

# Field Validation of GIS Mapped Hardened Shoreline Structures in the Peconic Estuary

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# Background

- Increases in the frequency and severity of storms, rising sea levels, and coastal flooding
- Coastal protection is a growing concern, and communities bordering the Peconic Estuary have seen an upward trend in shoreline hardening
- PEP has been focusing efforts on
  - Quantifying the extent of shoreline hardening within the Peconic Estuary
  - Assessing the impacts of these structures on intertidal wildlife, natural processes, and coastal community resilience

# Hardened Shoreline Impacts

- **Loss of intertidal and marsh habitats**

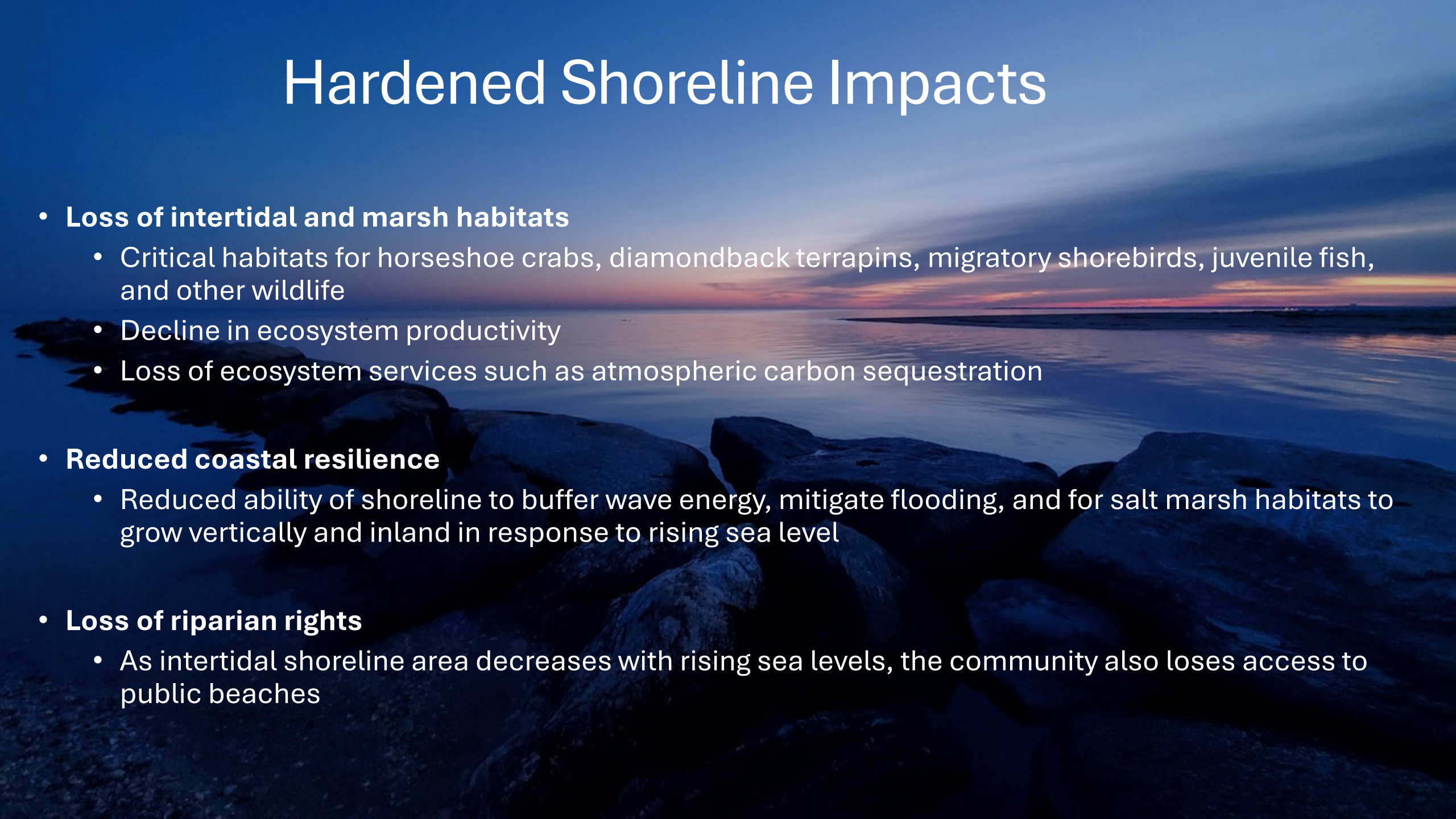
- Critical habitats for horseshoe crabs, diamondback terrapins, migratory shorebirds, juvenile fish, and other wildlife
- Decline in ecosystem productivity
- Loss of ecosystem services such as atmospheric carbon sequestration

- **Reduced coastal resilience**

- Reduced ability of shoreline to buffer wave energy, mitigate flooding, and for salt marsh habitats to grow vertically and inland in response to rising sea level

- **Loss of riparian rights**

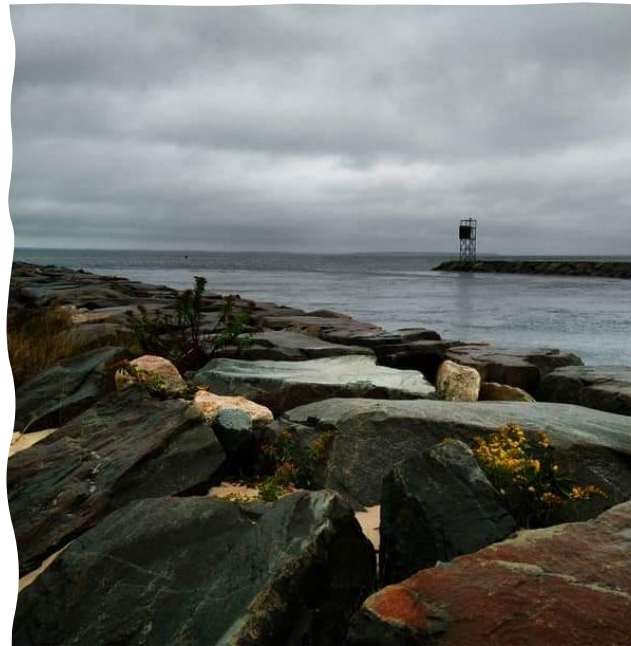
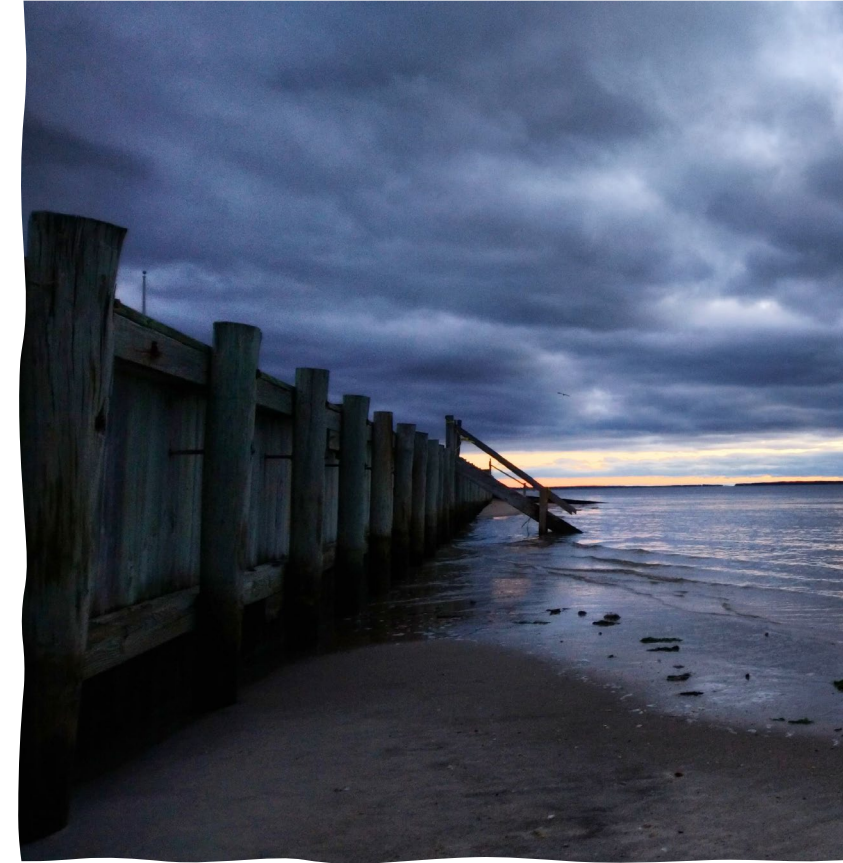
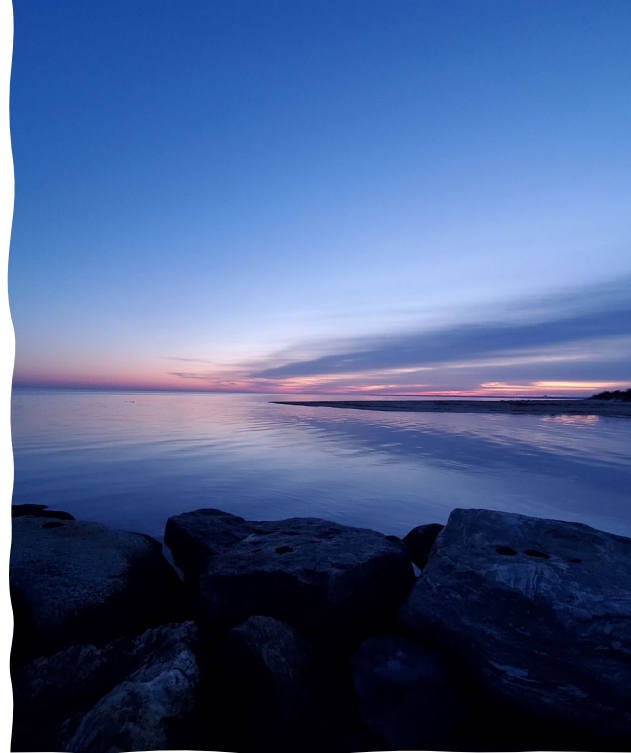
- As intertidal shoreline area decreases with rising sea levels, the community also loses access to public beaches





# PEP Shoreline Aerial Inventory

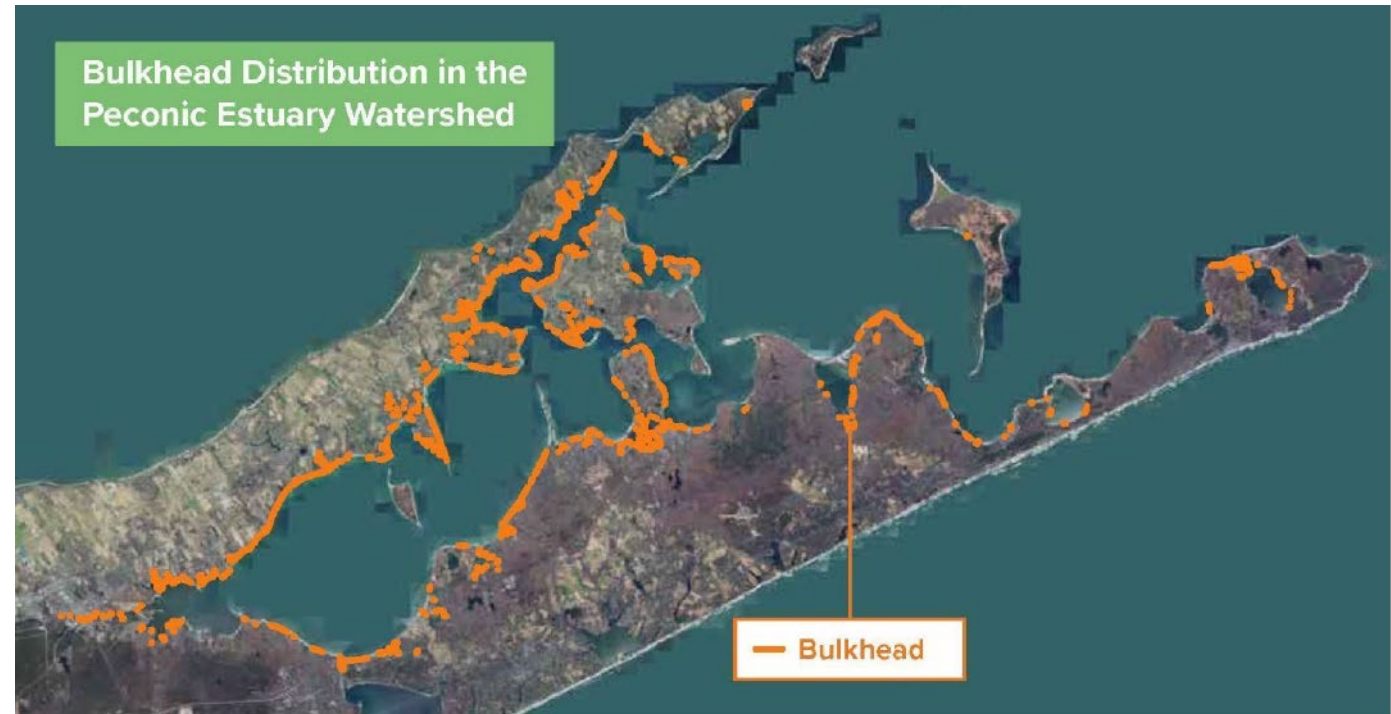
- In 2019, PEP completed a GIS-based inventory to document the extent of hardened shoreline coverage along the Peconic Estuary
- Goals of this inventory were to:
  - Assess the number of bulkheads, revetments, piers, groins, jetties, and docks using 2016 Orthoimagery from the NYS GIS Clearinghouse
  - Create a tool for local governments to inform decision-making regarding land preservation
  - Form the basis of the PEP Shoreline Hardening Strategy and future projects



# PEP Shoreline Inventory Results

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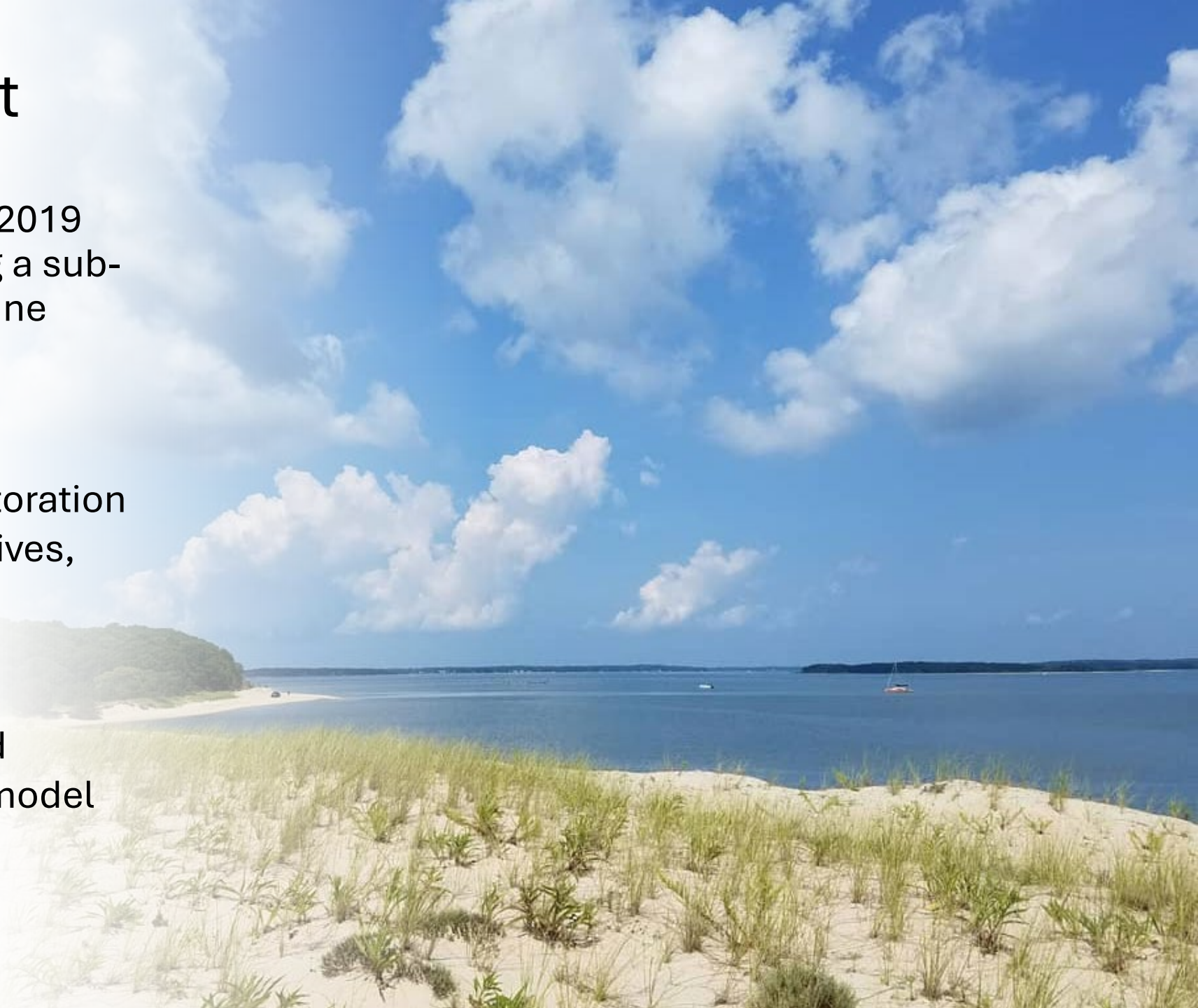
- Large increase in hardened shoreline linear footage from 2000 to 2016, particularly for bulkheads.
- The bulkhead length shows a possible 3-4 fold increase from 2000 to 2016
- It is important to verify these data through ground-truthing to confirm the accuracy of aerial interpretation of these shoreline structures





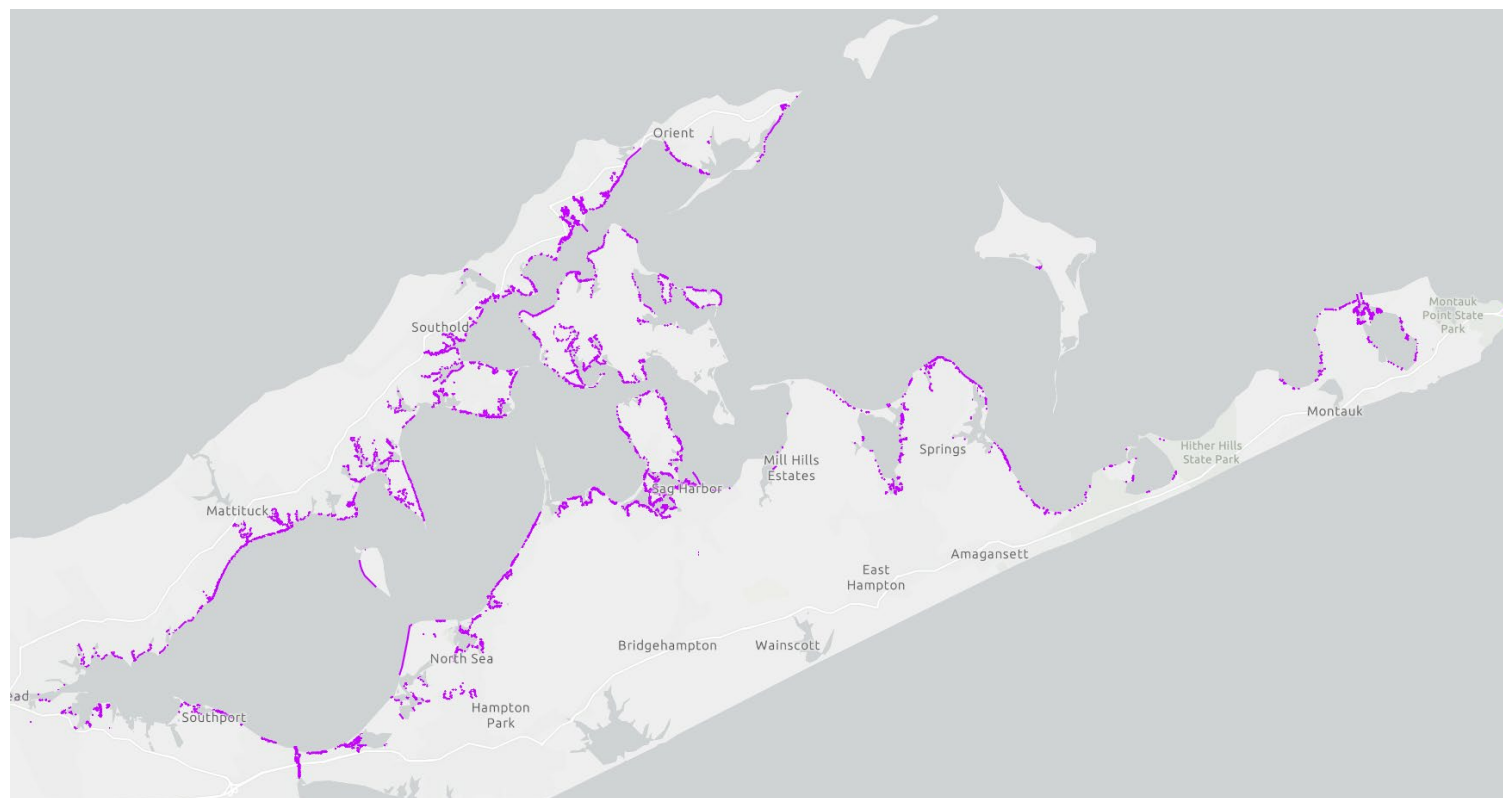
# Objectives of Project

- Confirm the accuracy of PEP's 2019 Survey through ground-truthing a sub-sample of the hardened shoreline structures as a quality control measure
- Inform PEP's future habitat restoration and shoreline protection initiatives, including strategies for natural resources
- Fit PEP's GIS work and this field validation effort into the VIMS model



# Field Validation Methods

- PEP's 2019 survey was used to randomly select GPS coordinates of a subsample of the structures
- Randomly selected 10% of bulkhead and rock revetment segments within each of the 5 towns bordering the Peconic Estuary, and 5% of docks within East Hampton Town (n = 147)
- Adjoining structures were often counted as single segments



# Field Verification Methods

- Each structure was validated by three staff members via vessel
- Data independently recorded by two staff members:
  - Presence / Absence
  - Structure Type (Bulkhead, Rock Revetment, Dock)
  - Material
  - Condition
  - Estimated Length
  - Nearby landmarks (roads, house #'s)
  - Shoreline features (SAV, sediment type, wildlife)
  - Spatial coordinates of end points
- Each structure was photographed
- Percent (%) Accuracy of PEP's 2019 aerial assessment was calculated
- Data were incorporated into a detailed GIS database to be used by PEP, local Townships, and other stakeholders



# GIS Map of Sampled Structures



Data collected from this survey were incorporated into a detailed GIS database



Line segments show start and end coordinates for each structure we validated in the field



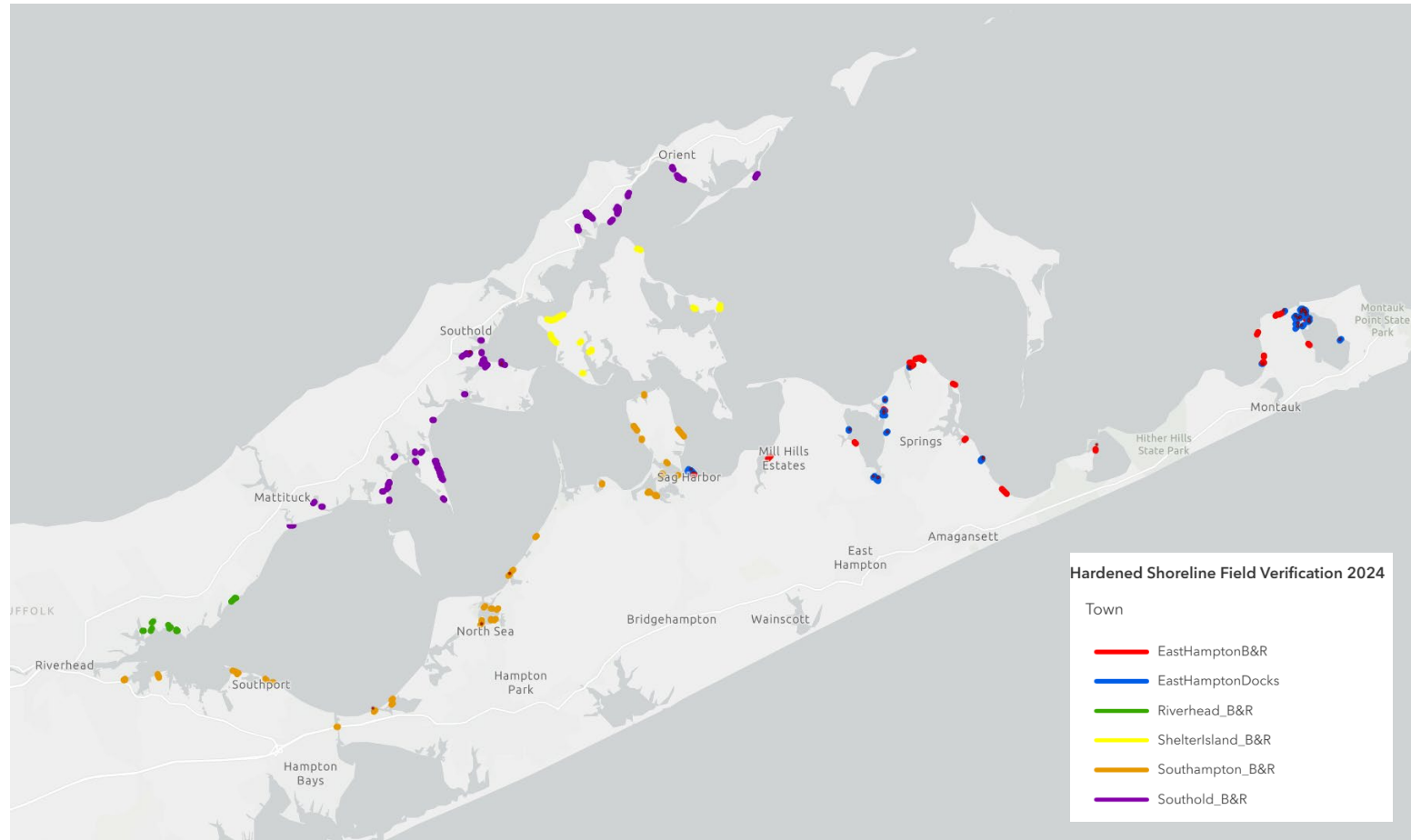
Color key shows the township and type of each structure

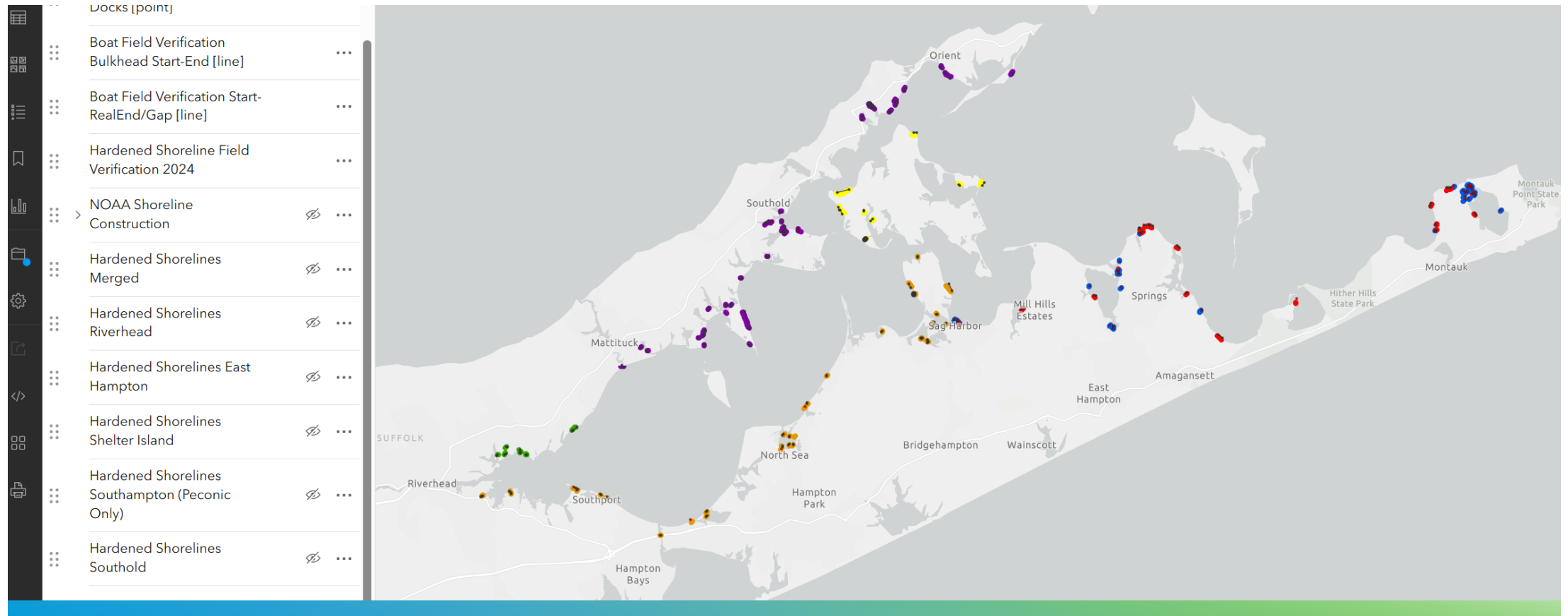


Relevant field notes & photos are displayed when a line segment is selected



PEP's existing map of shoreline hardening can also be toggled on and off

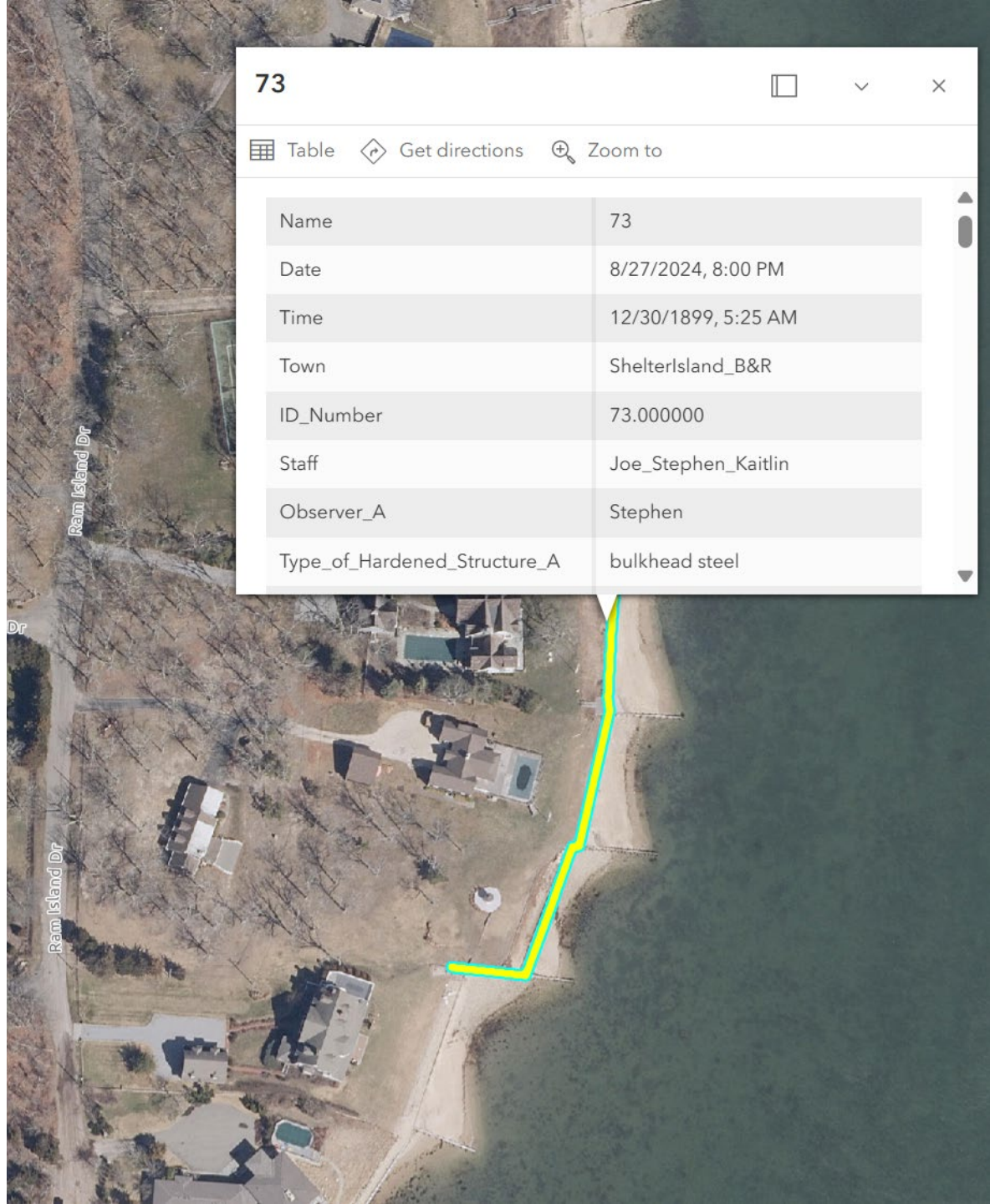
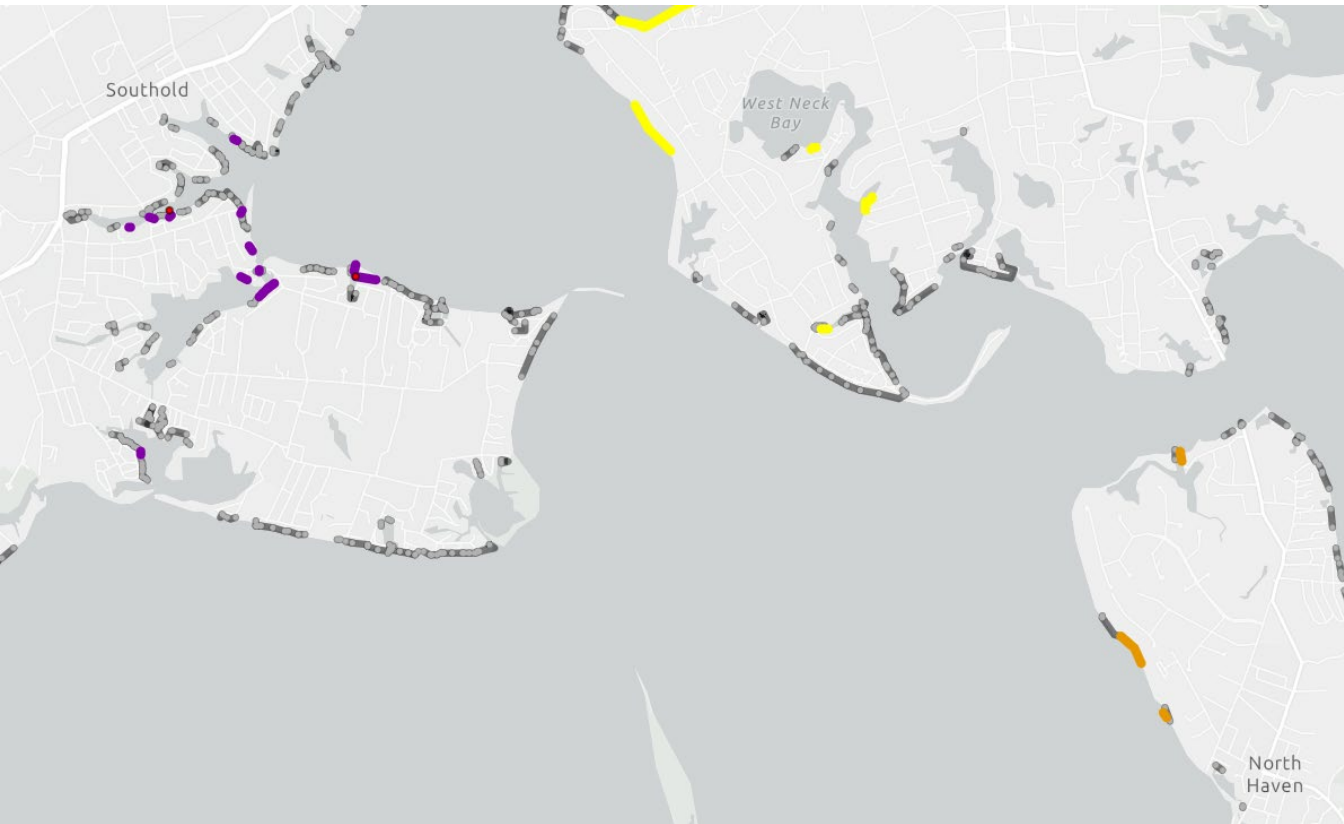




The Hardened Shoreline Field Verification map also has layers displaying several other features that can be toggled on and off by the user.



- Field notes, details, and photos corresponding to each structure can be viewed when each line segment is selected (right).
- PEP’s existing hardened shoreline GIS layers can be toggled on and off. The image below shows bulkheads in the Peconic Estuary in addition to several of the randomly-selected structures we validated in three of the five townships (structures within Southold, Shelter Island, and Southampton are shown below).



# Results – Percent Accuracy

Percent (%) accuracy of PEP's 2019 hardened shoreline survey was calculated based on the ratio of structures confirmed by vessel survey data compared to the total sampled.

Of the 147 total structures validated by our survey, only 6 were absent.

95.92% accurate

Of 108 bulkheads and rock revetments, only 3 were absent.

97.22% accurate

Of 39 docks in East Hampton Town, only 3 were absent.

92.31% accurate



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# Summary

- Overall percent (%) accuracy of PEP's 2019 hardened shoreline survey: 95.92%
- Confirms the usefulness of GIS-based surveys when combined with field validation
- Results of this project can be used to better inform stakeholders in future development and shoreline conservation efforts, including
  - PEP's future habitat restoration and shoreline protection initiatives
  - Resource managers
  - Researchers
  - Environmental and coastal planners





# Questions?

## Acknowledgements:

Peconic Estuary Partnership

Stony Brook University

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Town of Southold

Town of Shelter Island

Town of East Hampton

Town of Southampton

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Peter Martin.



**Peconic Estuary**  
**Partnership**

PROTECTING AND RESTORING LONG ISLAND'S PECONIC BAYS