Town of Westport

Barrier Beach Management Plan

Ocean Facing Barrier Beach Areas Fronting Town Roads

Atlantic Ave & Beach Ave

August 13, 2025

Project Team

Town of Westport – Project Lead

- Michael Burris
- Chris Capone
- Diya Wheeler

Coastal Zone Management – Funder of Technical Work

- Sam Haines
- Rebecca Haney

EEA Municipal Vulnerability Preparedness Program – Funder of Outreach

- Courtney Rocha

Woods Hole Group

- Conor Ofsthun – Project Manager
- Brittany Hoffnagle – Outreach and Alternatives Analysis
- Justine Rooney – Beach Management Plans
- Adam Finkle, Mitch Buck – Site Survey Leads

Southeast Regional Planning & Economic Development District (SRPEDD)

- Kevin Ham
- Maria Jones

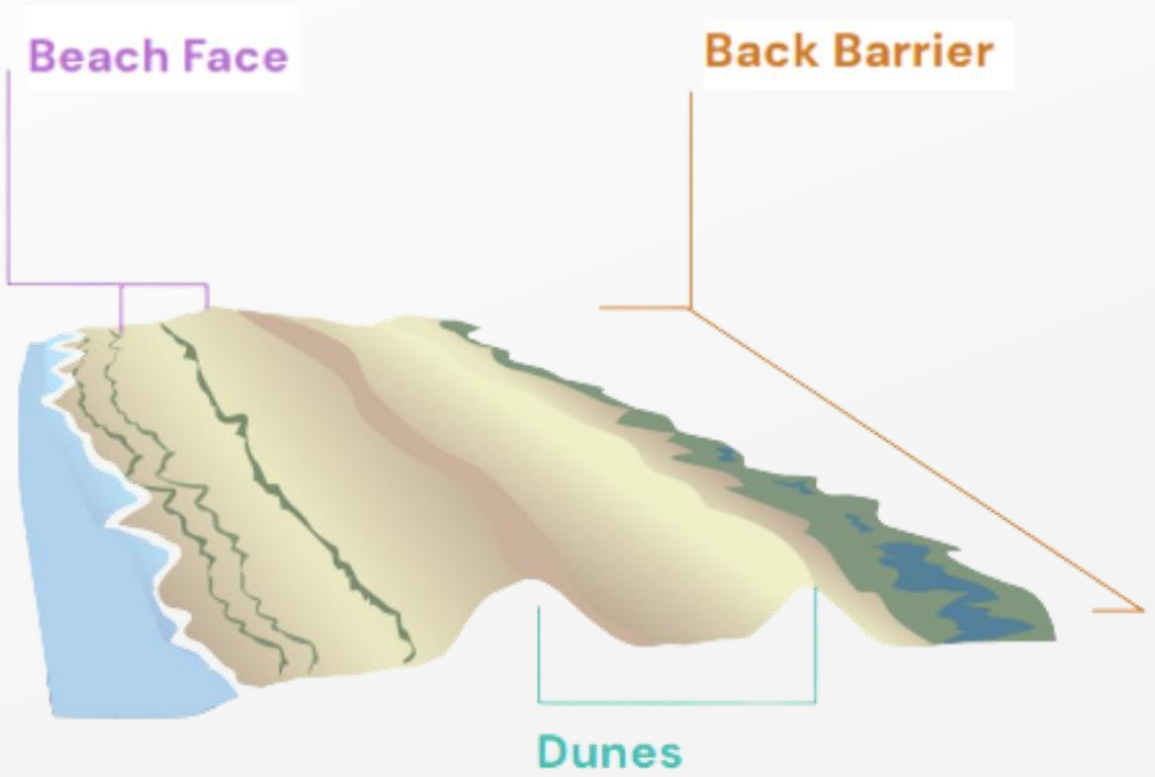
Atlantic Ave looking north – April 2025

Agenda

1. Project Overview
2. What is Driving the Need for Action
3. What Nourishment Is and Isn't
4. Building Resilience to Storms
5. What You Can Do
6. Discussion

WOODS HOLE GROUP
A CLS COMPANY

What is a Barrier Beach?



Geology of Atlantic Ave, a barrier beach – April 2025

WOODS HOLE GROUP
A CLS COMPANY

What is this Project About?

Establishing Existing Conditions

- We've mapped and documented wetland resources, analyzed sediments and dune materials, and conducting detailed topographic surveys.
- This gives us a clear baseline of how the barrier beaches look and function today.

Gathering Data to Support Mid- to Long-Term Options

- We're asking: How will changing weather and rising sea levels impact these barrier beaches in the coming decades?
- How can the Town work to create adaptive plans?

Drafting a Near-Term Management Plan for Current Conditions

- This plan looks at how to balance conservation with human use,
- Reduce storm damage, and
- Increase overall resiliency of the barrier beach system right now.

Storm damage and overwash at Atlantic Ave – January 2024

What is This Project Studying? And Why?

This project is focusing on Westport's ocean-facing barrier beaches that front Town-owned roads. Specifically:

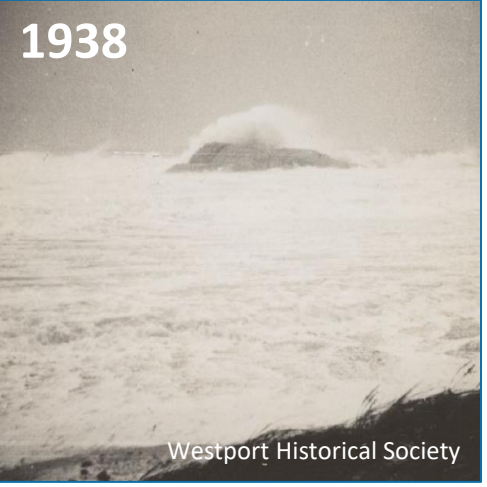
- Atlantic Avenue,
- Beach Avenue (The Knubble), and
- East Beach Road.

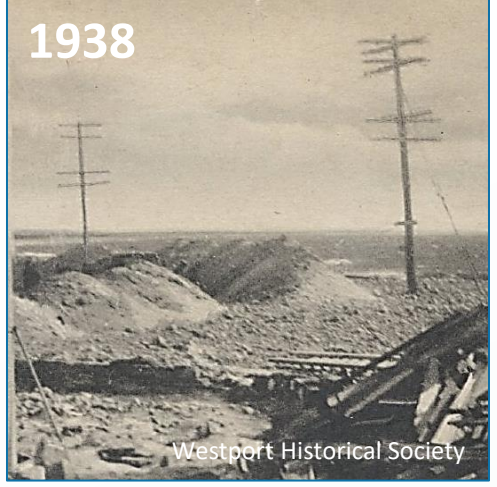
These areas are dynamic barrier beach systems that play a critical role in:

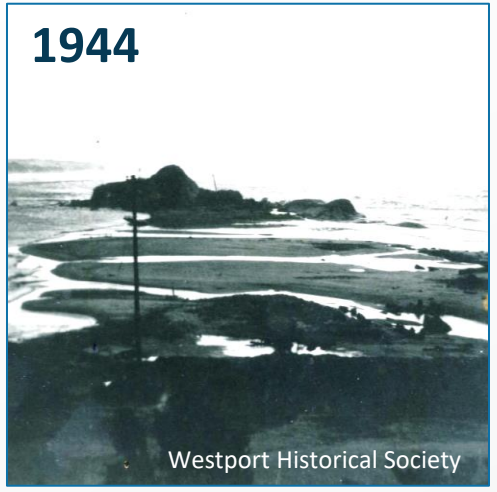
- Buffering inland areas from coastal storms and flooding,
- Providing essential habitat for protected wildlife, and
- Supporting public access and recreation.

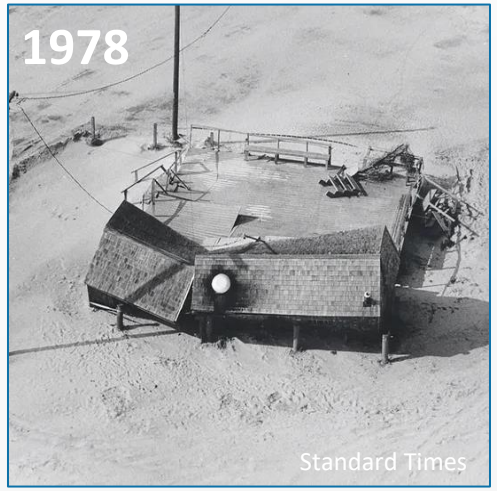
Project Sites

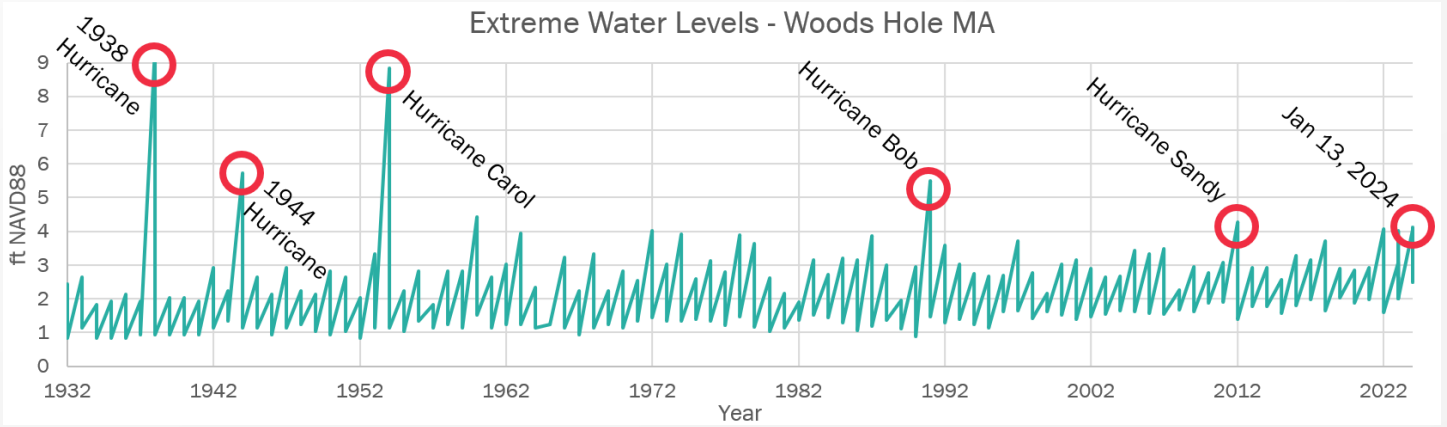
WOODS HOLE GROUP
A CLS COMPANY







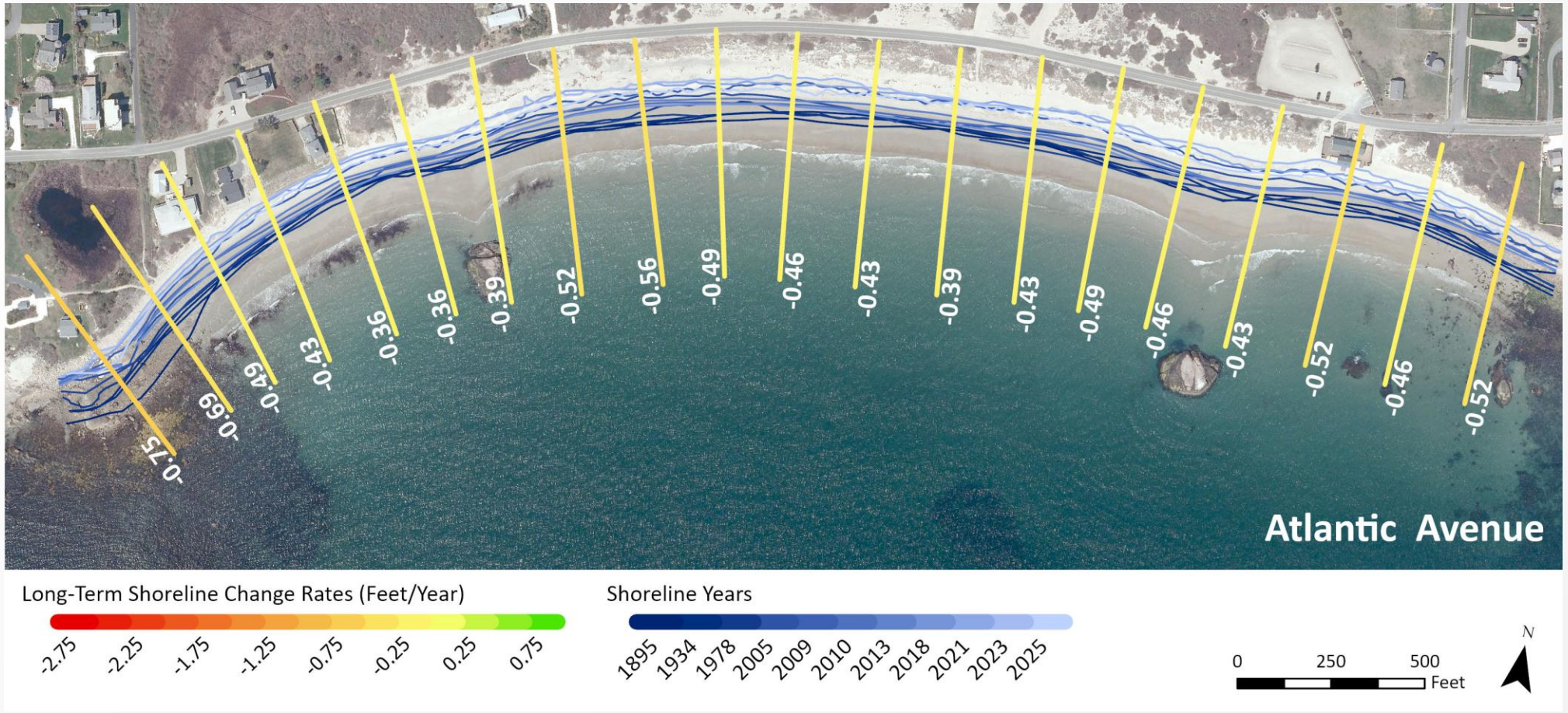




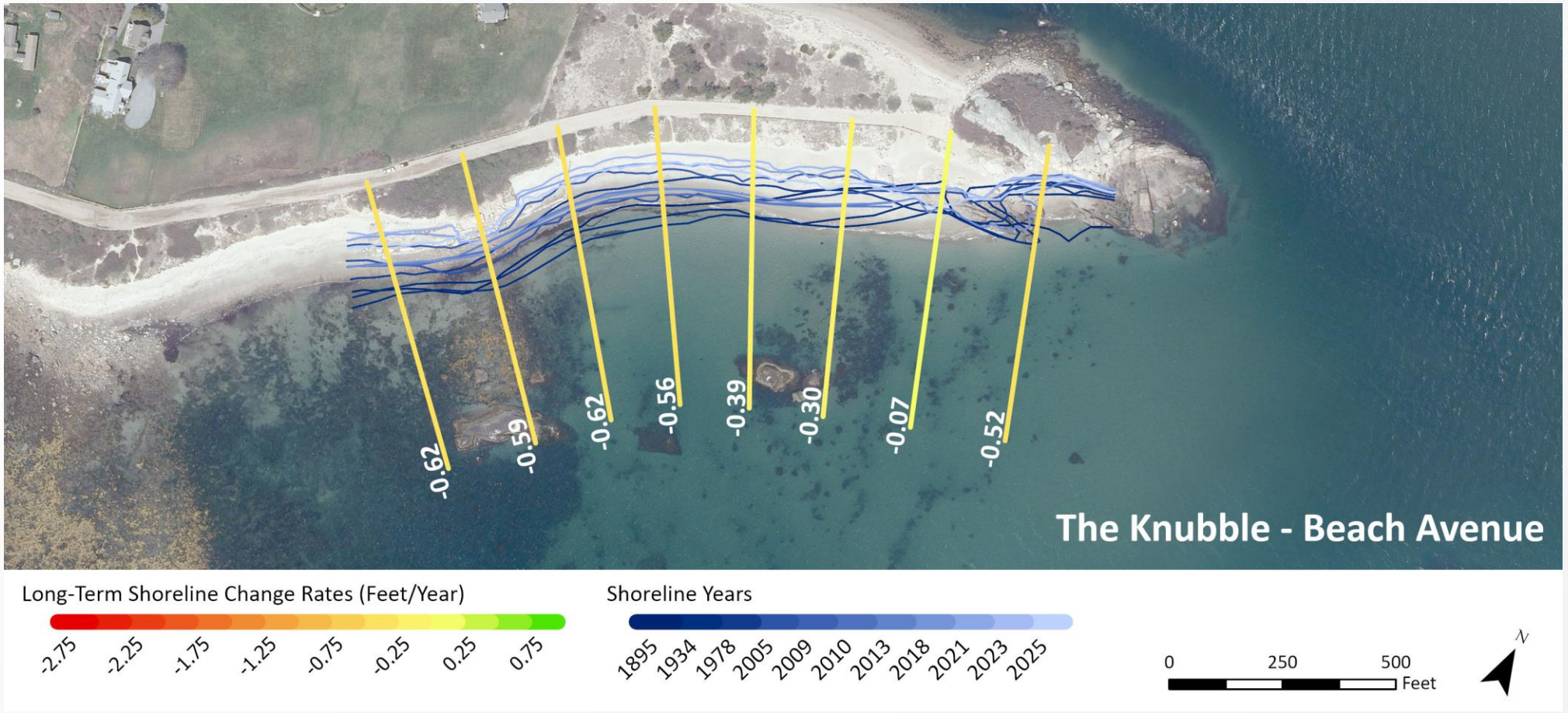
Timeline of storms and pictures of damage to East Beach Road

WOODS HOLE GROUP
A CLS COMPANY

Erosion Trends – 1895 to Present Day



Erosion Trends – 1895 to Present Day



Understanding where we are, we then ask:

- *How can Westport better manage this resource so they continue to reduce storm impacts?*
- *How do we respond across our roads, homes, and habitats into the future?*

What Comes Next for These Beaches?

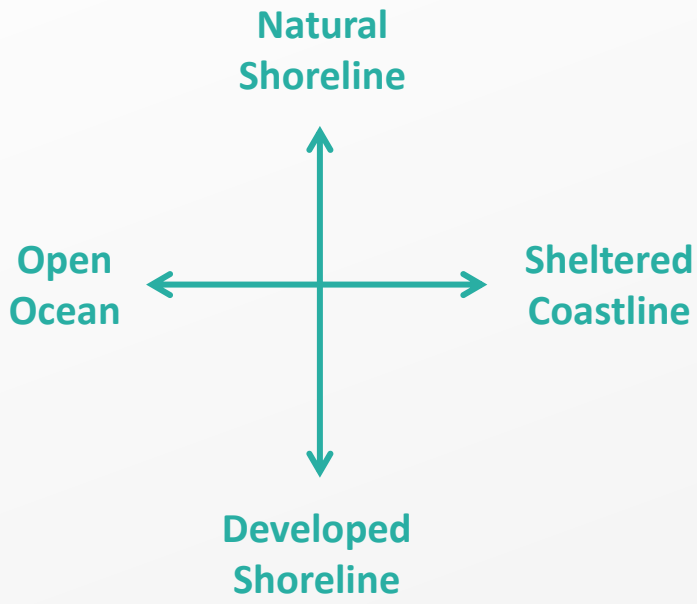
Beach Avenue and the Knubble – April 2025

WOODS HOLE GROUP
A CLS COMPANY

Types of Shorelines: Understanding the Starting Point

Why Does it Matter?

- Understanding shoreline type informs the design and materials used in living shoreline projects.
- Affects regulatory classification (e.g., dune vs. salt marsh).
- Guides expectations around performance, resilience, and maintenance.



Spectrum of shoreline types – both beaches are an open ocean / natural shoreline

Beach nourishment at Town Neck Beach – Sandwich MA (CapeCodTimes)

What are Beach & Dune Nourishment?

Beach nourishment involves bringing in compatible sand, gravel, or cobble from another location and placing it on the beach.

- It's used to widen beaches, rebuild dunes, and raise elevations where storms and sea level rise have caused erosion. This helps restore the natural buffer a barrier beach provides, expanding space for people and wildlife.
- The sand might be dredged from offshore or trucked in.
- We examined different beach nourishment and dune restoration strategies to:
  - Reduce wave energy hitting the shore,
  - Lower the chance of storm overwash onto roads,
  - Improve access and recreation areas for people

WOODS HOLE GROUP
A CLS COMPANY

A “Sacrificial” Strategy

- Nourishment is often called “sacrificial.”
- That’s because the added sand, gravel, or cobble is expected to erode and spread over time, by design.
- When waves and storms hit, they take sand from the beach first, instead of cutting into roads, dunes, or buildings behind it.
- It’s a way of sacrificing the project to protect more valuable inland infrastructure and habitats.
- This also means nourishment usually needs to be repeated periodically, depending on local erosion rates and storm frequency.
- Repeated projects incrementally spread along shore and in the nearshore, increasing the resilience of the region.

Dune restoration at Sandy Neck Beach, Barnstable MA – March 2022
(Source: Steve Heaslip/Cape Cod Times)

WOODS HOLE GROUP
A CLS COMPANY

Why do communities consider nourishment

Atlantic Ave and Elephant Rock Beach Club– April 2025

Westport's barrier beaches are sediment-starved.

- They don't get enough new sand, gravel, or cobble from natural sources to keep up with erosion.
- That makes them especially vulnerable to storms, rising seas, and everyday wave action.
- Without a significant sediment source, the beach will natural migrate inland in response to storms and sea level rise

WOODS HOLE GROUP
A CLS COMPANY

Where the Sand Can’t Come From

- Harvesting sediment from one area to nourish another benefits some at the expense of others, and disrupts the natural equilibrium of the beach and the ocean.
- By law in Massachusetts, we cannot take sand or cobble from existing dunes, beaches, or tidal flats to rebuild eroded areas.
- That means no “harvesting” local sediment by scraping dunes or tidal areas.
- All nourishment material must be compatible with the existing beach material and imported from approved, off-site sources, which helps protect sensitive habitats and maintain the natural shoreline.

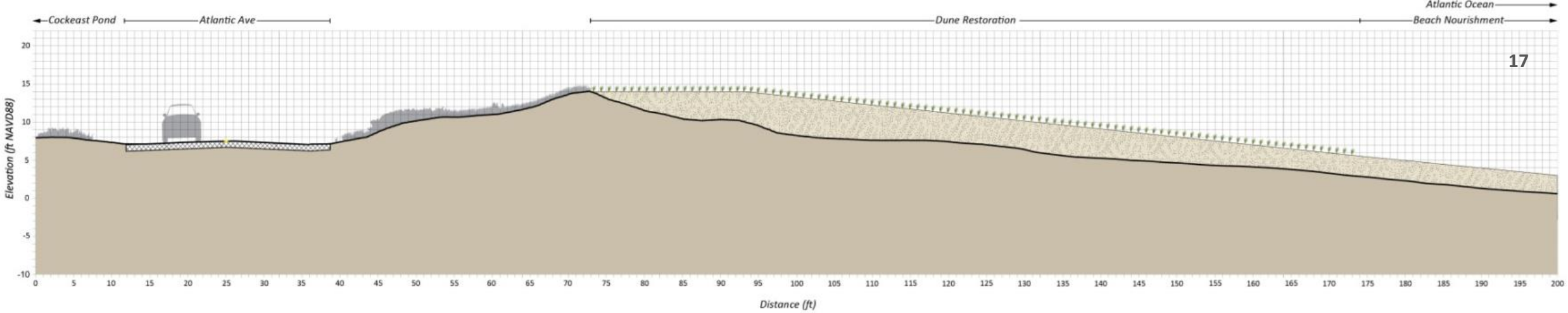
Coastal dune adjacent Elephant Rock Beach Club – February 2025

What About Overwash?

- Overwash (where waves push sand inland) is a natural process that helps dunes migrate landward and preserves sediment in the system.
- Generally, it's best to leave overwash in place.
- Sometimes, though, it needs to be moved, like if it blocks emergency access or poses safety hazards.
- But this should never be viewed as just "taking back" sand from the landward side to rebuild the beach.
- In most cases, Westport's beaches still need more imported sediment to restore volume on the seaward side.

Storm damage and overwash at Atlantic Ave – January 2024

WOODS HOLE GROUP
A CLS COMPANY



ALTERNATIVE 1

Atlantic Ave, Westport

WOODS HOLE GROUP
A CLS COMPANY

Nourishment Alternatives

Westport explored beach and dune nourishment options and how they'd perform under:

- 2-year, 10-year, and 100-year storm events
- With 0 ft and +1.2 ft of sea level rise (roughly 2070 conditions)

The analysis aimed to find strategies that:

- Reduce wave energy
- Minimize roadway overtopping
- Support wildlife habitat
- Keep barrier beaches functioning as natural storm buffers

WOODS HOLE GROUP
A CLS COMPANY

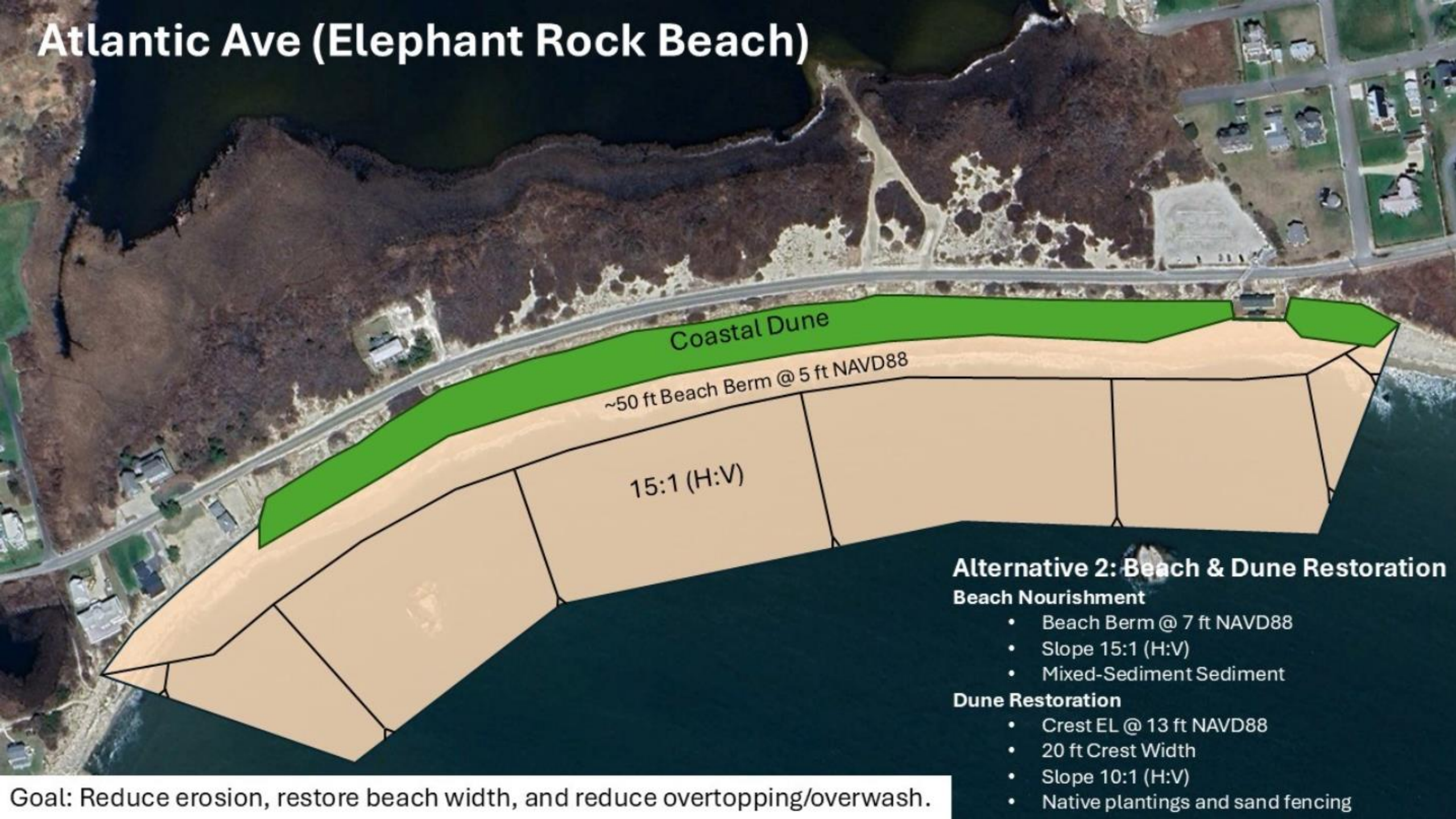
Atlantic Ave (Elephant Rock Beach)

Alternative 1: Dune Restoration

- Crest EL @ 13 ft NAVD88
- 20 ft Crest Width
- Slope 10:1 (H:V)
- Native plantings and sand fencing

Goal: Restore dune, reduce overtopping & overwash.

Atlantic Ave (Elephant Rock Beach)



Alternative 2: Beach & Dune Restoration

Beach Nourishment

- Beach Berm @ 7 ft NAVD88
- Slope 15:1 (H:V)
- Mixed-Sediment Sediment

Dune Restoration

- Crest EL @ 13 ft NAVD88
- 20 ft Crest Width
- Slope 10:1 (H:V)
- Native plantings and sand fencing

Goal: Reduce erosion, restore beach width, and reduce overtopping/overwash.

The Knubble (Beach Ave)

Alternative 1: Beach Nourishment

- 40 ft Beach Berm @ 5 ft NAVD88
- Slope 15:1 (H:V)

Goal: Restore beach to 1938 width and reduce erosion.

The Knubble (Beach Ave)

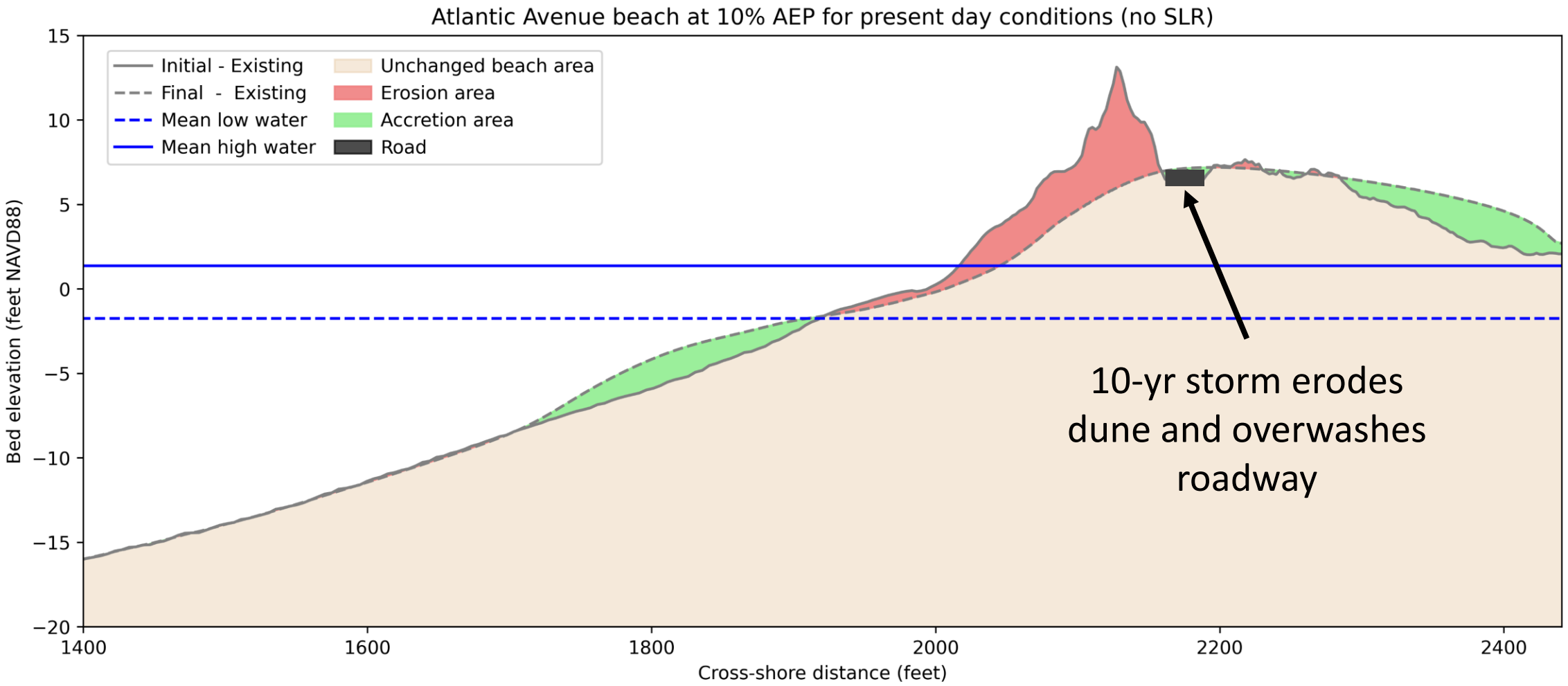
Alternative 2: Beach & Dune Restoration

- **Beach Nourishment**
  - 40 ft Beach Berm @ 5 ft NAVD88
  - Slope 15:1 (H:V)
- **Dune Restoration**
  - Crest EL @ 12 ft NAVD88
  - 75-175 ft Total Width
  - Fore and Back Slope 10:1 (H:V)
  - Native plantings and sand fencing

Goal: Restore natural resources.

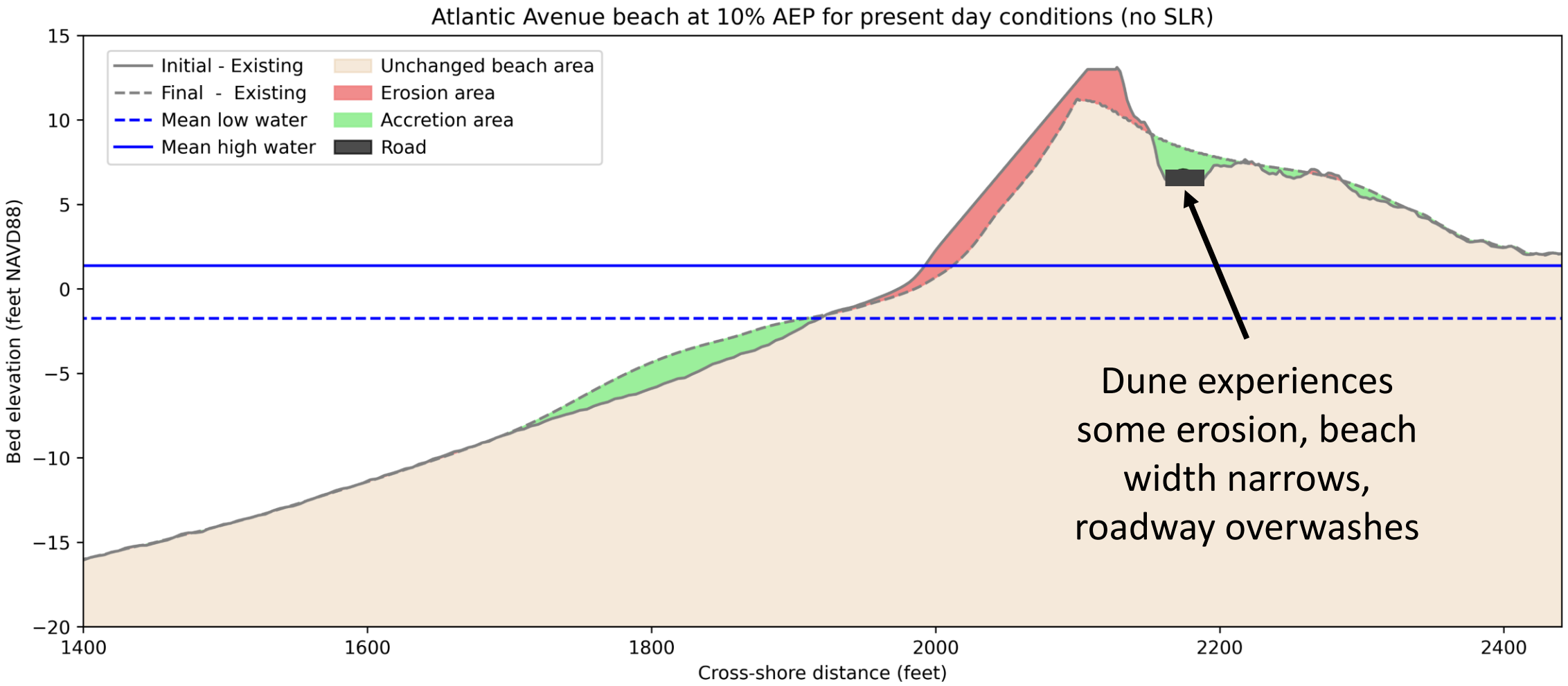
10-yr Storm – Existing Conditions

Atlantic Ave Modeling Results



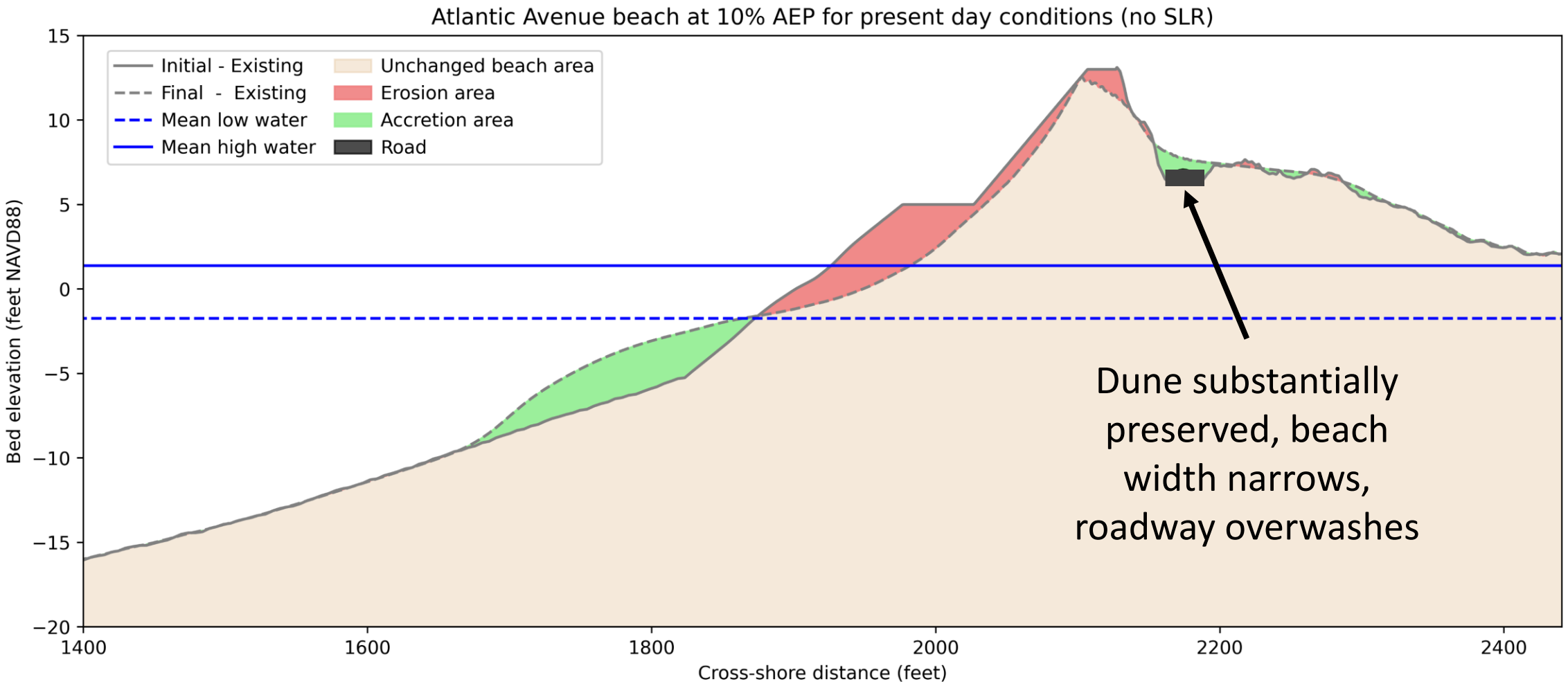
10-yr Storm – Dune Restoration

Atlantic Ave Modeling Results



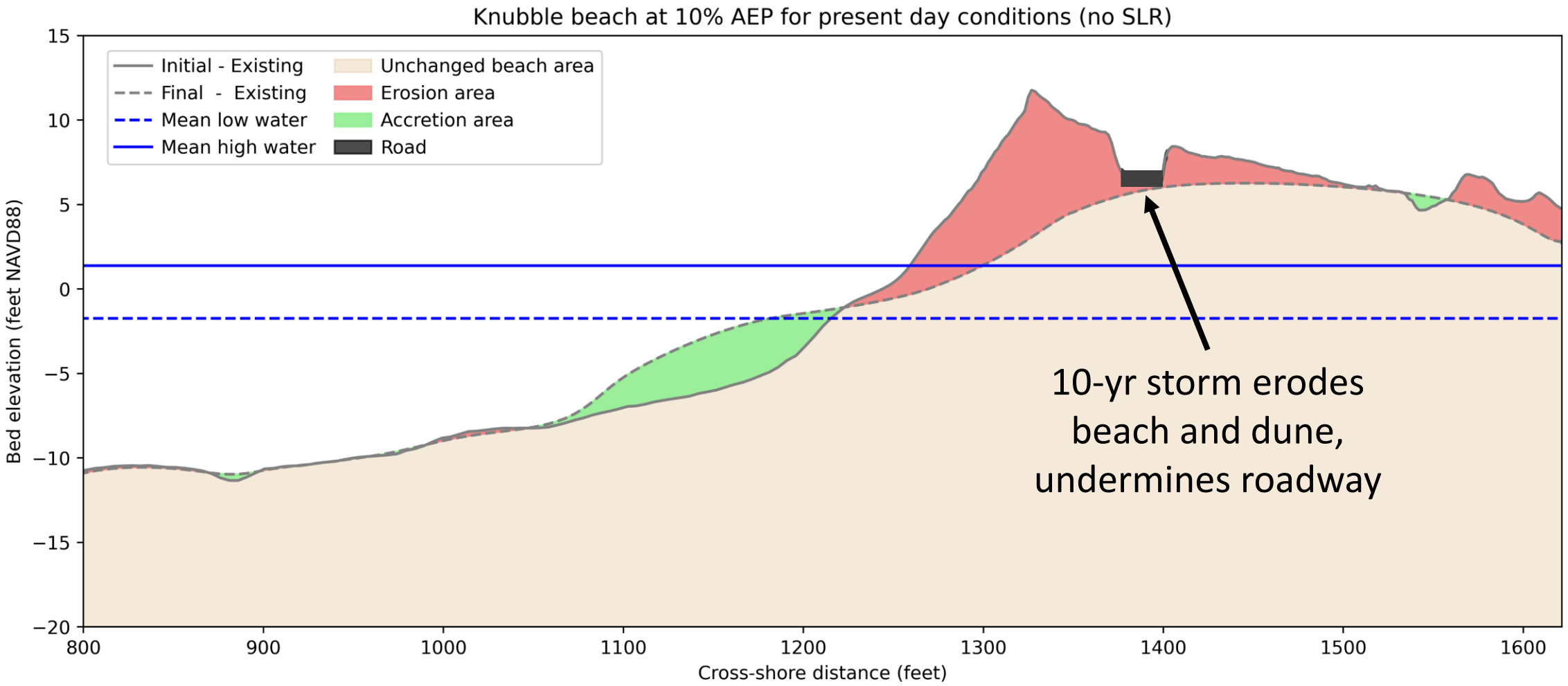
10-yr Storm – Beach and Dune Restoration

Atlantic Ave Modeling Results



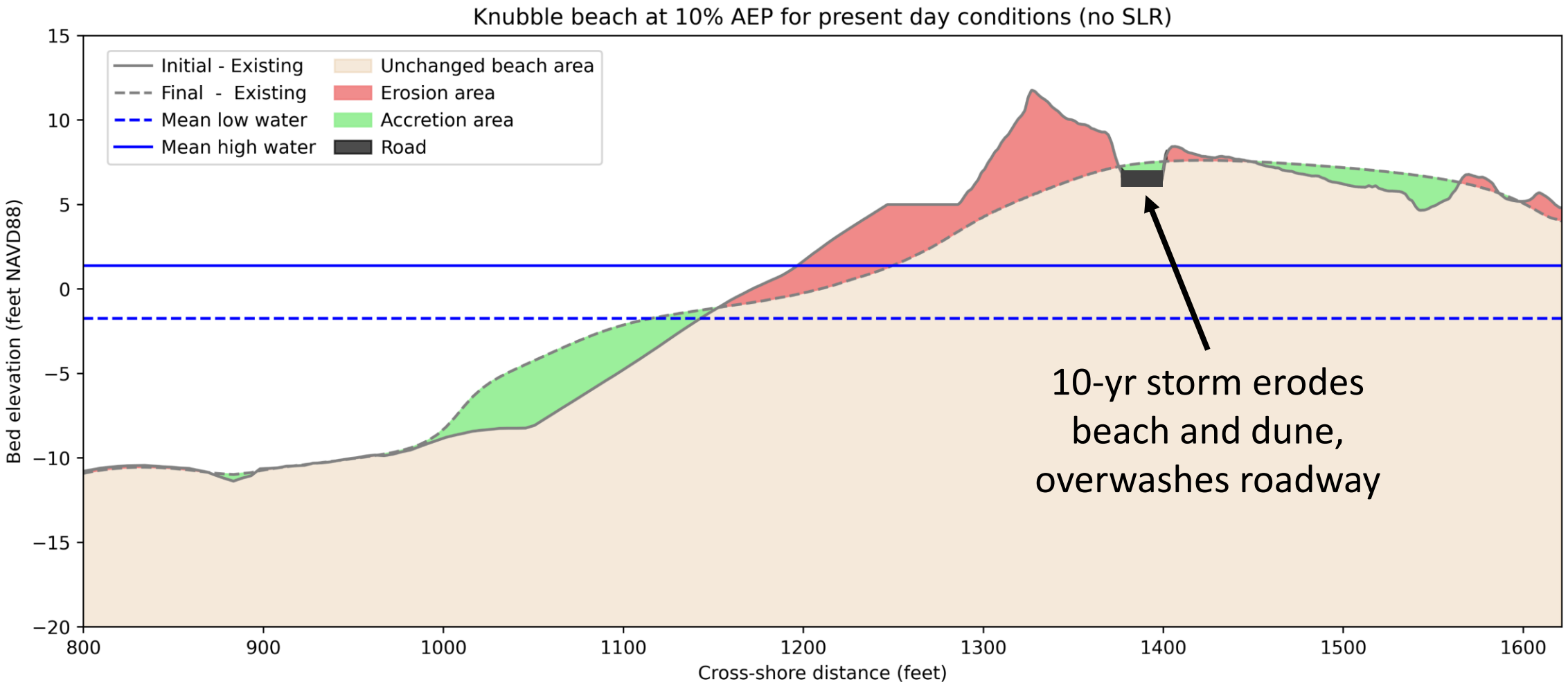
10-yr Storm – Existing Conditions

Beach Ave Modeling Results



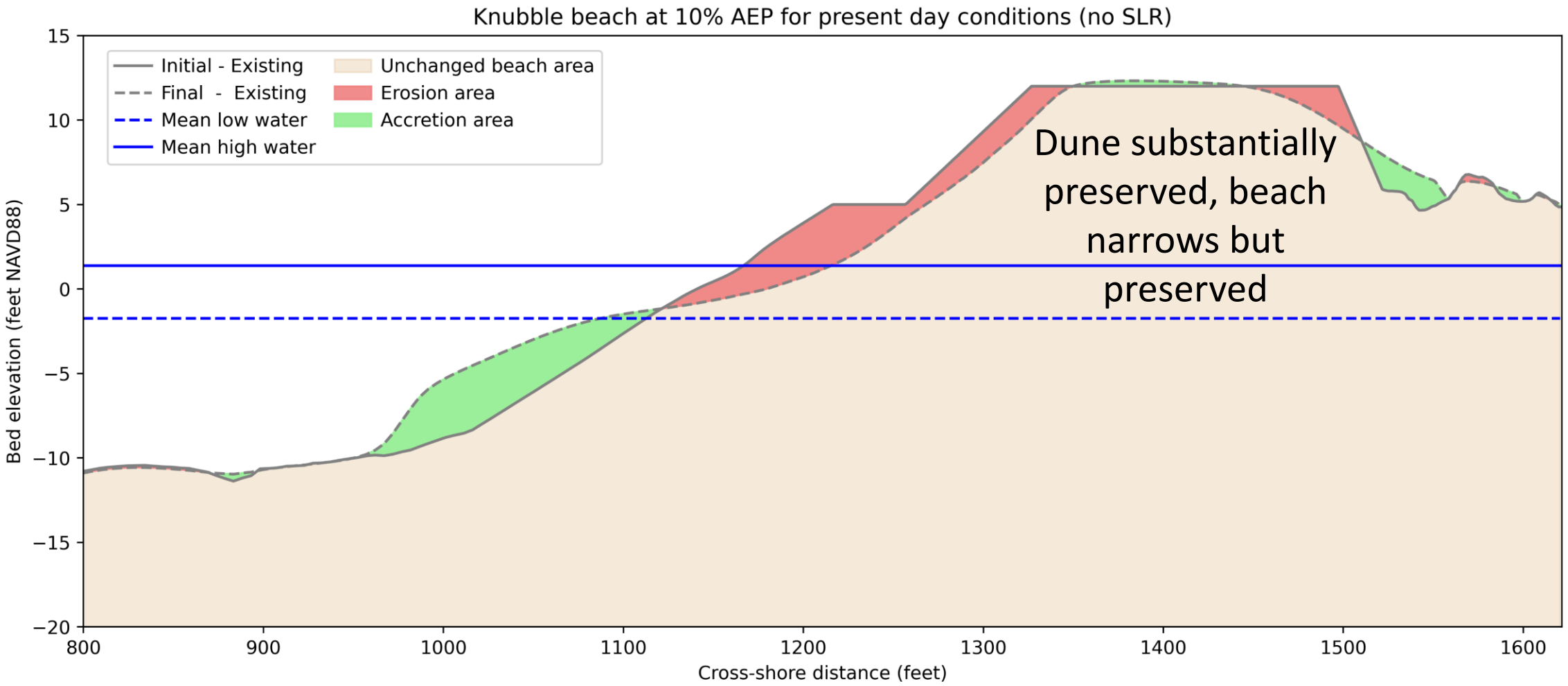
10-yr Storm – Beach Nourishment

Beach Ave Modeling Results



10-yr Storm – Beach and Dune Restoration

Beach Ave Modeling Results



The Reality: Public Funds, Cost, Time & Risk

Large-scale nourishment, dune reconstruction, and cobble berms can offer **storm protection benefits,** but they come with big challenges:

- If public funding is utilized to nourish private properties, **easements for shore-parallel public access** would be expected to be necessary.
- **Very expensive**, needing large volumes of imported material, heavy equipment, and weeks or months of time.
- **Time-consuming to fund and permit**, often requiring state or federal grants plus multi-agency approvals.
- And even then, these are **temporary measures**, relying on sacrificial dunes that are designed to give way to storms.

Beach nourishment at Duxbury Beach Reservation – Duxbury MA (2025)

WOODS HOLE GROUP
A CLS COMPANY

Construction Cost Estimate

Reach	Alternative	Detail	Estimated Construction Cost
Atlantic Ave	Alt 1 – Dune Restoration	46,550 cubic yard of sediment	$4,100,000
	Alt 2 - Beach and Dune Restoration	100,053 cubic yard of sediment	$7,850,000
Beach Ave	Alt 1 – Beach Nourishment	22,148 cubic yard of sediment	$1,550,000
	Alt 2 - Beach and Dune Restoration	56,487 cubic yard of sediment	$4,350,000

Estimated order of magnitude costs are for construction activities only. Additional costs can be expected for engineering, permitting, construction oversight, and post-construction monitoring and maintenance.

A Real-World Example: Salisbury Beach

Beach and dune erosion in Salisbury, MA – March 10, 2024 (CZM MyCoast)

Look at Salisbury Beach in March of 2024:

- Residents raised over $565,000 to truck in 15,000 tons of sand to rebuild dunes for 25 homes.
- The project finished just days before a major winter storm.
- Half the sand — about $300,000 worth — washed out of the dune and spread along the previously absent beach almost immediately.

Still, residents noted:

- ***"The sacrificial dunes did their job… they protected some properties from being eaten up by the storm."*** (WBUR March 14, 2024)

This example shows the value but also the limits of nourishment:

- It can buy time and reduce immediate impacts, protecting homes and roads.

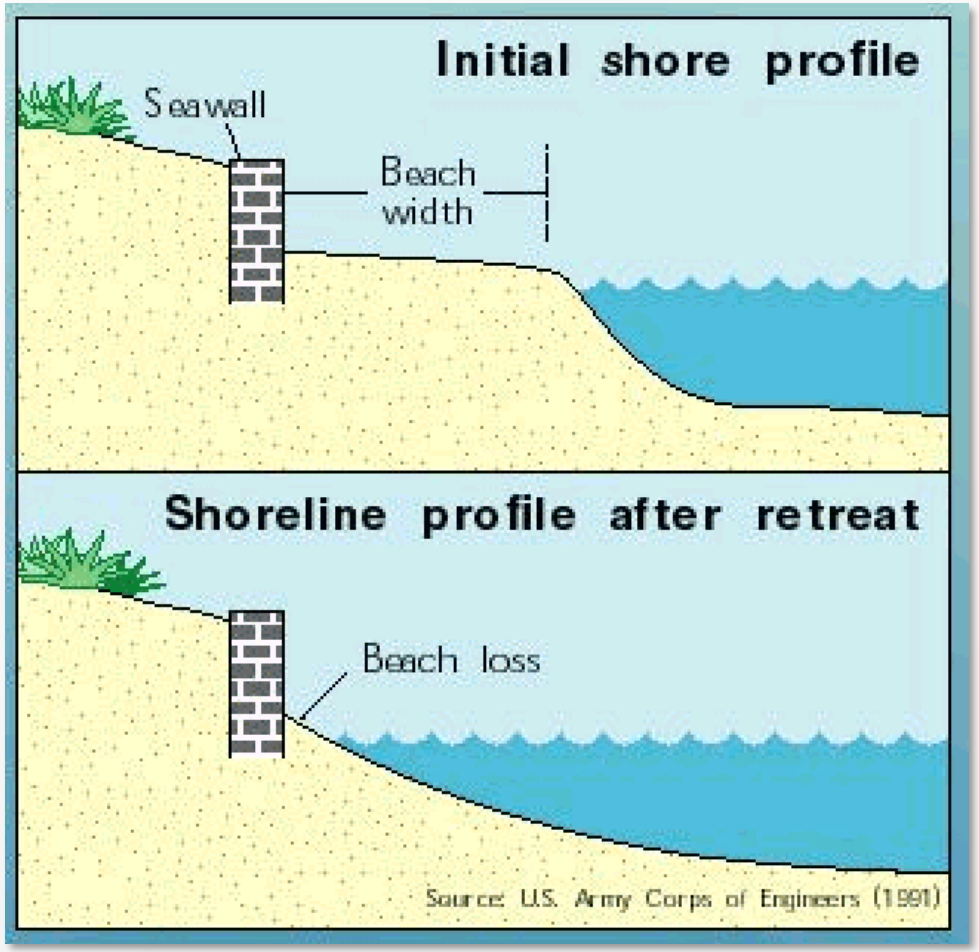
WOODS HOLE GROUP
A CLS COMPANY

Why Not Seawalls, Groins, or Breakwaters?

Hard armoring intentionally disrupts natural sediment transport

- The Project ruled out seawalls and revetments because they protect the immediate inland at the expense of the beach and nearby properties
- The Project did not evaluate groins because they amass sediment upcoast (to the west), essentially robbing from the downcoast (to the east)
- The Project did not evaluate offshore breakwaters or artificial reefs because they do not address the core of the issue – **lack of sediment in the beach system**

Armored shorelines: beach narrows & elevation drops



WOODS HOLE GROUP
A CLS COMPANY

What the BBMP Focuses On Right Now

Because large-scale nourishment is costly and slow to implement, the **Barrier Beach Management Plan (BBMP)** is designed to:

- Improve day-to-day management of the beaches and ensure activities comply with local, state, and federal regulations.
- Coordinate how the Town prepares for each season and responds to storms, so departments work together efficiently.
- Educate the public about how barrier beaches work, why they're managed this way, and how it benefits everyone — from wildlife to property owners.
- Favor nature-based approaches to enhance shorelines and adapt to rising seas.
- Promote best practices that guide residents, visitors, and landowners in caring for these fragile areas.

East Beach Road closure from storm damage – January 13, 2024 (CZM MyCoast)

What Can You Do To Help?

Detailed guidance coming in the Beach Management Plan

Beach and Dune Nourishment

Proper slope design reduces the risk of dune collapse and limits sand loss over time. More gentle, gradual slopes help trap windblown sand, allowing the dune to grow over time. If the bottom of a dune has eroded and the slope is steeper than the upper portion of the dune, it is likely unstable. Efforts to restore the dune slope should be considered. Grain size should be compatible with existing beach, utilizing coarser material where possible.

Sand Fencing

Sand fencing is often used to capture sand and build up dunes. As wind blows through sand fencing, it creates a drag that reduces the wind speed and sand is deposited at the base of or behind the fence. Sand fencing is a low-cost and easy way to build dunes and protect inland areas from storm damage. Unlike seawalls or rock revetments, sand fencing doesn't push waves onto nearby beaches or properties. Sand fencing must not impact protected shorebirds such as piping plover and least terns, and coordination with Conservation is necessary.

Dune Vegetation Planting

Salt-tolerant plants with extensive root systems can help address both kinds of coastal erosion problems. Plant roots hold sediment in place, helping to stabilize the areas where they are planted. Dune plants can root up to 9-feet deep, providing significant stabilization over turf grass which roots on the scale of inches. Unlike seawalls or rock revetments, vegetated coastlines absorb and dissipate wave energy, rather than reflecting waves and causing scour and beach loss.

WOODS HOLE GROUP
A CLS COMPANY

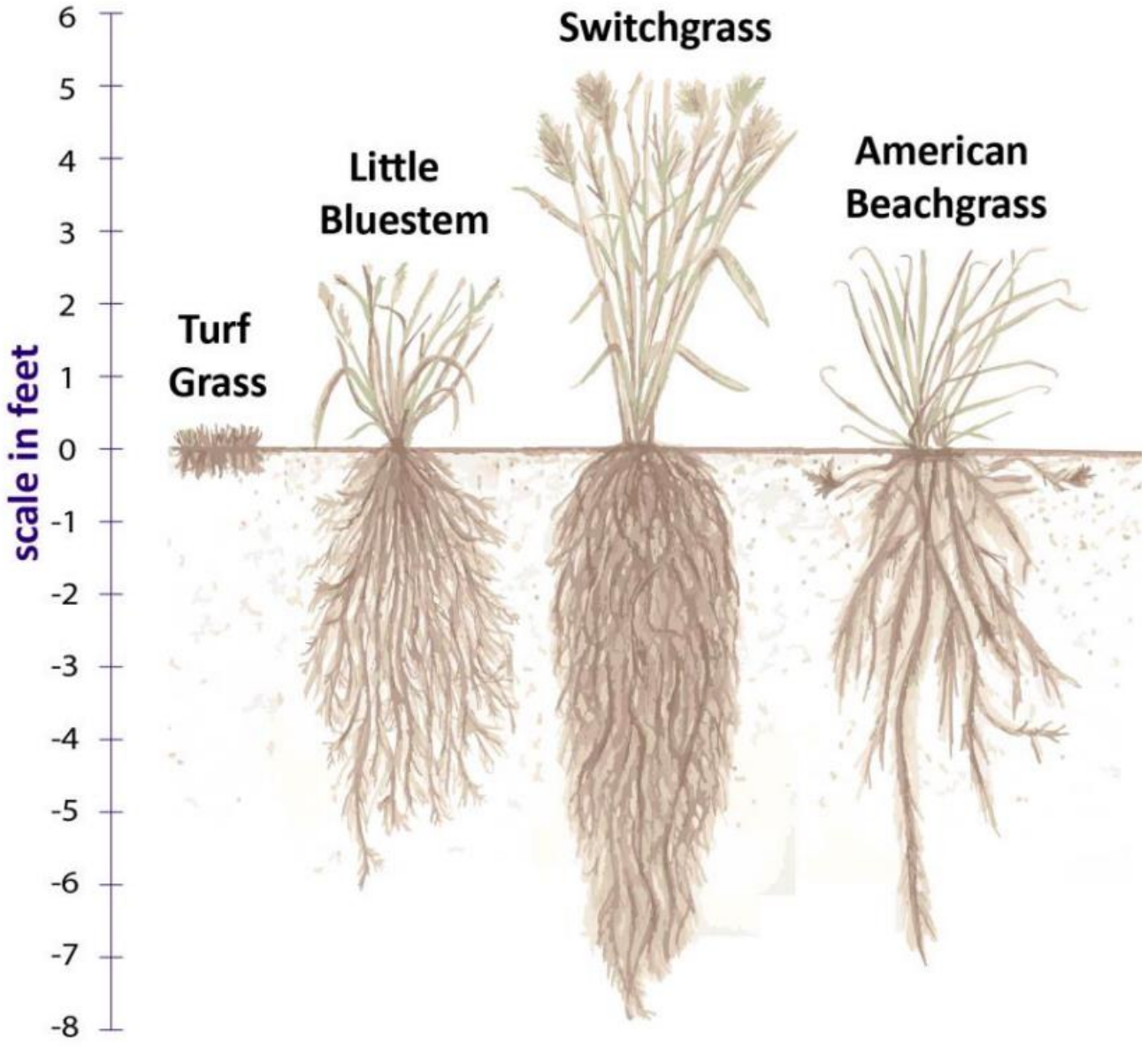
What Can You Do To Help?

CZM StormSmart Properties Fact Sheets

Planting Vegetation

Dune Nourishment

Sand Fencing

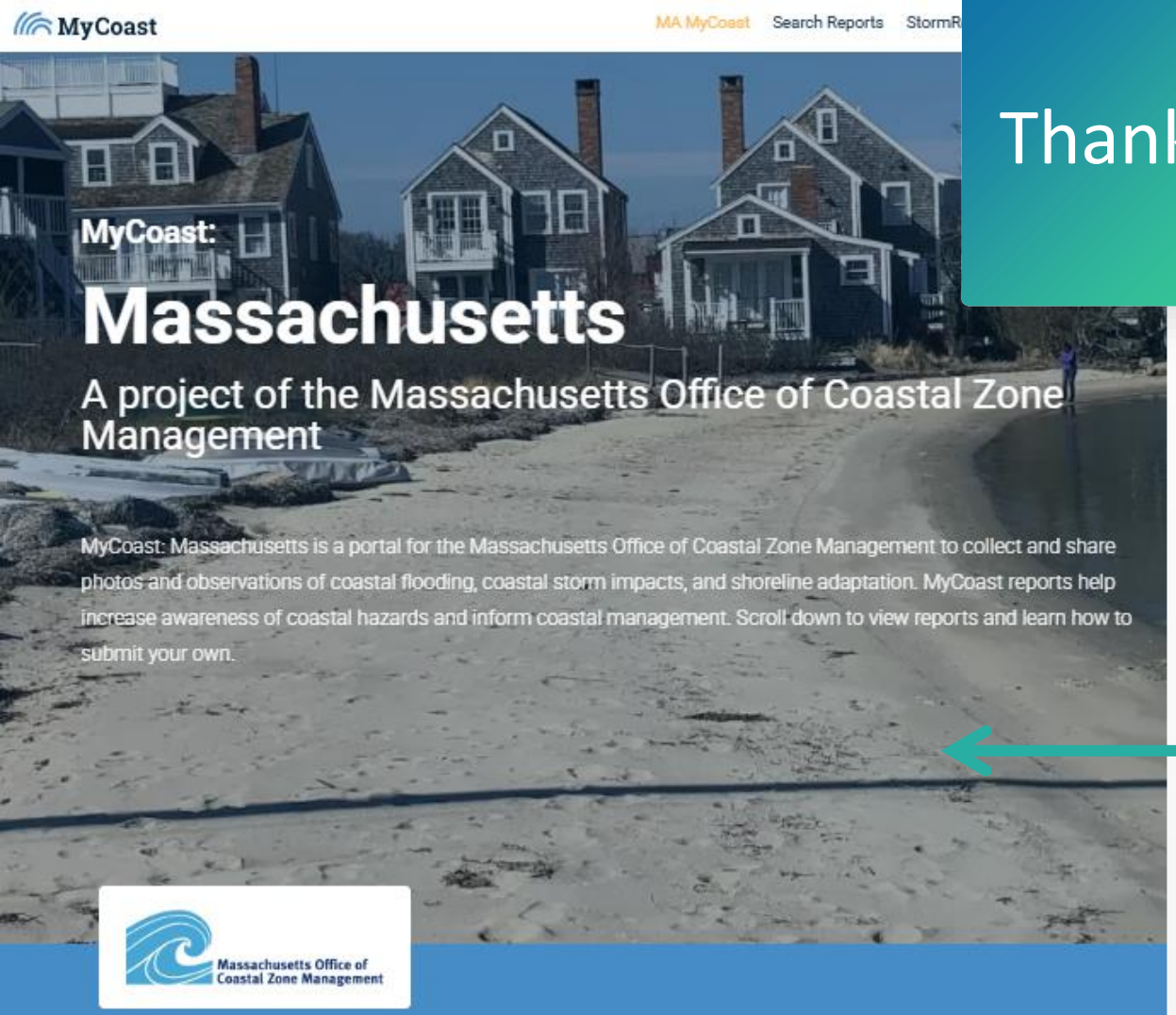


A Two-Tiered Approach

1. The Barrier BMP sets up Town processes and public guidance to improve day-to-day management for storm damage prevention and response. Provides a regulatory-compliant framework.
2. The Beach and Dune Restoration Feasibility Study lays out the costs and benefits to larger engineered projects. Town and public can then make informed decisions for future management

This two-track strategy means Westport's beaches are being protected now, while exploring more ambitious interventions down the road.

WOODS HOLE GROUP
A CLS COMPANY



Thank You

Contact Information:

Michael Burris -
burrism@westport-ma.gov

Conor Ofsthun -
cofsthun@woodsholegroup.com

Upload your photos of flooding and storm impacts to:
https://mycoast.org/ma

WOODS HOLE GROUP
A CLS COMPANY

Questions and Discussion


NO
PARKING
EMERGENCY
ACCESS
THIS SIDE
HANDICAP
PARKING ONLY
BEYOND THIS
POINT
PROCEED AT
OWN RISK


TOWN
BEACH