

Massachusetts Coastal Policy

Climate Change Adaptation and Resilience Strategies



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Why green infrastructure?

Green infrastructure enhances resilience to coastal storm effects through **protection, enhancement, or restoration of natural resource functions:**

- Attenuation of flood waters
- Sediment availability and transport
- Energy dissipation
- Natural resource adaptation
- Ecosystem continuity
- Ability of storm/flood waters to recede



Finding the Balance

“CZM's mission is to balance the impacts of human activity with the protection of coastal and marine resources.”

- Today, more than half of all Americans live within 50 miles of the coast
- In Massachusetts, that number is closer to 85 percent
- Residences, businesses, industry, public access, and recreational interests all compete for use of shoreline and nearshore resources;
- Without careful forethought, these uses— and where we put them and how we protect them--can have significant and lasting negative impacts on our natural resources;
- 27% of the Massachusetts coastline surveyed has already been armored with seawalls, bulkheads, and revetments



Massachusetts Coastal Resources



- Land under ocean
- Coastal beaches
- Coastal dunes
- Barrier beaches
- Coastal banks
- Rocky Intertidal shores
- Salt marshes
- Land under salt ponds
- Land containing shellfish
- Banks of/land under fish runs

Function **together** as a **coastal system**

MA Coastal Policy Goal: Protection, Enhancement or Restoration of Natural Coastal Systems

Massachusetts coastal policy and law protects those natural resources that provide natural resilience to climate change impacts by providing storm damage protection and flood control:

- Land under ocean
- coastal beaches
- coastal dunes
- barrier beaches
- coastal banks
- rocky intertidal shores
- salt marshes



MA Coastal Policy Goal:

Protection, Enhancement or Restoration of Natural Coastal Systems

Other key functions of coastal resource areas that are protected by MA policy and law include:

- Protection of marine fisheries/land containing shellfish;
- Protection of wildlife habitat;
- Prevention of pollution; and
- Ground water supply



Any project proposed in MA, including Green Infrastructure projects designed to address climate change impacts, must meet strict performance standards to assure that these existing functions of coastal resource areas are not adversely impacted.

Relevant MA Coastal Policies

(Enforceable)

Coastal Hazards policies 1-3 (Summary)

1. *Preserve, protect, restore, and enhance the beneficial functions of storm damage prevention and flood control provided by natural coastal landforms, such as dunes, beaches, barrier beaches, coastal banks, land subject to coastal storm flowage, salt marshes, and land under the ocean.*
2. Ensure that construction in water bodies and contiguous land areas *will minimize interference with water circulation and sediment transport*. Flood or erosion control projects must demonstrate *no significant adverse effects* on the project site or adjacent or downcoast areas.
3. Ensure that state and federally funded public works projects proposed for location within the coastal zone will:
 - Not exacerbate existing hazards or damage natural buffers or other natural resources.
 - Be reasonably safe from flood and erosion-related damage.
 - Not promote growth and development in hazard-prone or buffer areas, especially in velocity zones and Areas of Critical Environmental Concern.
 - Not be used on Coastal Barrier Resource Units for new or substantial reconstruction of structures in a manner inconsistent with the Coastal Barrier Resource/Improvement Acts.

Relevant MA Coastal Policies

(Enforceable)

Habitat policy 1 (summary)

Protect coastal, estuarine, and marine habitats—including salt marshes, shellfish beds, submerged aquatic vegetation, dunes, beaches, barrier beaches, banks, salt ponds, eelgrass beds, tidal flats, rocky shores, bays, sounds, and other ocean habitats—and coastal freshwater streams, ponds, and wetlands to preserve critical wildlife habitat and other important functions and services including nutrient and sediment attenuation, wave and storm damage protection, and landform movement and processes.

Advance the restoration of degraded or former habitats in coastal and marine areas.



Relevant MA Coastal Policies

(Enforceable)

Protected Areas policy 1 (summary)

Preserve, restore, and enhance coastal Areas of Critical Environmental Concern, which are complexes of natural and cultural resources of regional or statewide significance.



MA WPA Coastal Standards

Based on characteristics *critical* to resource area function

•Coastal resource areas are protected for the *specific functions* they provide in the public interest:

- Storm damage prevention
- Flood control
- Protection of wildlife habitat
- Protection of marine fisheries
- Protection of land containing shellfish
- Prevention of pollution
- Ground water supply



•Protection of each of these functions is directly tied to specifically identified *critical characteristics* of each resource area that allow them to function for these interests.

•Performance standards that must be met by all coastal projects are in place to assure that these critical characteristics are not diminished or lost.

MA WPA Coastal Standards

Characteristics *critical* to resource area function

•Land under Ocean:

- Water circulation,
- Distribution of sediment grain size,
- Water quality,
- Finfish habitat, and
- Important food for wildlife



MA WPA Coastal Standards

Characteristics *critical* to resource area function

•Coastal Beaches

- Volume (quantity of sediments) and form
- Ability to respond to wave action;
- Distribution of sediment grain size
- Water circulation
- Water quality, and
- Relief and elevation



MA WPA Coastal Standards

Characteristics *critical* to resource area function

•Coastal dunes

- The ability of the dune to erode in response to coastal beach conditions
- Dune volume
- Dune form, which must be allowed to be changed by wind and natural water flow
- Vegetative cover
- The ability of the dune to move landward or laterally
- The ability of the dune to continue serving as bird nesting habitat



MA WPA Coastal Standards

Characteristics *critical* to resource area function

•Barrier Beaches

- All beach and dune characteristics are applicable on Barrier Beaches
- Barrier beaches are comprised of (primarily) beaches and dunes
- Barrier beaches provide an important buffer to landward areas, including salt marshes, estuaries, salt ponds, freshwater marshes and ponds.
- Barrier beaches function as a whole to protect landward areas



MA WPA Coastal Standards

Characteristics *critical* to resource area function

- **Coastal Banks**

- The ability of the coastal bank to erode in response to wave action,

and/or

- the stability of the bank, i.e., the natural resistance of the bank to erosion caused by wind and rain runoff



MA WPA Coastal Standards

Characteristics *critical* to resource area function

•Rocky Intertidal Shores

- form and volume of exposed intertidal bedrock and boulders
- water circulation and water quality



MA WPA Coastal Standards

Characteristics *critical* to resource area function

•Salt Marshes

- the growth, composition and distribution of salt marsh vegetation,
- the flow and level of tidal and fresh water; and
- the presence and depth of peat



MA WPA Coastal Standards

Characteristics *critical* to resource area function

•Land under Salt Ponds

- water circulation;
- distribution of sediment grain size;
- freshwater inflow;
- productivity of plants; and
- water quality.



MA WPA Coastal Standards

Based on characteristics *critical* to resource area function

•Land Containing Shellfish

- shellfish;
- water quality;
- water circulation; and
- the natural relief, evaluation or distribution of sediment grain size of such land.



Great Marsh ACEC Designation

- Designated in 1979, the Great Marsh Area of Critical Environmental Concern (ACEC) comprises 25,500 Acres of coastal resources, extending from Gloucester to Newburyport
- Stricter requirements for protection:
 - A higher performance standard under the Wetlands Protection Act of “**no adverse effect**” to Coastal Resource Areas, with few exceptions (dredging, restoration).
 - **High priority for receipt of state open space acquisition funds granted** to municipalities, and for acquisition and management by the Department of Fish and Game (as a state wildlife area), DCR (as a state forest or park), and DAR (as an agricultural preservation restriction)

NOT ALLOWED:

- **New dredging** except for maintenance of existing channels or for enhancement of shellfish and other marine productivity.
- **Disposal of dredged material**, except in instances when the material may be used for beach nourishment, dune stabilization, or marsh creation.
- **Private structures below MHW, unless** such structures are **consistent with an ACEC resource management plan** adopted by the municipality and approved by the EEA Secretary. (Public structures are allowed with restrictions)

Impacts and limitations from armoring

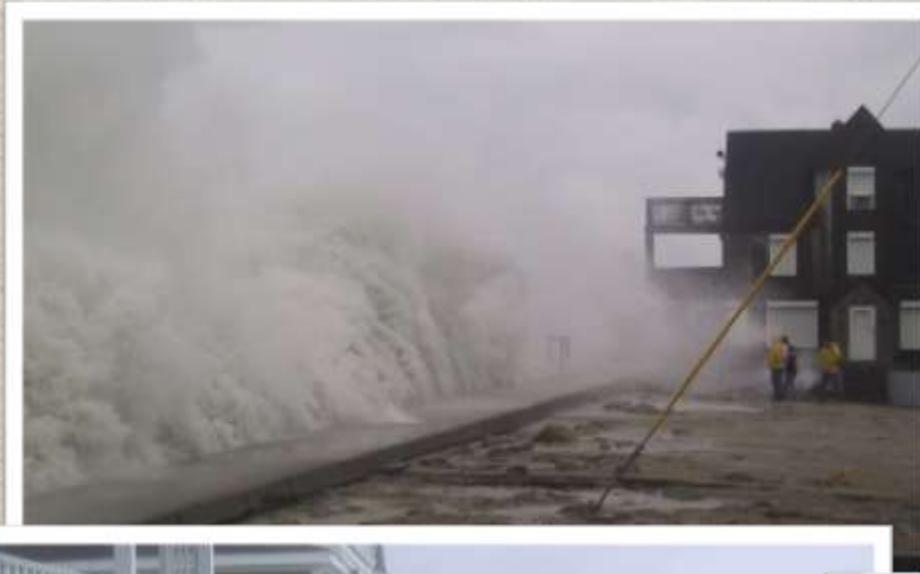


N. Scituate Beach Nourishment Design & Permitting

- 10-year design life given 50-year storm event along 4,900' of beach
- Alternative analysis included nearshore breakwater & seawall repair
- Permitting took ~ 18 months
- 392,000 CY of sand, gravel & cobble will be transported by ~ 17,800 truck trips over 6 months (if \$13+ million construction funded)
- Public easements were required



Shore Parallel Structures



- Overtopped by waves, sediment & debris
- Costly maintenance
- Monitoring & mitigation required for new structures



Benefits of Green Infrastructure

Green infrastructure enhances resilience to coastal storm effects through **protection, enhancement, or restoration of *natural* resource functions:**

- Attenuation of flood waters
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Dune Nourishment & Artificial Dune Examples



- Dune Nourishment
- Add compatible sediment & vegetation to eroded dunes

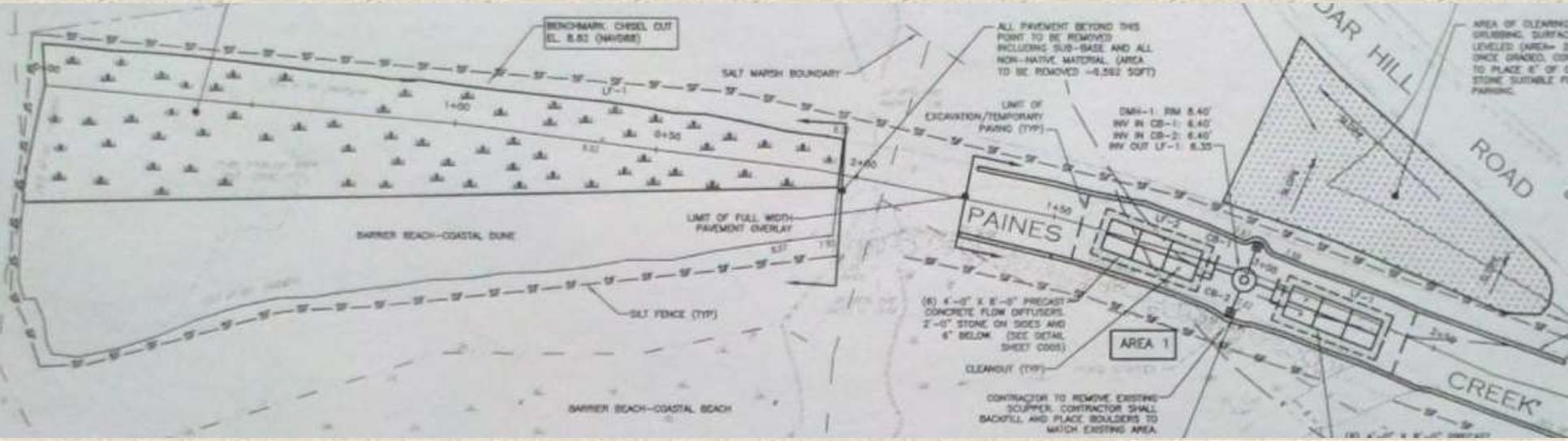


- Artificial Dune
- Construct dune seaward of an eroding coastal bank/bluff with vegetation & sand fencing

Relocation & Restoration Example – Brewster Parking Area (2011)



Brewster Parking Area Relocation & Restoration



Before



Coir Rolls & Vegetation Example

- Reflects less wave energy than rocks or sandbags

During



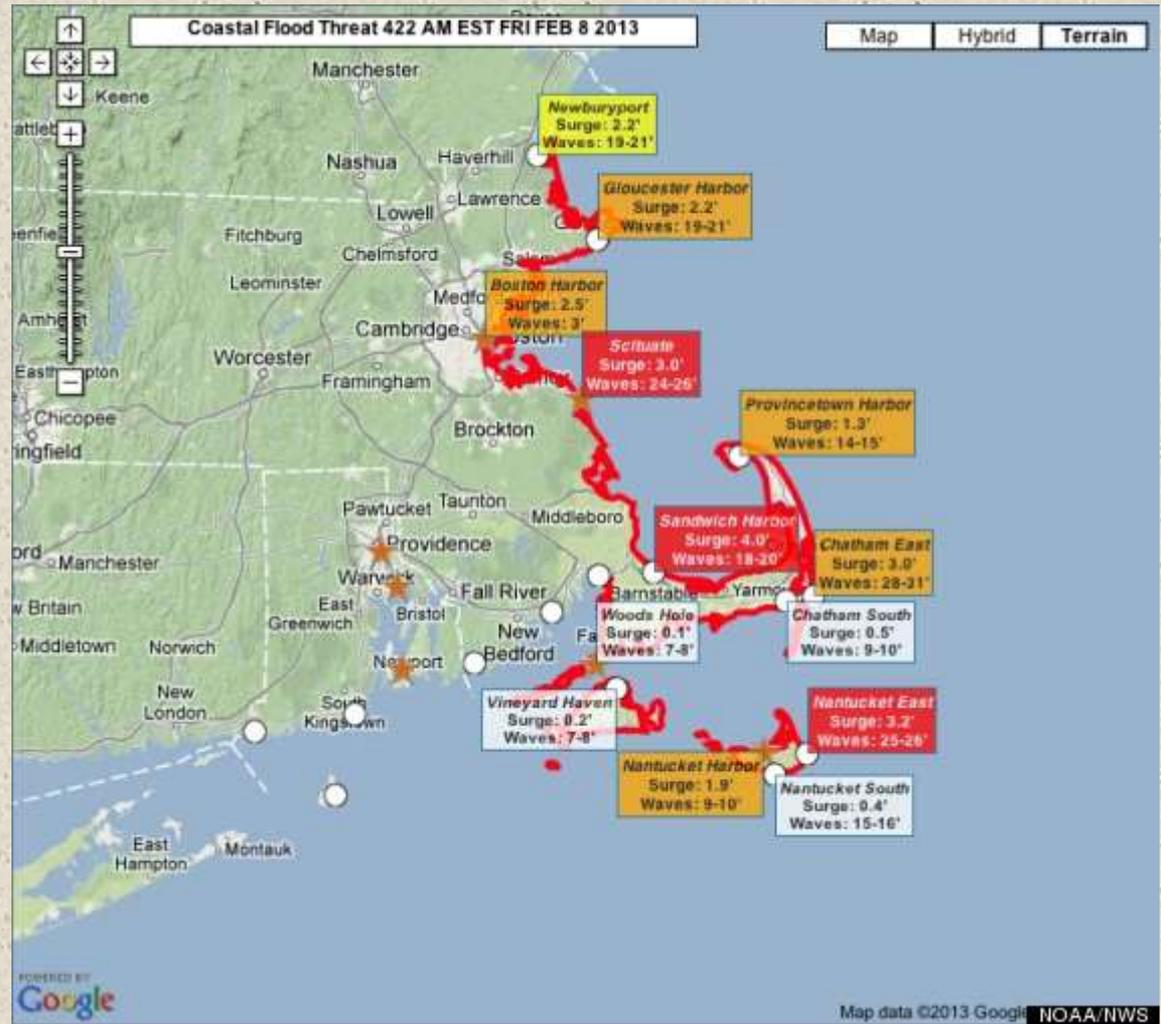
10 years later



Photos: New England
Environmental, Inc.

Non-structural Approaches to improving Resilience to Climate Change Impacts

- “First do no harm”
- Zoning options
- Building incentives
- Long term view



February 8, 2013

Goal: Coastal Wetland Protection, Enhancement, and Restoration

- Healthy coastal resources naturally enhance resilience to changing climate effects
- Massachusetts law and policy aims to protect these natural functions, and support and promote methods that enhance these benefits to improve resilience to climate change impacts



Questions?

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