Diverse Environments Diverse Solutions

Engineering Challenges Of Nature Based Solutions

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Dynamic Environments

BESCCH Engineering Objectives

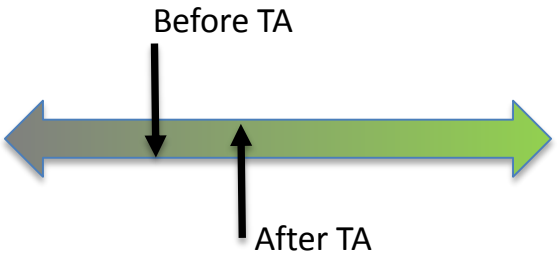
Provide technical assistance to NJ communities considering ecological approaches for addressing coastal hazards

Key question 1: What are the primary project objectives?

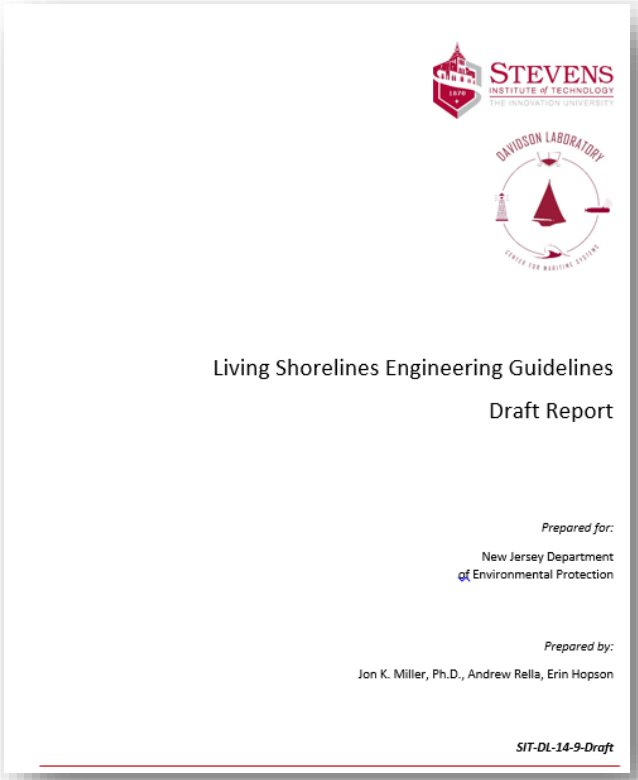
Key question 2: Can ecological solutions be a part of the solution?

- In many cases yes
- In some cases no

"Move the Needle"



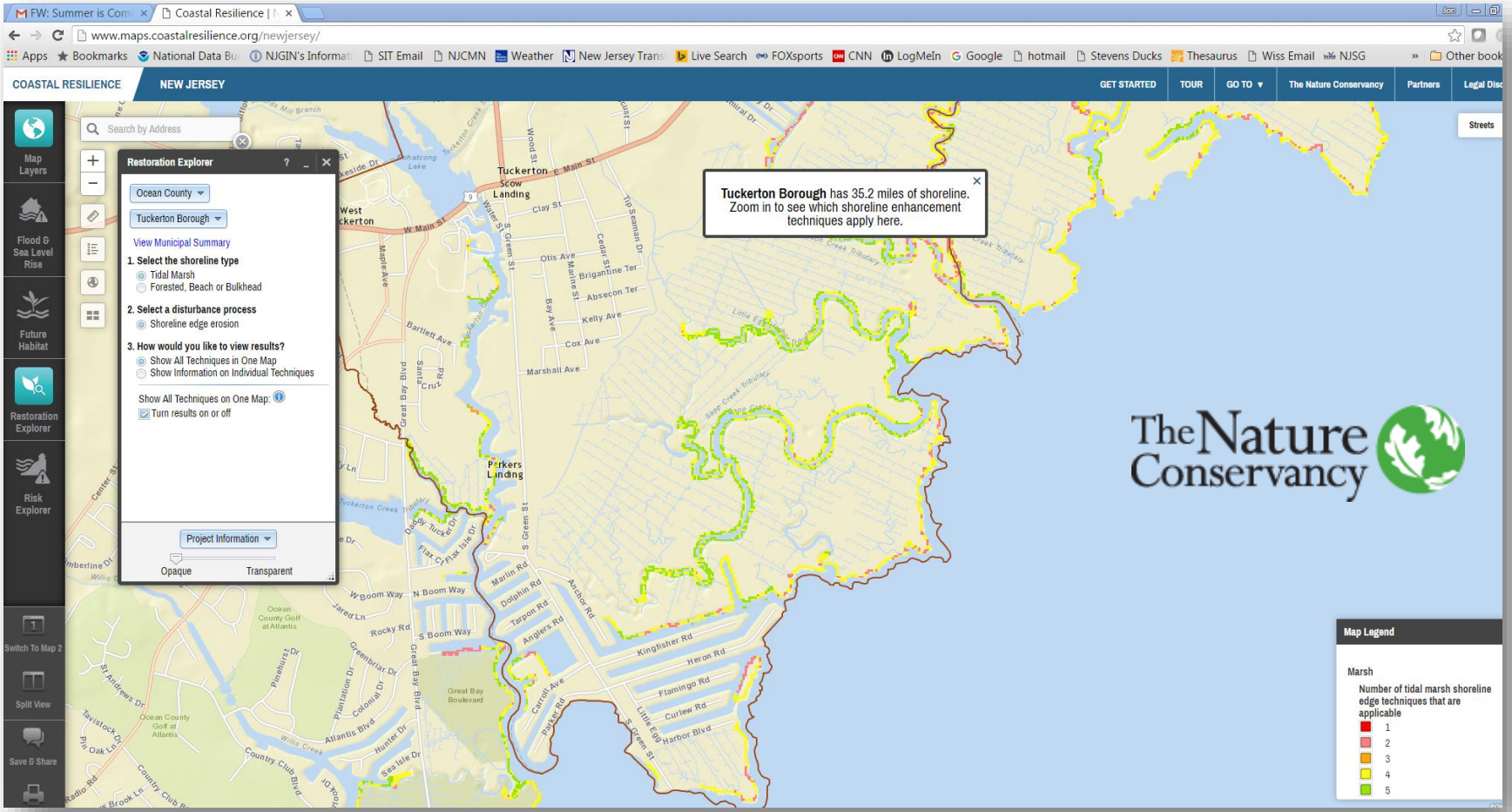
NJ Living Shorelines Engineering Design Guidelines



	Marsh Sill	Breakwater	Revetment	Living Reef	Reef Balls
System Parameters					
Erosion History	***Low-Med***	***Med-High***	***Med-High***	***Low-Med***	***Low-Med***
Sea Level Rise	Low-Mod	Low-High	***Low-High***	Low-Mod	Low-Mod
Tidal Range	***Low-Mod***	Low-High	Low-High	***Low-Mod***	Low-Mod
Hydrodynamic Parameters					
Wind Waves	***Low-Mod***	***High***	***Mod-High***	***Low-Mod***	***Low-Mod***
Wakes	***Low-Mod***	***High***	***Mod-High***	***Low-Mod***	***Low-Mod***
Currents	Low-Mod	Mod-High	Mod-High	Low-Mod	Low-Mod
Ice	***Low***	***Low-Mod***	***Low-High***	***Low***	Low-Mod
Storm Surge	Low-High	***Low-High***	***Low-High***	Low-High	Low-High
Terrestrial Parameters					
Upland Slope	Mild-Mod	Mild-Steep	***Mild-Steep***	Mild-Steep	Mild-Steep
Shoreline Slope	***Mild***	***Mild-Steep***	**Mild-Steep**	***Mod***	Mild-Steep
Nearshore Slope	***Mild***	***Mild-Mod***	Mid-Steep	***Mild-Mod***	***Mild-Mod***
Offshore Depth	Shallow-Mod	Mod-Deep	Shallow-Deep	Shallow-Mod	Shallow-Mod
Soil Bearing	Mod	***Mod-High***	***Mod-High***	Mod	***Mod-High***
Ecological Parameters					
Water Quality	Poor-Good	Poor-Good	Poor-Good	***Good***	***Poor-Good***
Soil Type	***Any***	Any	Any	Any	Any
Sunlight Exposure	***Mod-High***	Low-High	Low-High	Low-High	Low-High

http://www.nj.gov/dep/cmp/docs/living-shorelines-engineering-guidelines-final.pdf

Restoration Explorer Tool



http://www.maps.coastalresilience.org/newjersey/

Gardner's Basin, Atlantic City

Key Engineering Challenges

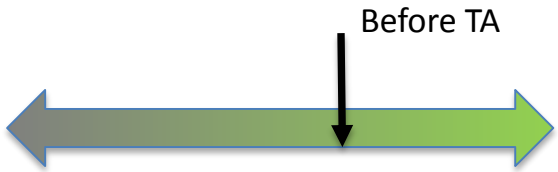
- Space constraints
- Existing outfall
- Existing site use
- Wakes

Key Ecological Considerations

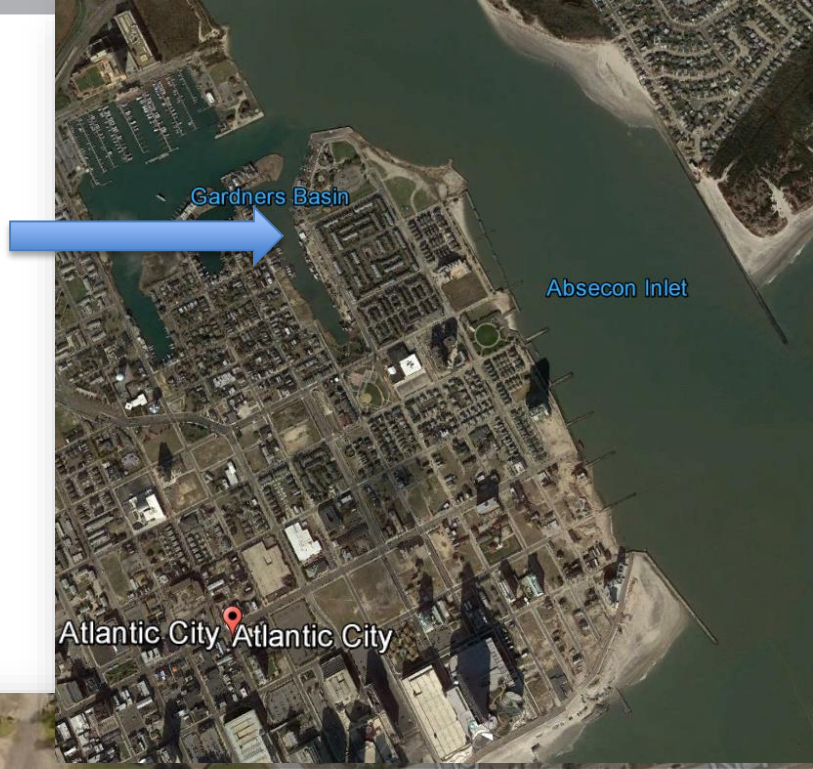
- Horseshoe crabs

Original Design

- Breakwater, wetland planting, vegetated berm



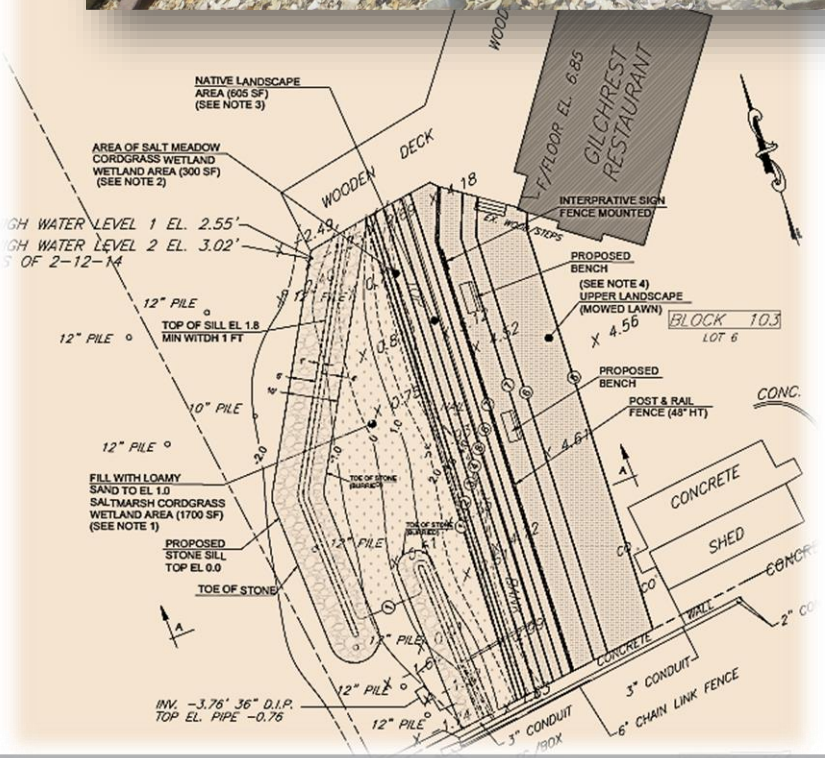
Design: Arthur Ponzio & Associates

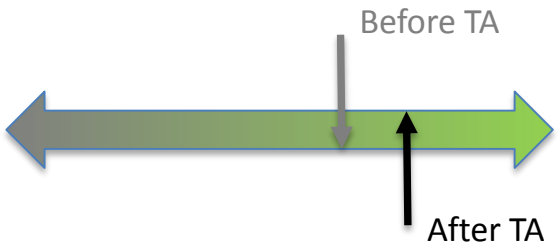


Gardner's Basin, Atlantic City

Proposed Design

- Segmented sill
- Horseshoe crab ingress/egress
- Marsh plantings
- Vegetated berm
- Native landscaping





Design: Arthur Ponzio & Associates

Upper Township

Key Engineering Challenges

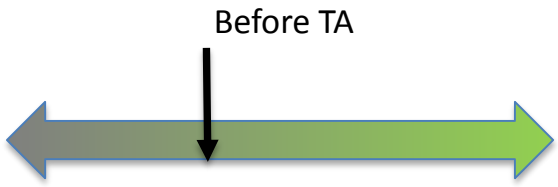
- Anticipating roadway/bulkhead elevation projects
- Space
- Adjacent bulkhead
- Adjacent drainage ditch

Key Ecological Considerations

- Restore eroding marsh edge
- Reestablish vegetation

Original Design

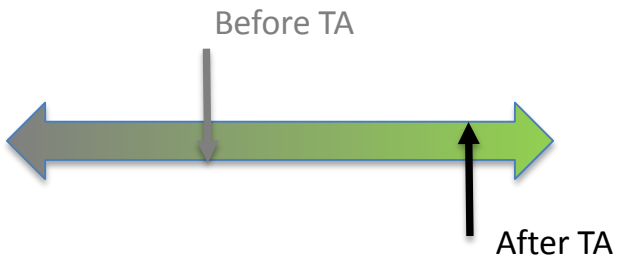
- Extend boat ramp and bulkhead

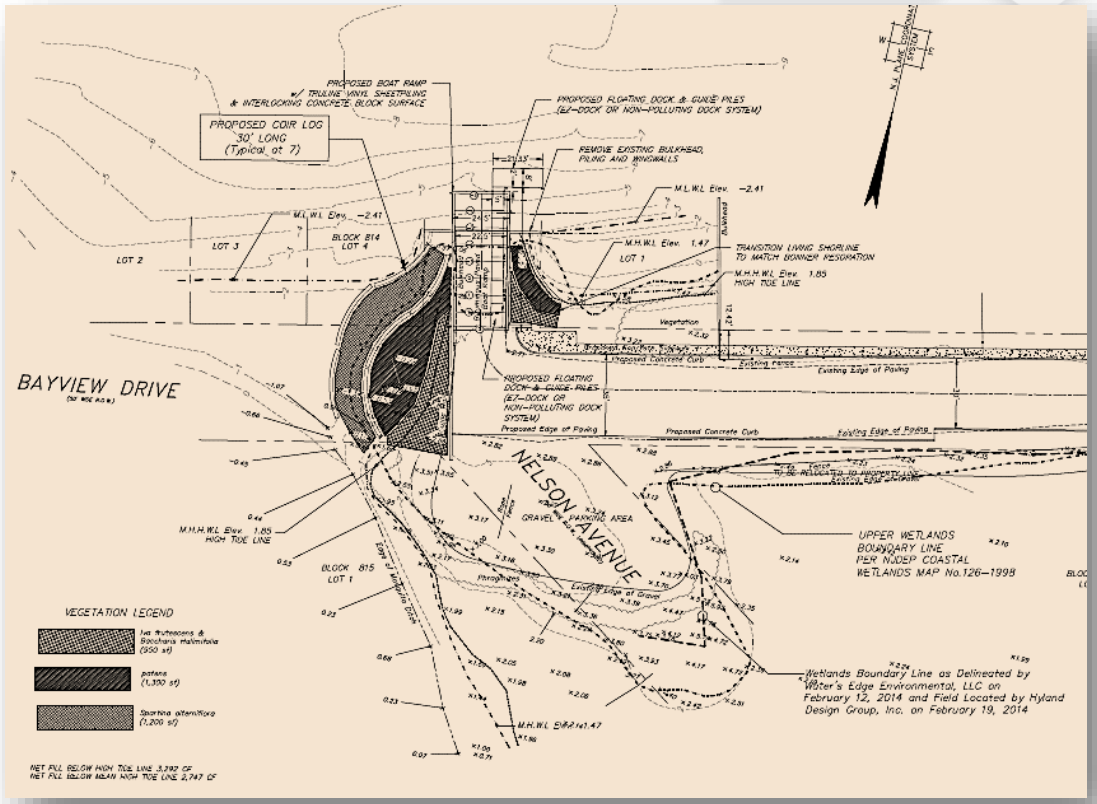


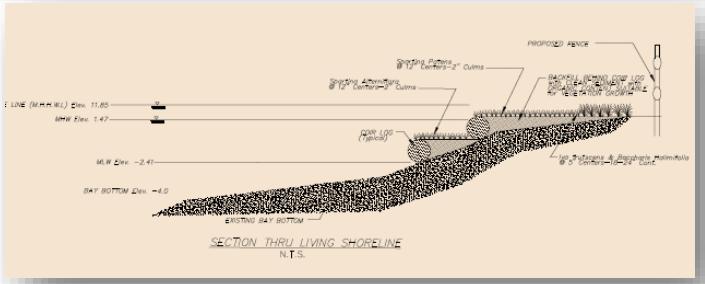
Upper Township

Proposed Design

- Extended boat ramp
- Terraced edge with coir log toe
- Native vegetation







Design: Upper Township – Paul Dietrich

Gandy's Beach, Downe Township

Key Engineering Challenges

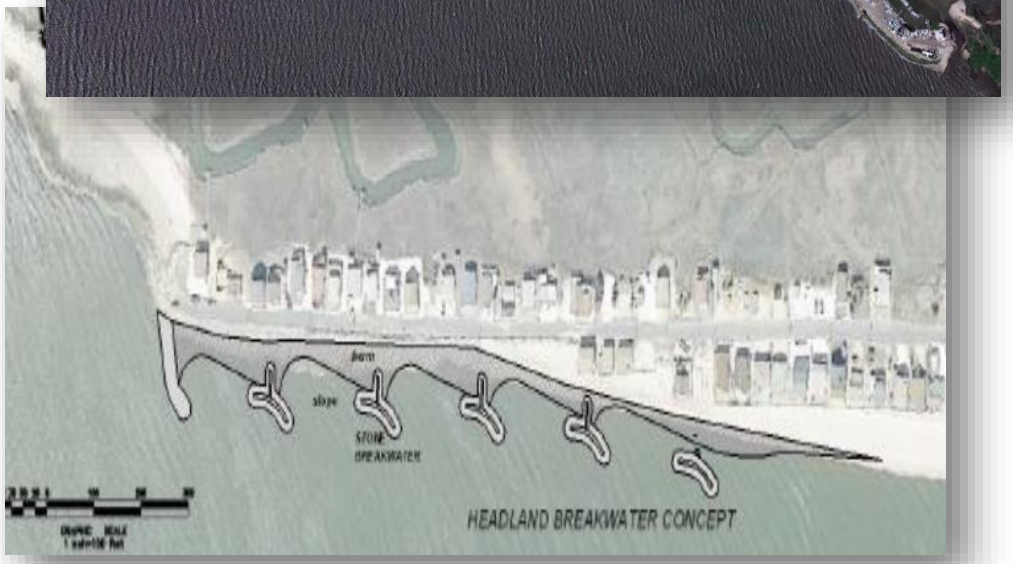
- Coordination with ongoing projects
- Coordination with USACE nourishment project
- Back side flooding

Key Ecological Considerations

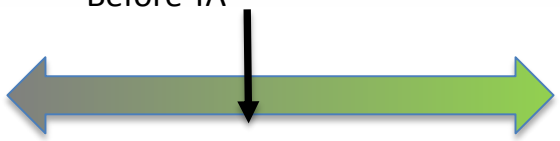
- Horseshoe crabs
- Eroding wetlands

Original Design

- Headland breakwaters



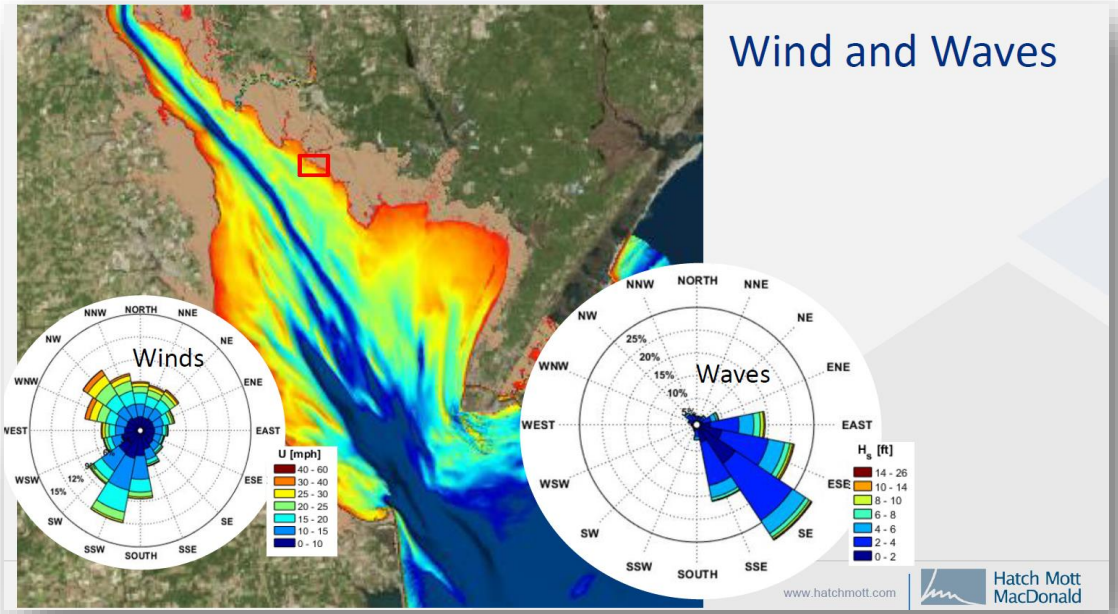
Before TA

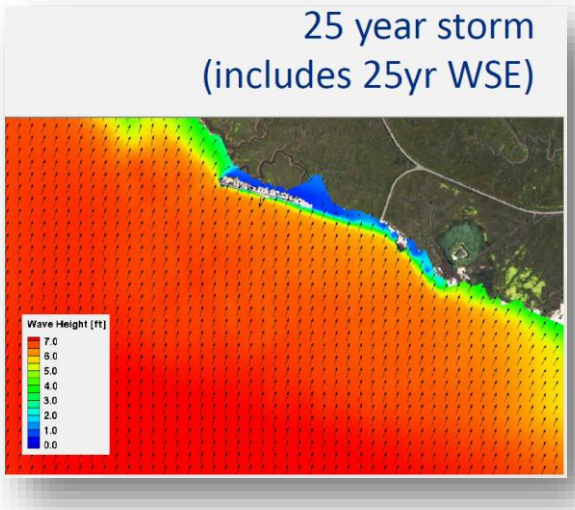


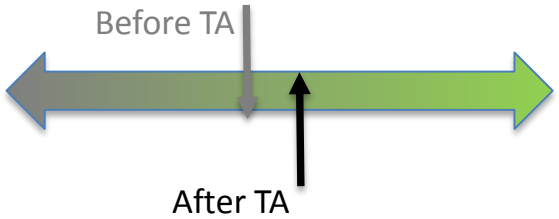
Gandy's Beach, Downe Township

Proposed Design

- Nourishment and structure(s)
- Final design/layout not complete
- Coordination with the USACE and others is encouraging







Modeling: Mott MacDonald

West Wildwood

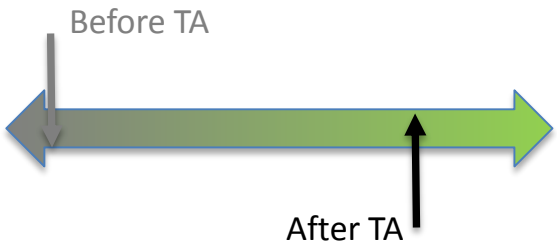
Not one of the BESCCH communities

TA provided through NOAA CREST grant to TNC

Original plan – bulkhead peninsula

Conceptual design – segmented sill

Final design – CH2M

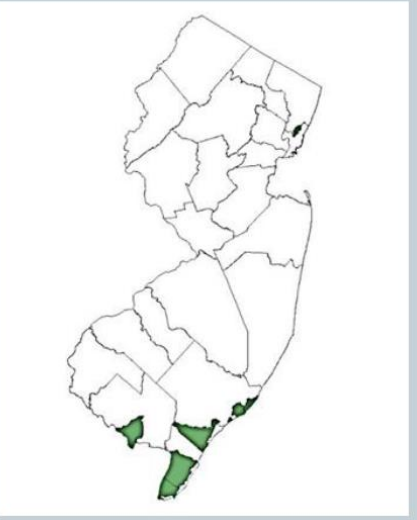


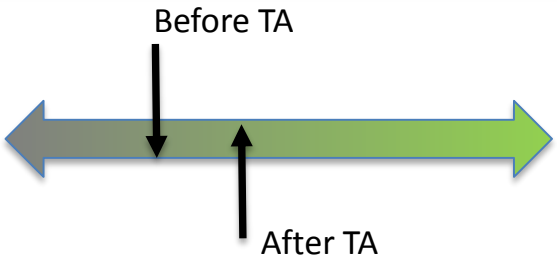
Summary

- Over three dozen communities receiving assistance
  - 20 Tier 1 communities receiving technical assistance in the form of evaluation of "problem" areas
  - 15 Tier 2 Blue Acres communities being evaluated for the possibility of BESCCH
  - 10 Tier 3 communities receiving design/permitting assistance
    - 3 sill/breakwater, 4 vegetated berms, 2 beneficial reuse, 1 structure removal, 2 hydrology studies

Local Partners

- Atlantic City
- Brigantine
- Downe Township
- Margate
- Somers Point
- Secaucus
- Spring Lake
- Lower Township
- Upper Township
- Cape May County





"We're moving the needle"