

## Introduction

Stratford Point (Fig. 1) was home to Remington Arms Gun Club, a trap and skeet shooting range from 1926 to 1986. Years of shooting resulted in lead contamination in the intertidal zone from the accumulation of lead shot. The 12 acres of intertidal habitat on site historically supported a tidal fringe marsh which was degraded by remediation activities that included the removal and separation of shot from intertidal vegetation and sediments. Prior efforts to restore the intertidal marsh failed due to storm events.

To restore the fringe marsh habitat, and allow for protection from storm events:

- A 150 ft. artificial reef structure consisting of 64 Reef Balls® was installed in May 2014 (Fig. 2) and 273 more were placed in November 2016.
- Over 3,500 *Spartina alterniflora* plants were planted directly behind and to the southwest of the reef in June 2015 (Figure 4 & 5).
- Deployment of pressure sensors prior to storms in winter 2014 to test any decrease in wave intensity as waves pass through Reef Balls (Figure 3).



Figure 1. Location of Stratford Point Living Shoreline site.

## What is a Living Shoreline?

- A nature-based solution to coastal erosion.
- Utilizes *gray and green engineering* that includes wetland plants and vegetation, shells or cultch, sand, along with a limited use of rocks, stone and cement reef structure.

### Living Shoreline vs. Hard Engineering

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| <ul style="list-style-type: none"> <li>➤ <b>Stabilize shoreline:</b> <ul style="list-style-type: none"> <li>➤ Dampen wave action</li> <li>➤ Trap sediments</li> </ul> </li> <li>➤ Cap heavy metals</li> <li>➤ Provide food, refuge, and nursery area for fish and shellfish</li> <li>➤ Remove suspended sediments and phytoplankton</li> <li>➤ Sequester excess nutrients = clean water</li> </ul> | vs. | <ul style="list-style-type: none"> <li>(jetties, seawalls, groins etc.)</li> <li>➤ <b>Cuts Connectivity of the land to the sea:</b> <ul style="list-style-type: none"> <li>➤ Provides no habitat value for fish and wildlife.</li> <li>➤ Increase in erosion in front of barrier, decreases beach area,</li> <li>➤ Storm surges hit the structures and reflect with greater force and erodes behind the wall.</li> </ul> </li> </ul> |
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Figure 2. Rockweed colonizing a reefball



Figure 3. Deployment of automated water sampler for sediment detection and pressure sensors during a storm



Figure 4. Newly planted marsh grass, June 2014.



Figure 5. Growth of marsh, September 2016.

## Results from 2 Year Monitoring Program

Data from continual monitoring indicate:

- Aquatic invertebrate, macroalgae and fish are living in or on the reefballs.
- *Spartina alterniflora* has successfully taken root shoreward of the reef.
- Sediment is accumulating landward and seaward of the reef allowing the salt marsh grasses to triple in size since planting.
- A 30% decrease in wave intensity has been observed during storm events which has halted erosion both behind and in front of the reef.
- Decreasing wave height linked to increasing amount of sediment deposition.

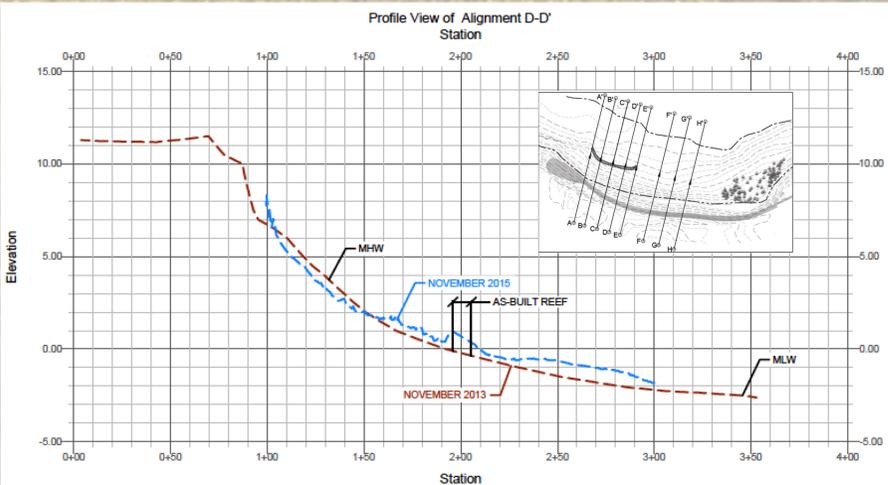


Figure 6. Beach profile through the reef.

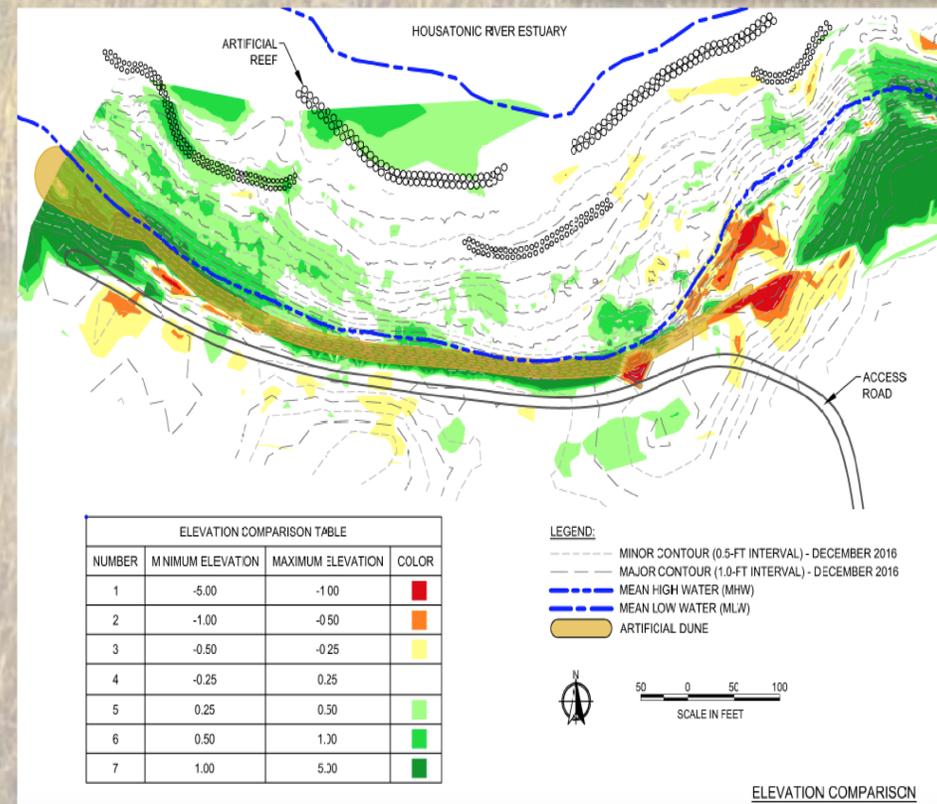


Figure 7. Sediment erosion and accretion & reef expansion, November 2016

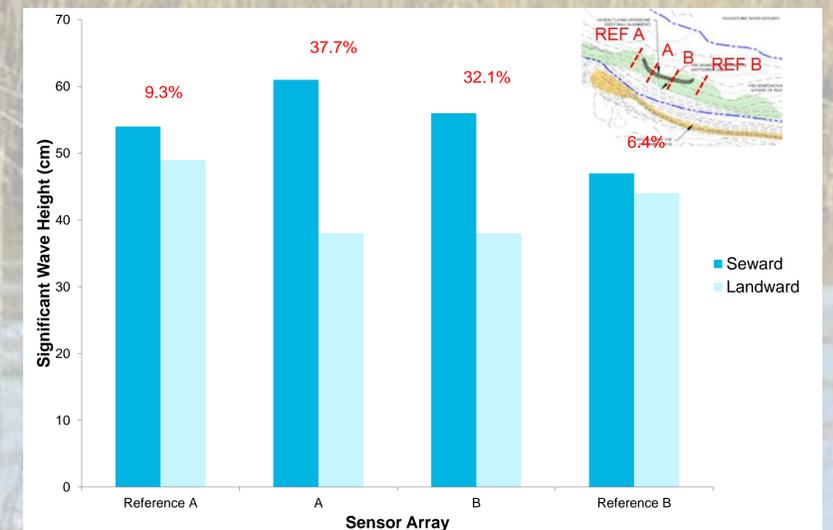


Figure 8. Reduction in significant wave height.

## Conclusion & Future Directions

- Pilot study was successful in preventing erosion, allowing sediment deposition, and salt marsh restoration.
- Increased horseshoe crab spawning and nursery habitat.
- Next step is to plant the expanded reef, April 21<sup>st</sup> & 22<sup>nd</sup>
- [www.sacredheart/livingshorelines](http://www.sacredheart/livingshorelines)