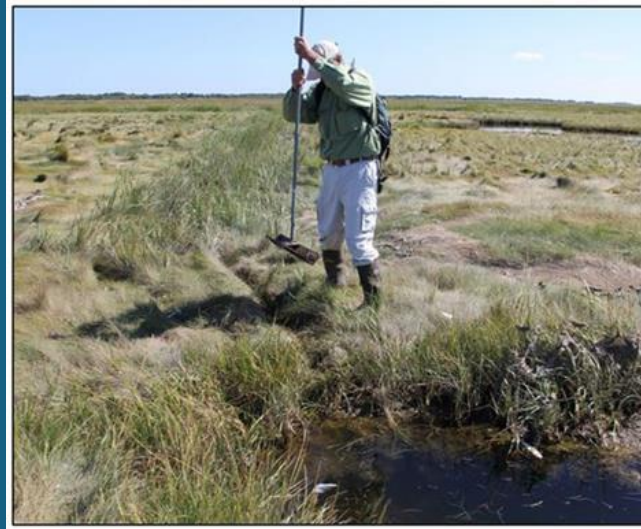
Pool Expansion & Vegetation Loss



Restoration at Goosefare

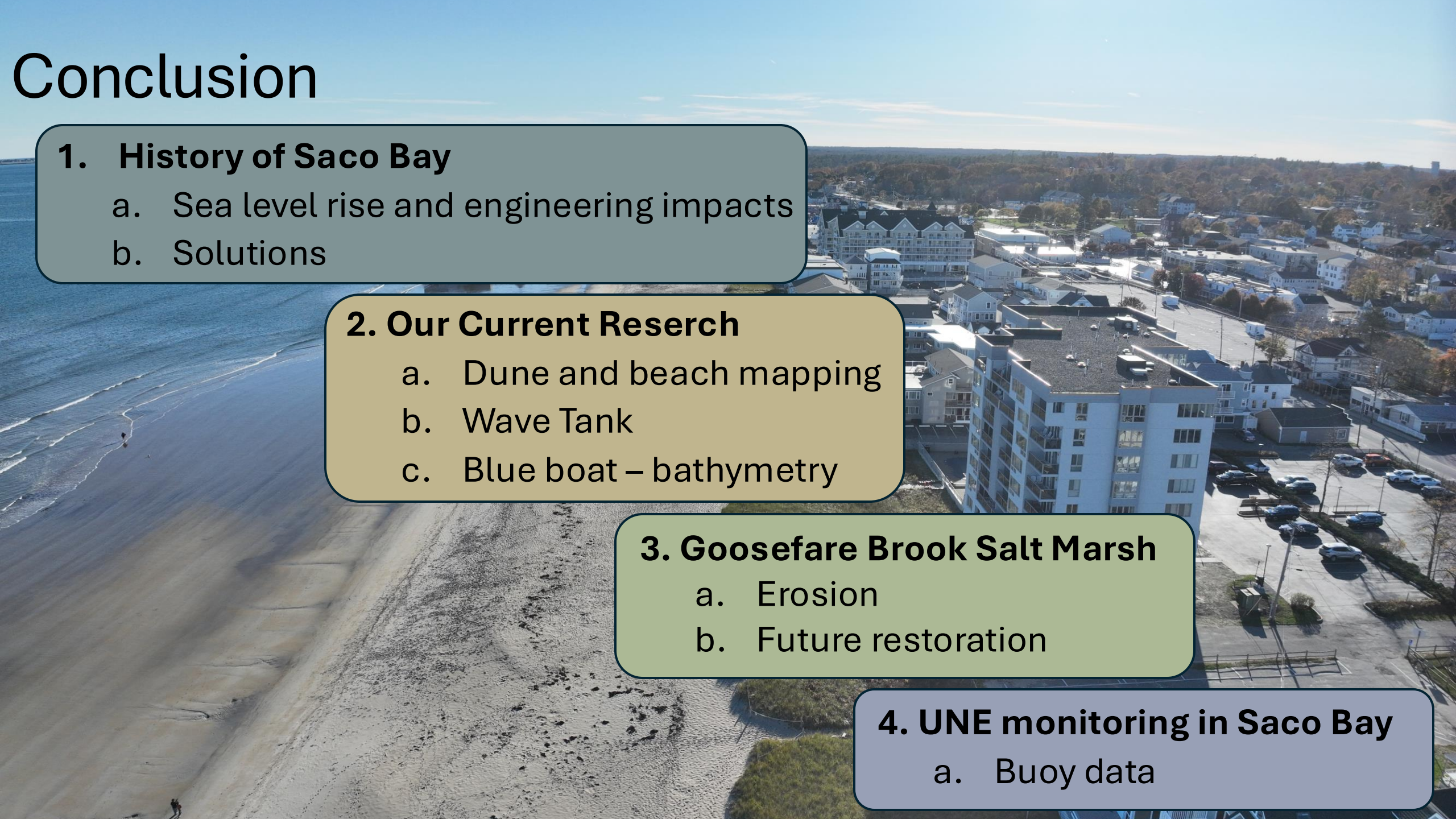
Goosefare Timeline

- Design winter 2026
- Permitting spring 2027



Runnel method
developed at
Great Marsh, MA

Conclusion

An aerial photograph of Saco Bay, Maine, showing a wide sandy beach in the foreground, a line of residential buildings along the shore, and the ocean extending to the horizon under a clear blue sky.

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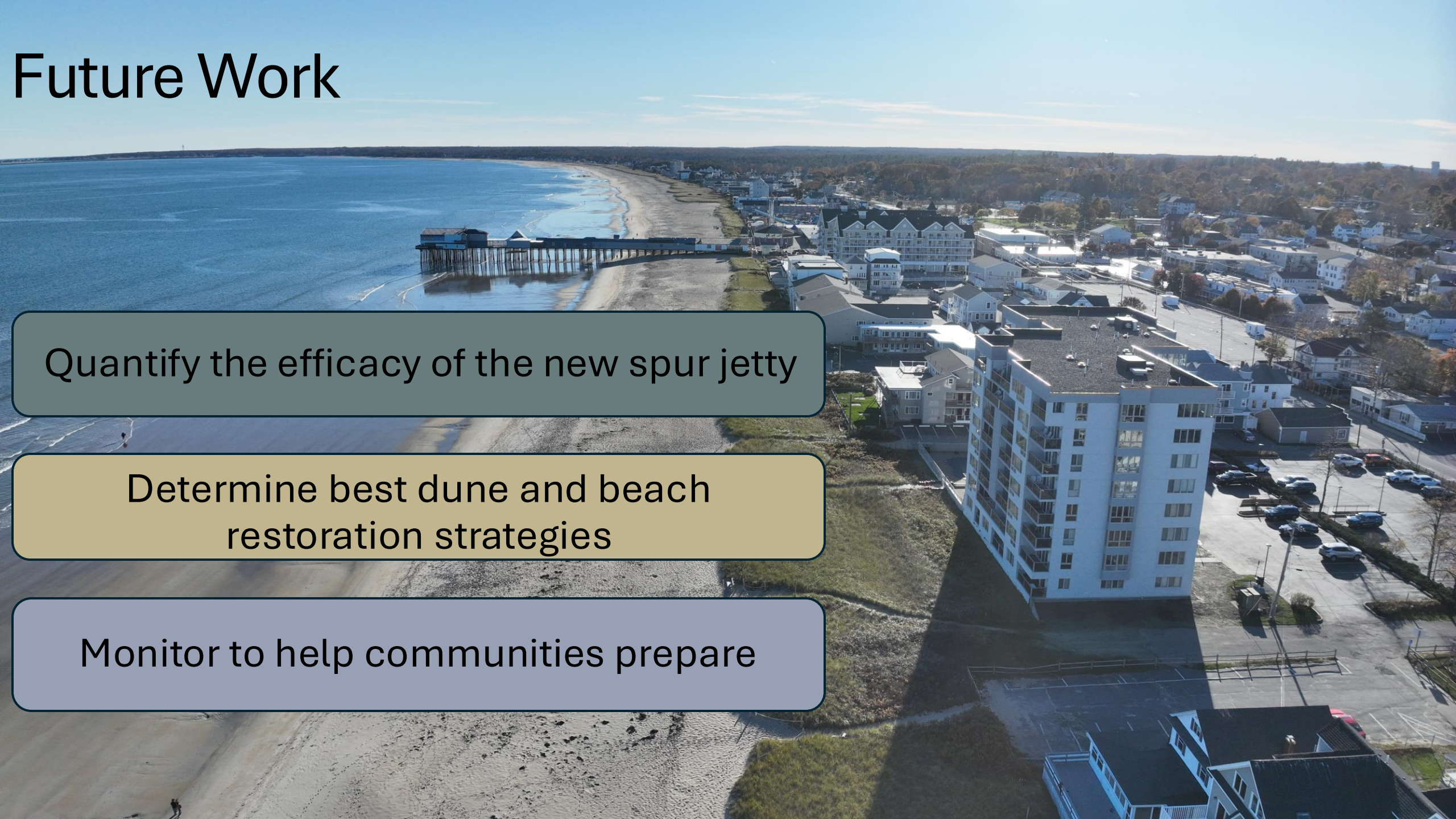
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Future Work

An aerial photograph of a coastal town. On the left is a wide, sandy beach meeting a blue ocean. A long wooden pier extends from the beach into the water. To the right of the beach is a residential area with various houses and a prominent, tall, modern white apartment building with many windows. The sky is clear and blue.

Quantify the efficacy of the new spur jetty

Determine best dune and beach
restoration strategies

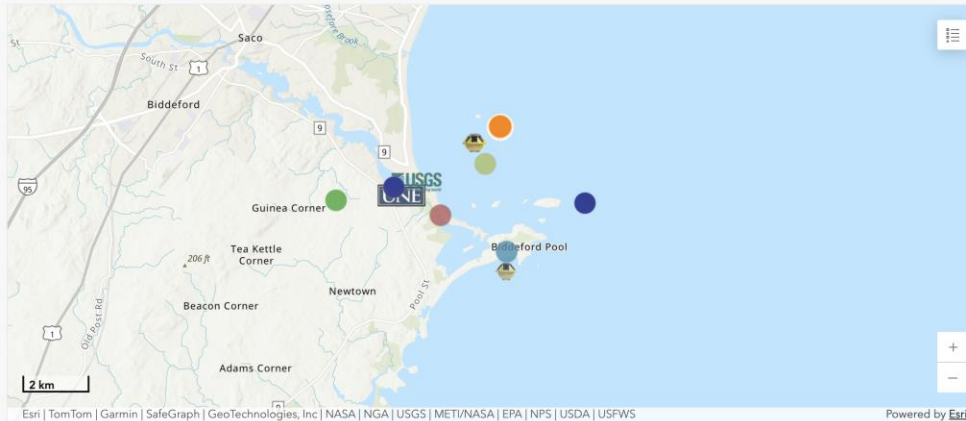
Monitor to help communities prepare

Monitoring in Saco Bay

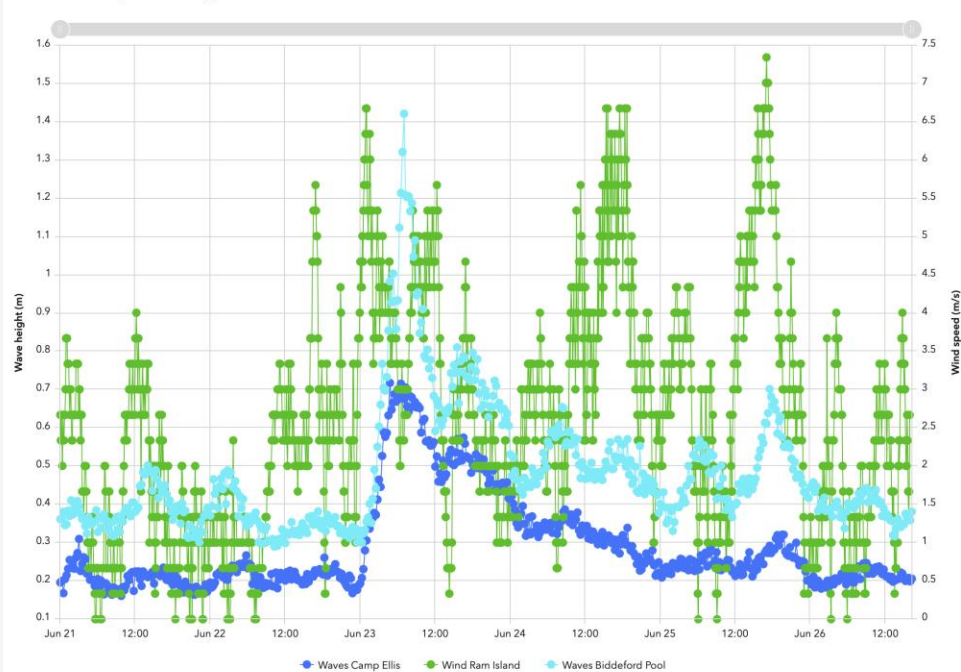


UNE Marine and Environmental Monitoring and Observations Dashboard

School of Marine and Environmental Programs, University of New England



Wind and waves, York County, Maine



Sea surface temperature

59.3°F

mean for today from Ram Island

Maximum wave height

0.8 ft

today from Ram Island

Maximum wave height

1.5 ft

today from Biddeford Pool

Environmental monitoring – across aquatic, terrestrial, atmospheric, and other systems - is for our understanding of Earth systems and for projecting future change. At UNE, our long-term observations are critical to track the impacts of climate change, monitor environmental degradation, and assess impacts to human health and livelihoods. Our integrated monitoring supports teaching, research, and the health and livelihood of southern Maine communities. For more information, comments, suggestions, or questions please contact Dr. Will Kochtitzky at wkochtitzky@une.edu.

About this page: The map on the left shows our current station network. If you click on the station you will find a link to take you to the near-real-time data (updated every 15-60 minutes). This website aggregates data from these stations approximately every 30 minutes, which can cause an up to 1.5 hour delay in data displayed here. The grey bars above each of the datasets below will allow you to change the time period you are viewing. Each element here can be resized for easier viewing.

[See where UNE's drifters buoys are currently located!](#)

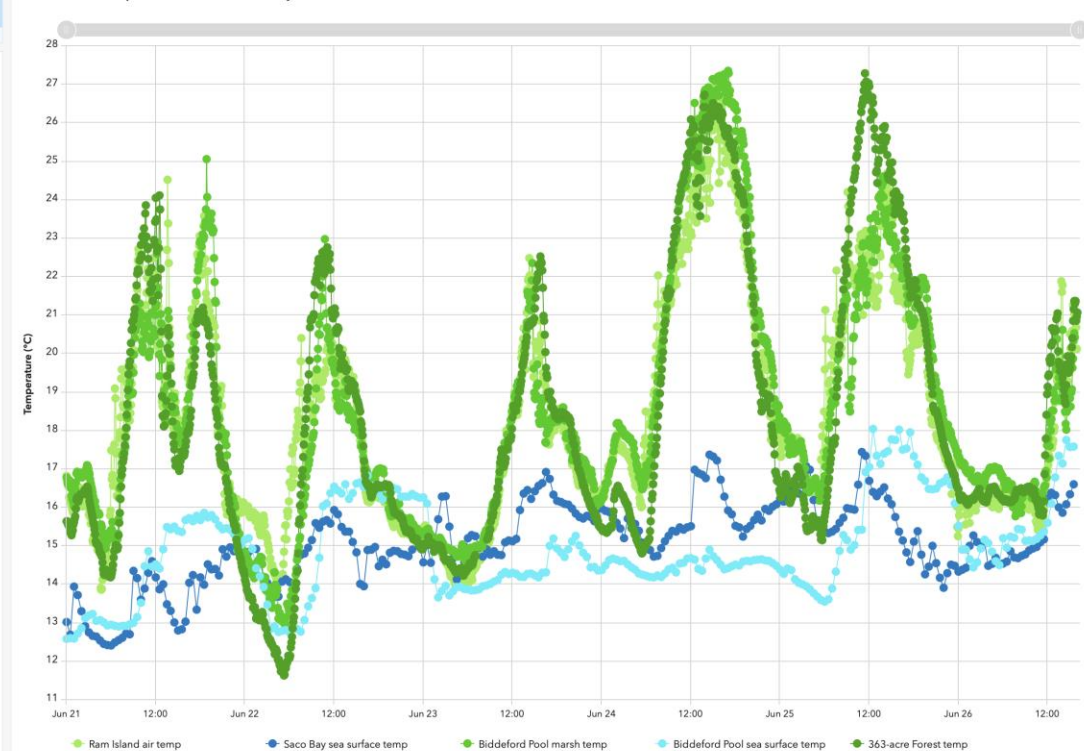
Custom UNE Data-Dashboards:

[Fathom Live Plankton buoy - Saco Bay conditions](#)

[Bluesonde - Saco River Estuary water quality](#)

[Biddeford Pool - Waves and Winds](#)

Sea and air temperatures in York County, Maine



Monitoring coming for Ocean Park



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Questions?

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