

# Stratford Point living shoreline: Benefits, Limits and Lessons Learned with Nature-based Installations

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# List of Specific Goals

## 1) Erosion Control & Sediment Deposition

- Wave attenuation = Artificial Shellfish Reef--→  
Natural Shellfish Reef
- Sediment deposition & retention = Marsh/Grassland,  
Coastal Shrub/Forest Restoration

## 2) Habitat Restoration & Ecosystem Services

- Shellfish Reef, Low Marsh, High Marsh,  
Grasslands/Dunes

# History of the Site

## Remington Arms

- Gun Club 1920's-1986
- Lead deposition

- Wetland filled
- Suburban development
- Remediation/Restoration
  - >320 tons removed
- Currently, land has a Conservation Easement, held by the State



# Make a plan for restoration & management



# Landscape planning: Unite Fragments



Wheeler Marsh,  
CTDEEP

The larger the habitat the higher the biodiversity.

Stewart B. McKinney NWR  
Great Meadows Marsh

Long Beach

Millford Point

Short Beach Park

Stratford Point

# Problems:

1. Highly disturbed
2. Flat
3. Barren
4. Eroding
5. No soil structure



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NOV 3 2000

# Pilot Study of 64 reef balls installed May 2014 ~150 feet



**2015, after planting and 6 inches of sediments accumulated.**

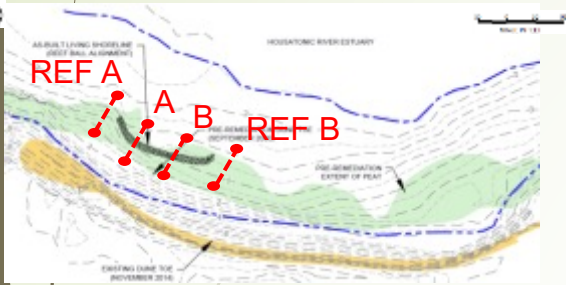
**Lessons learned so far: Wave Attenuation comes first!**



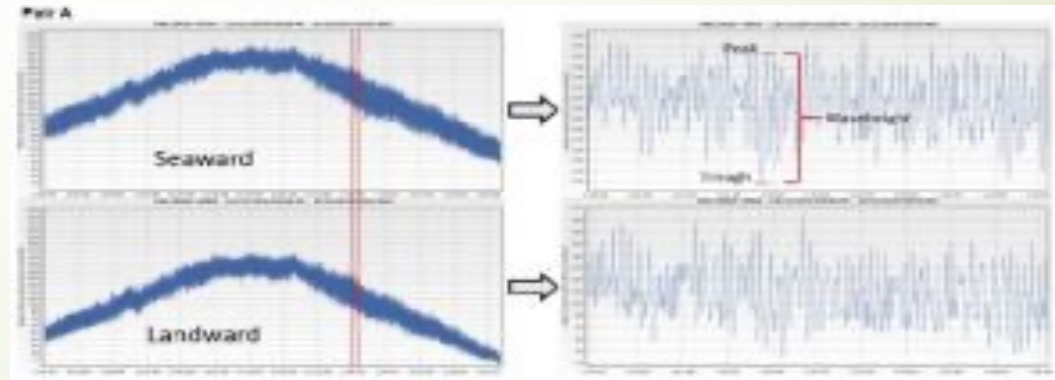
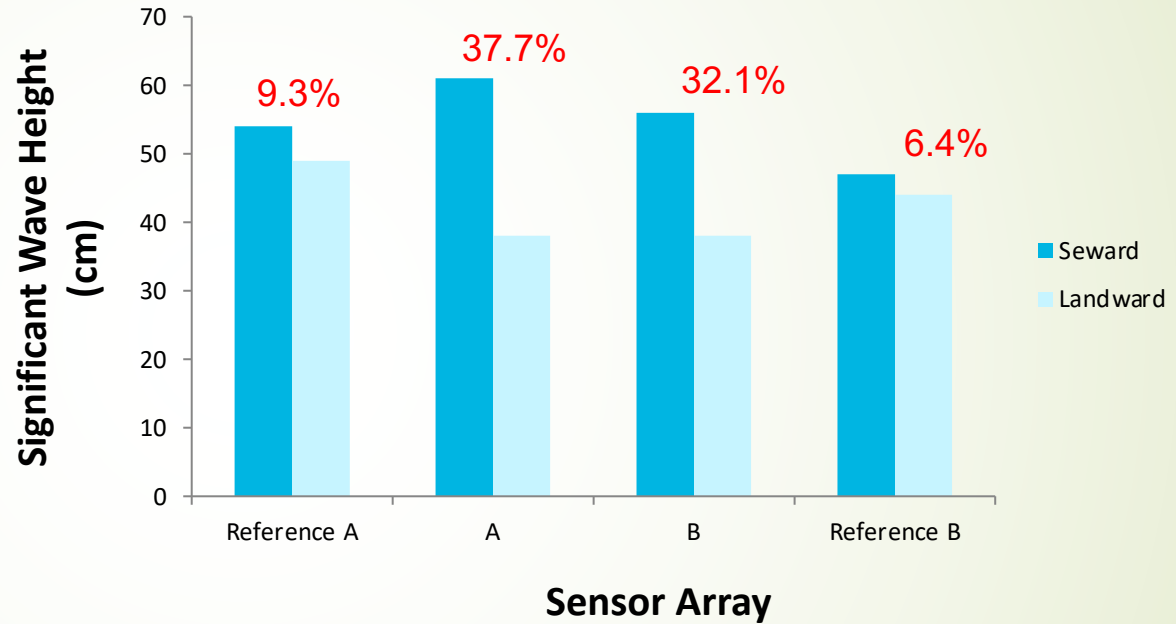
**Plant grasses early- In April for maximum plant growth**



# Wave Attenuation



## Reduction in Significant Wave Height

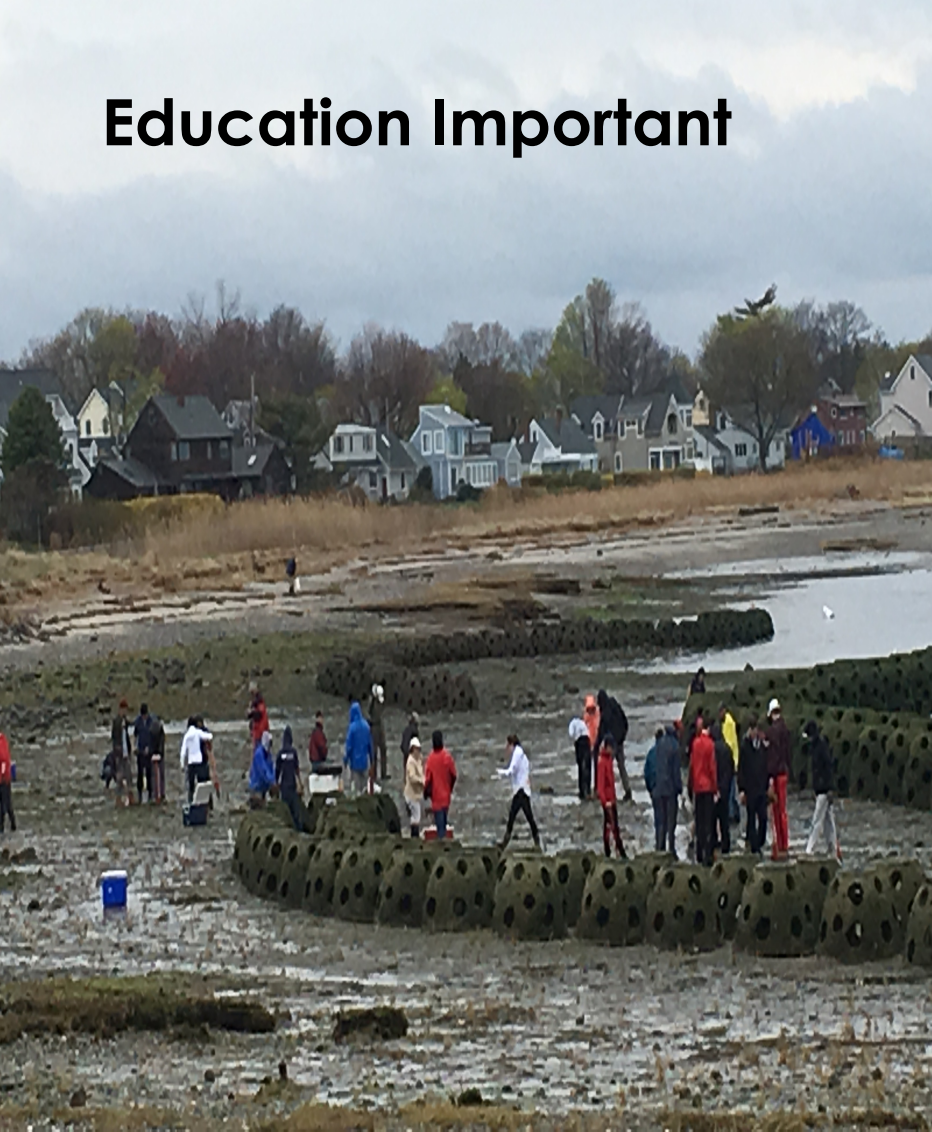


**The larger the area of restoration, the higher the biodiversity and greater ecosystem services will be.**



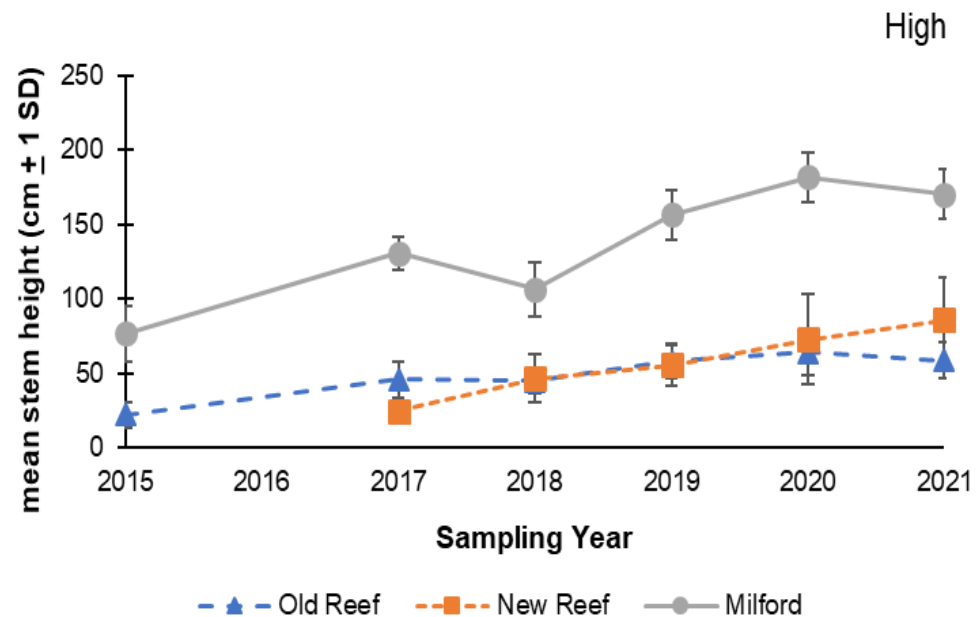
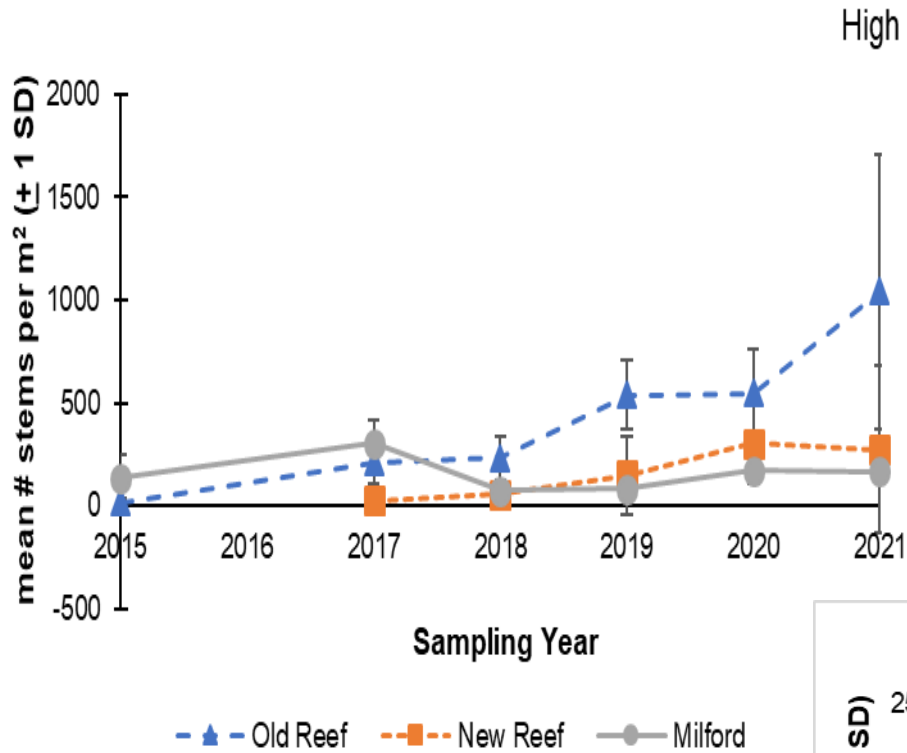
**November 2016 Reef expansion ~300m  
327 reef balls deployed**

# Education Important



~200 volunteers planting *Spartina* on Earth Day 2017.

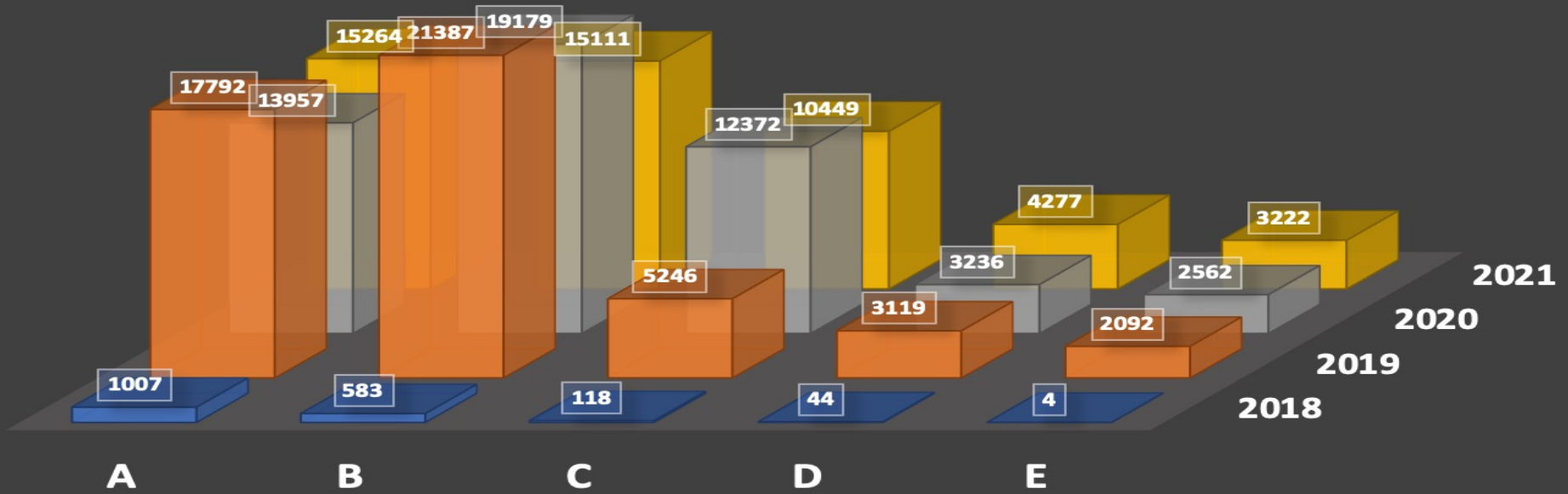
# Spartina growth measures over time.





# Oyster Counts over time

■ 2018 ■ 2019 ■ 2020 ■ 2021

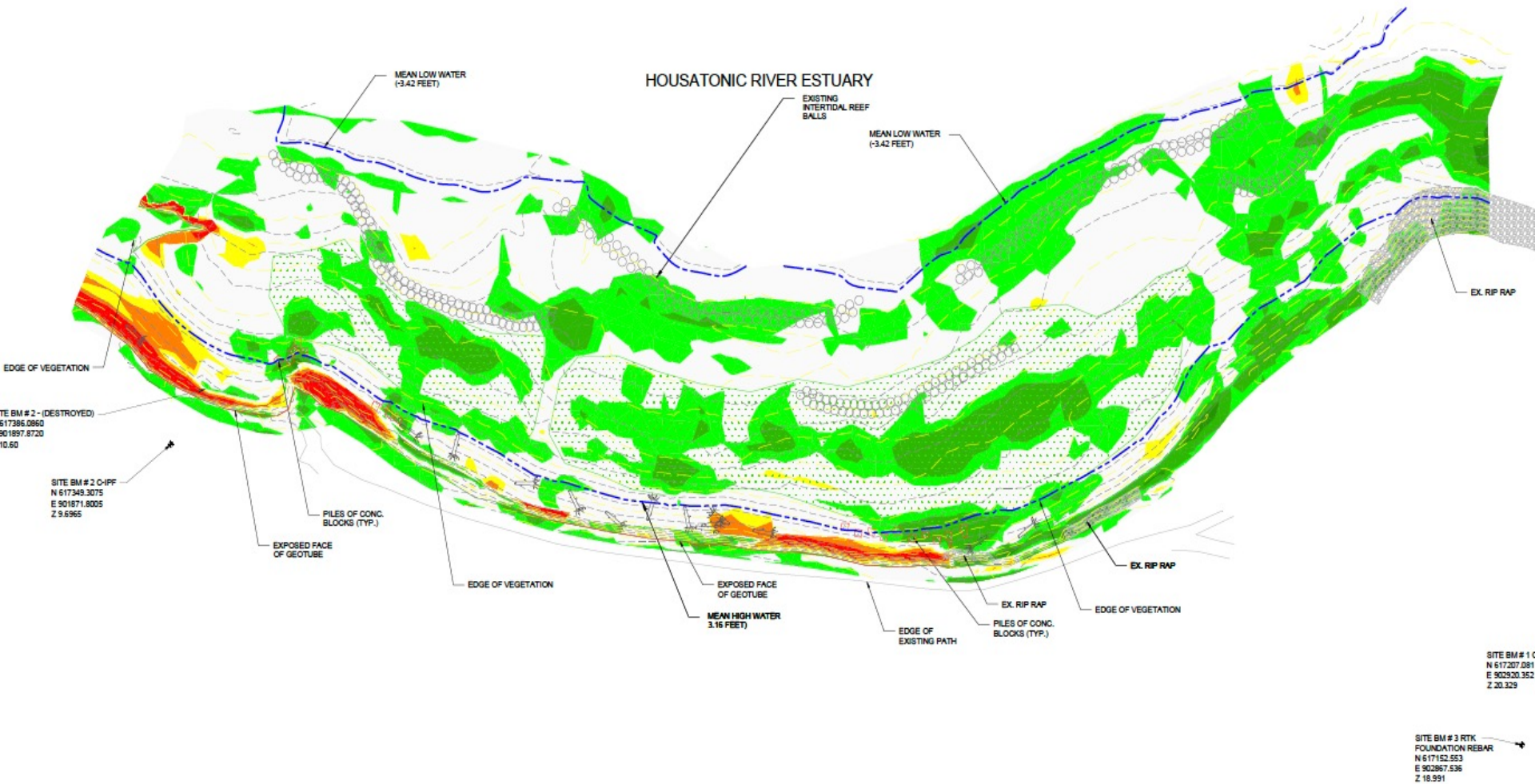




## What about climate change?

- If sediments continue to accumulate marsh growth seaward; with SLR, marsh growth landward.
- Oyster survival/expansion with SLR

# Real Time Kinematic (RTK) survey system (AECOM)



**LEGEND:**

- MINOR CONTOUR INTERVAL (0.5 FOOT) AUGUST 2022
- MAJOR CONTOUR INTERVAL (1.0 FOOT) AUGUST 2022
- GEOTUBES / ROPE TUBES
- MEAN HIGH WATER (MHW)
- MEAN LOW WATER (MLW)
- RIP-RAP

**Cut/Fill Summary**

Date	Cut Factor	Fill Factor	Sd Area	Cut	Fill	Net
2021 to 2022 Comparison	1.000	1.000	212303.98 Sq. Ft.	405.87 Cu. Yd.	3808.29 Cu. Yd.	1407.42 Cu. Yd. <P111>
2017 to 2022 Comparison	1.000	1.000	154790.90 Sq. Ft.	1093.90 Cu. Yd.	1064.32 Cu. Yd.	17.38 Cu. Yd. <Cur>

Point #	Northing	Easting	Elevation	Description
1	617207.081	902920.352	20.329	C-IPP Site BM
2	617349.308	901871.800	9.696	C-IPP Site BM
3	617152.553	902867.536	18.991	RTK Foundation Rebar (North)

NUMBER	MINIMUM RANGE	MAXIMUM RANGE	COLOR
1	-5.00	-1.00	
2	-1.00	-0.50	
3	-0.50	-0.25	
4	-0.25	0.25	
5	0.25	0.50	
6	0.50	1.00	





## SUCCESS! SHELLFISH REEF & SALTMARSH

- 30-40% Wave Abatement (pilot reef)
- *Spartina alterniflora* doubling in size over one year and average density is greater than reference marsh on Milford Point.
- >30cm Sediment Deposited Behind The Reef In 2 Years in patches
- Lead Is No Longer Exposed Behind The Pilot Reef
- Rockweed, Oysters and blue mussel surviving On The Reef

# To Date:

- ➔ 372 Reef Balls placed
- ➔ ~20,000 Marsh Grass (*Spartina*) plugs
- ➔ 35 species of trees and shrubs
- ➔ 800 individual woody plants
- ➔ 50 species of native wildflowers/grasses
- ➔ 1000's of seeds



**Geotextiles have no role to play in Nature-based shoreline restoration; not biodegradable, breaks down when exposed to UV-light into strands and micro-plastics, smothers and entangles organisms.**



NOT A LIVING SHORELINE



**Before Restoration =  
flat & barren & vulnerable**



**After = Habitat Structure =  
Biodiversity = Resiliency**



## Coauthors

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## **THANK YOU**

## Undergraduates:

- **Adrian Nelson**  
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- **Sam Koeck**  
(UDEL) CT & DE Sea Grant Intern
- **Katherine Quinn**  
(SHU) Funding from NOAA/UConn
- **Clare Gagliano**  
(SHU) USACE/Audubon ILF
- **Jeff Young**  
(SHU) USACE/Audubon ILF



Stratford's living shoreline has become a national showcase for how to use nature-based solutions to problems of sea level rise, erosion and repair ecosystem function and services (See examples below):

- Long Island Sound Study: <https://longislandsoundstudy.net/2019/11/creating-living-shorelines/>, <https://longislandsoundstudy.net/2020/09/how-living-shorelines-make-the-coast-resilient/>
- Mattei, J. 2020. Environmental Protection Agency: Soak Up the Rain New England Webinar Series: *Living Shorelines: Slowing Coastal Erosion and Saving Connecticut Habitats*. April 9, 2020 10:30AM-12:00PM. Attended by 525 people (a record number of people for Environmental Protection Agency webinars), 200 from New England states and the rest from 37 other states and Canada. <https://www.epa.gov/soakuptherain/soak-rain-new-england-webinar-archive#20200409>
- CT Dept. of Energy and Environmental Protection: <https://ctdeep.maps.arcgis.com/apps/MapJournal/index.html?appid=4f6604af81934bc9126cb31597d0f5f>
- National Fish and Wildlife Foundation, Long Island Sound Futures Fund: <https://ctdeep.maps.arcgis.com/apps/MapJournal/index.html?appid=4f6604af81934bc9126cb31597d0f5f> See page 16 of: <https://www.nfwf.org/sites/default/files/2020-12/long-island-sound-futures-fund-15-year-report.pdf>
- American Shore & Beach Preservation Association, Best Restored Shores of 2020: <https://asbpa.org/2020/09/14/best-restored-shore-award-spotlights-unique-coastal-projects/#:~:text=The%202020%20winners%20are%3A,Restoration%20of%20Cooks%20Beach%2C%20NJ>
- Audubon Connecticut: <https://ct.audubon.org/news/connecticuts-first-living-shoreline-thriving-stratford-point>, <https://ct.audubon.org/news/stratford-point-receives-best-restored-shore-award>
- Connecticut Institute for Resilience & Climate Adaptation (CIRCA) .<https://circa.uconn.edu/stratford-point-living-shoreline/>
- Coming soon: The Nature Conservancy web site featuring living shorelines from New England including Stratford Point.