



**Long Island Sound Study**

A Partnership to Restore and Protect the Sound



# Long Island Sound Coastal Resilience Forum

Tuesday October 29, 2024



9:45 AM	<b>Welcome &amp; Introductions</b>
10:05 AM	<b>Planning for Sea Level Rise &amp; Other Climate Threats</b>
10:35 AM	<b>Creating Resilient Shorelines</b>
12:30 PM	<b>Lunch</b>
1:30 PM	<b>Field Trip to Iron Pier Beach/Maidstone Landing</b>
3:30 PM	<b>Return from Field Trip/Depart</b>

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**Long Island Sound Study**  
A Partnership to Restore and Protect the Sound

# Planning for Sea Level Rise & Other Climate Threats





## Comprehensive Conservation & Management Plan

The *draft* 2025 Plan is available for public comment until November 22, 2024.

A public information session will be held October 1 at 12pm

The Plan addresses:



Clean water and healthy watersheds



Thriving habitat and abundant wildlife



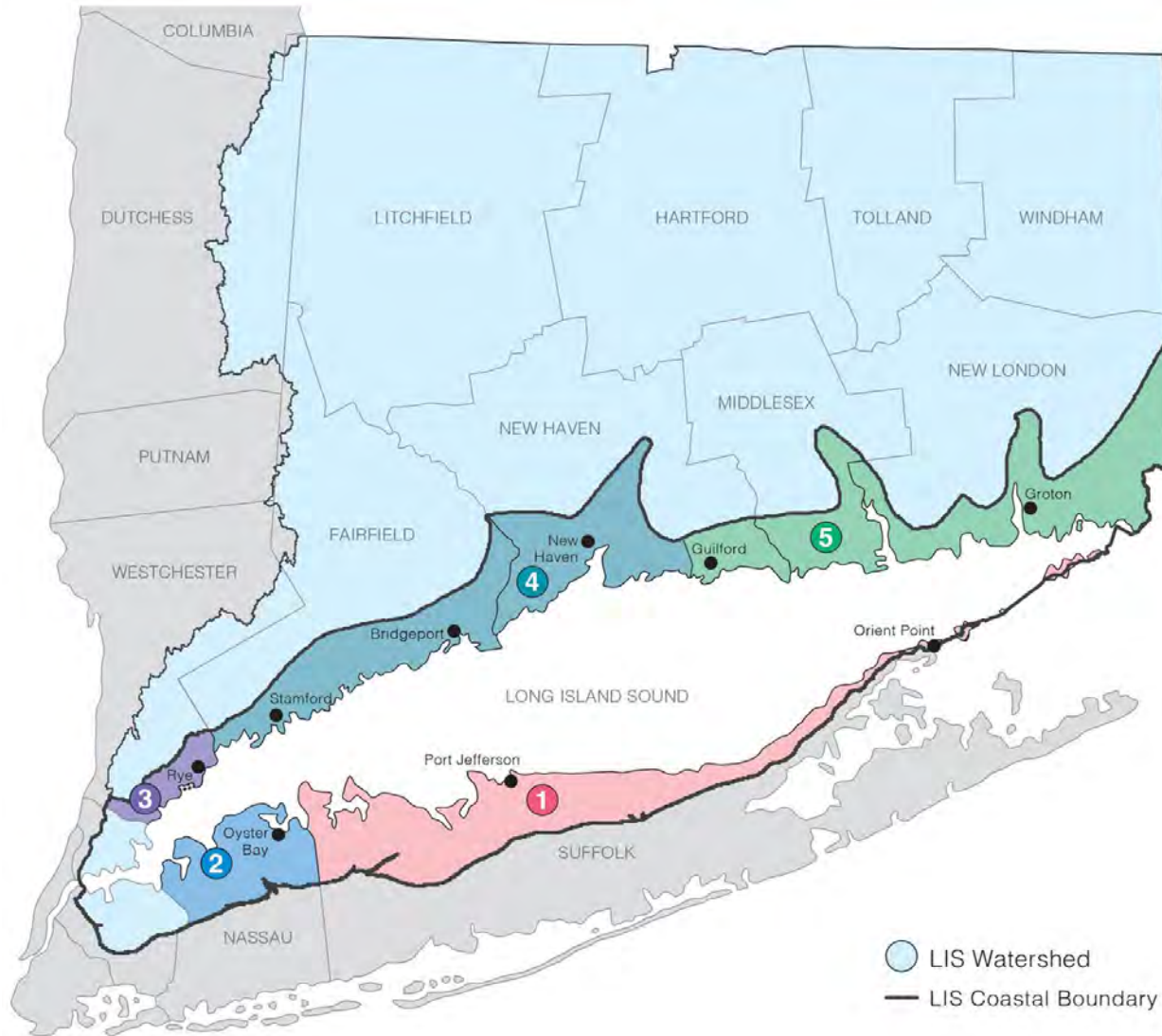
Informed and engaged public



Sustainable and resilient communities

Learn more at: <https://longislandsoundstudy.net/about/ccmp-revision-updates/>

# The SRC Extension Professionals Team



- 1** Suffolk County  
**Elizabeth Hornstein**
- 2** Nassau County  
**Sarah Schaefer-Brown**
- 3** Westchester County  
**Sara Powell**
- 4** Western CT  
**Deb Visco Abibou**
- 5** Eastern CT  
**Sarah Schechter**

***A Sustainable and Resilient Long Island Sound Community is one which can anticipate and overcome disturbances, while achieving well-being for all.***



# Finding climate resources should be easy

The Long Island Sound Resilience Resource Hub is here to help your community. Learn about environmental challenges, planning solutions, and how to implement and sustain projects now.

Select your Planning Phase, Location, and/or Topic of interest to access a filtered selection of our curated resources and tools.

Planning Phase

Select a Planning Phase



Location

Select a Location



Topic

Select a Topic



Get Started

## Filters

Select one or more of the filters below to find relevant tools and resources for your needs

Planning Phase

Learn

Location

Suffolk County, NY

Topic

Sea Level Rise

Reset Filters

Apply Filters

Mapper

Level of Effort: ● ● ○

### NOAA Sea Level Rise Viewer

Use this web mapping tool to visualize community-level impacts from coastal flooding or sea level rise (up to 10 feet above average high tides). Photo simulations of how future flooding might impact local landmarks are also...

New York State

Connecticut State

Flooding

Habitat

Land Use

Nature-based Solutions

Sea Level Rise

Infrastructure

Extreme Weather & Storms

Wetlands

View Details

Mapper

Level of Effort: ● ● ○

### NYS Sea Level Rise Viewer

This floodplain mapper shows the estimated boundary of future coastal floodplains for different sea level rise scenarios for New York State. Customize a scenario by choosing the amount of sea level rise in inches an...

New York State

Flooding

Sea Level Rise

Extreme Weather & Storms

View Details

Guidance Tool

Level of Effort: ● ● ●

### APPLICATION GUIDE for the 2022 Sea Level Rise Technical Report

This guide is designed to assist decision makers and coastal professionals with applying and integrating the information in the 2022 Sea Level Rise Technical Report, produced by the Sea Level Rise and Coastal Flood Hazard...

New York State

Connecticut State

Sea Level Rise

View Details



## MyCoast NY [mycoast.org/ny](https://mycoast.org/ny)



**NY Sea Grant has launched MyCoast NY**, an online portal for collecting and analyzing photos of flooding and storm damage. When a photo report is submitted, it is automatically linked to the closest weather, river, and tidal gauge data to help provide context to the photo.

- **High Water:** Tracking (any type of) flooding across the state. This includes riverine, coastal, and shallow flooding (pluvial), such as flooding due to stormwater overflows and poor urban drainage.
- **Storm Reporter:** Documenting storm damage across the state.

MyCoast NY [mycoast.org/ny](https://mycoast.org/ny)

## NY CoastSnap Photos

Select a CoastSnap Location



Rockaway Beach

[View Photos](#) 



Hudson Ferry Landing

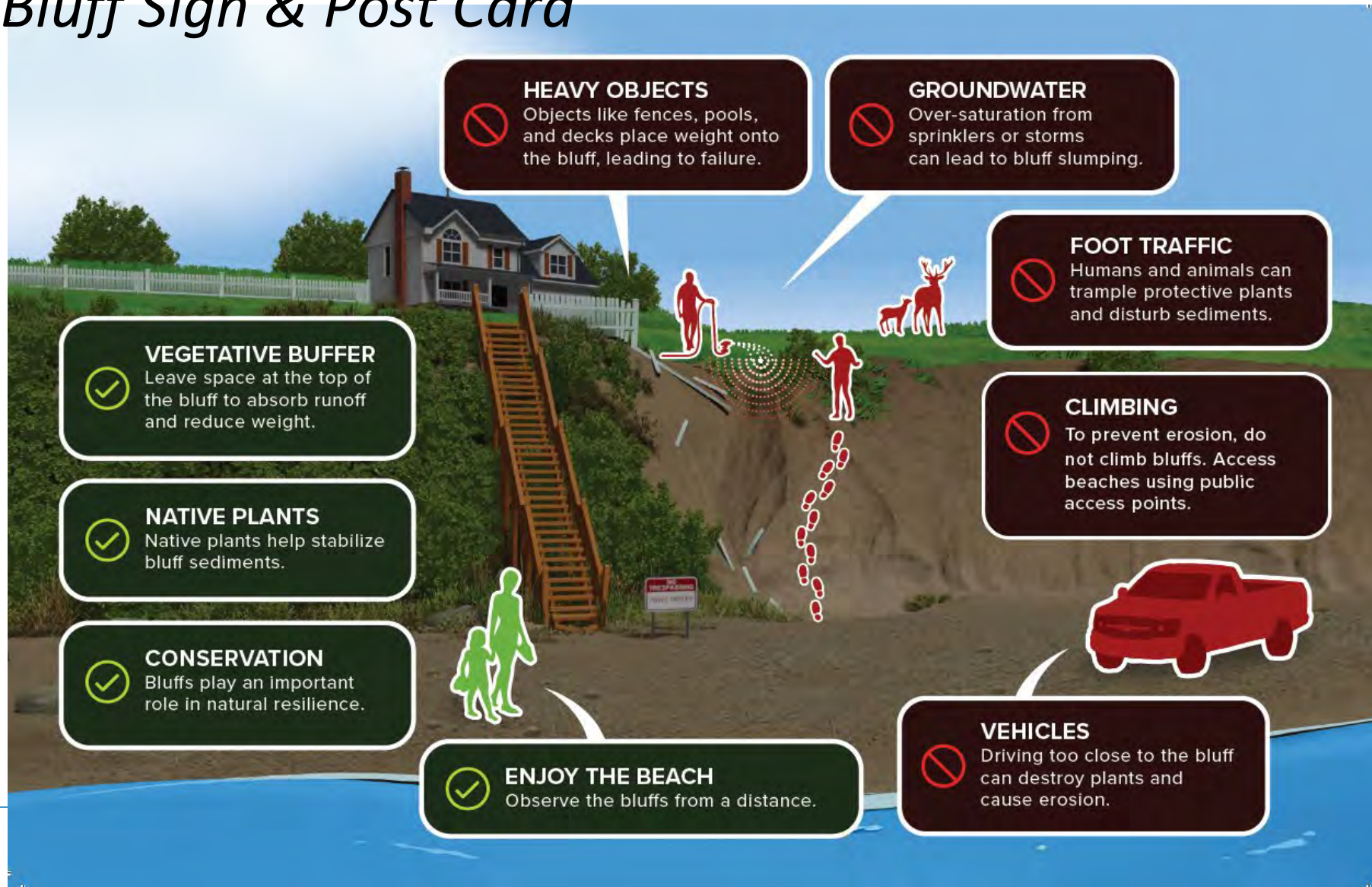
[View Photos](#) 



Watch Hill

[View Photos](#) 

## Bluff Sign & Post Card



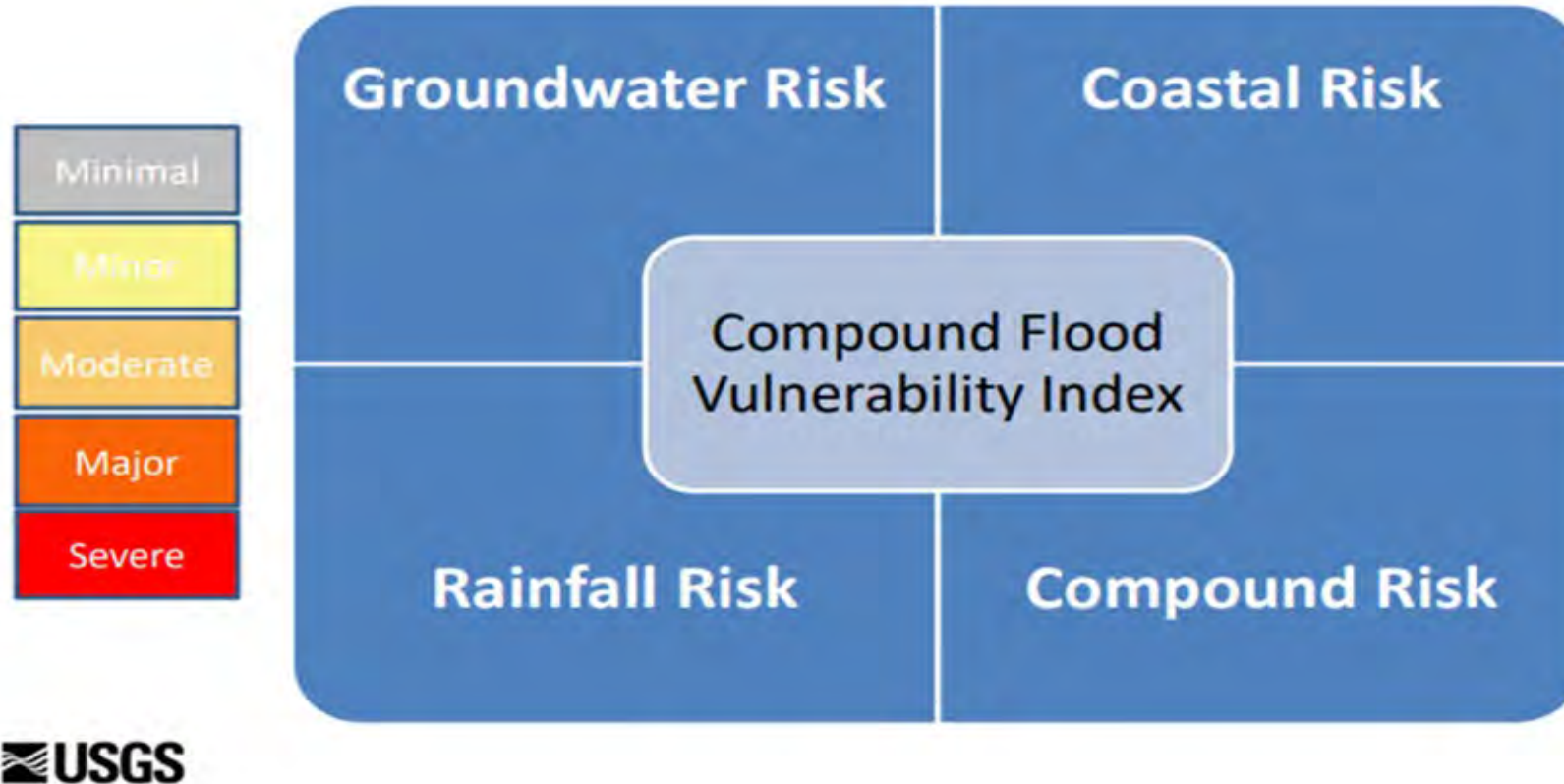
## A Guide to Permitting

Shoreline Modification Projects  
in New York's Tidal Waters



# New Tool: *Coming Soon!*

## *Compound Flood Mapper for Long Island Sound - Coming Soon!*





## A Guide to Resilience Planning

Use the PERSISTS criteria below to help identify, prioritize, and implement high-impact projects

PERSISTS Framework adapted and adopted from Connecticut Institute for Resilience and Climate Adaptation. (2020). Resilient Connecticut Planning Framework.

**P**

Permittable

**E**

Equitable

**R**

Realistic

**S**

Safe

**I**

Innovative

**S**

Scientific

**T**

Transferable

**S**

Sustainable

## Resilience Planning Guide

The *PERSISTS* Criteria can help you identify, prioritize, and implement successful projects

---

**Permissible** – Can get all necessary permits and/or permissions

---

**Equitable** – Considers input from and impacts to vulnerable populations

---

**Realistic** – Has community support and can be realistically achieved

---

**Safe** – Enhances or maintains the wellbeing of communities

---

**Innovative** – Process has considered innovative options including nature-based solutions

---

**Scientific** – Incorporates the best available science

---

**Transferable** – Can serve as model for other communities

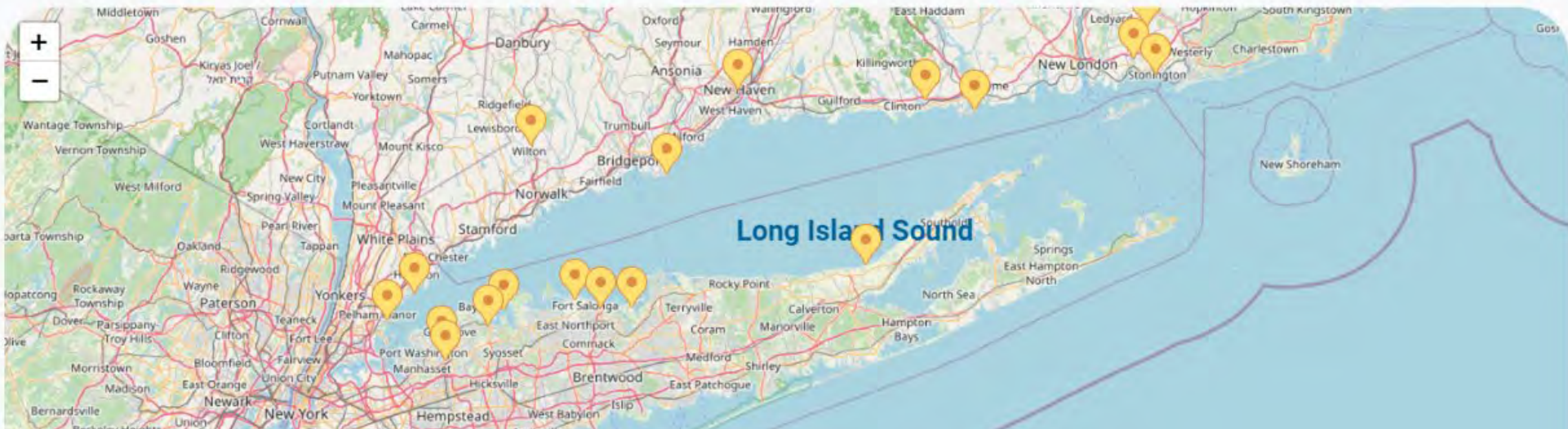
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**Sustainable** – Socially, economically, and ecologically sustainable

## Case Studies


### Case Studies

Learn about other climate change resiliency projects in the Long Island Sound.





## Funding Database



### Funding Database

Find funding for your project

#### Filters

Select one or more of the filters below to find relevant tools and resources for your needs

Status

Select a Status ▼

Planning Phase



Select a Planning Phase ▼

Location

Select a Location ▼

Topic

Select a Topic ▼

 Funding  Open: Due on Mar 8, 2024

No pre-defined funding range

### Working Lands Climate Corps



The Working Lands Climate Corps will provide technical training and career pathway opportunities for young people, helping them deliver economic benefits through climate-smart agriculture solutions for farmers and ranche...

[Habitat](#) [Land Use](#) [Environmental Justice](#) [Community Engagement](#)

## 2 days

remaining to apply

[View Details](#)

 Funding  Open: Due on Mar 11, 2024

less than \$1M

### Connecticut Recreational Trails Program

## 5 days

remaining to apply

## Historic Funding is Available for Resilience Projects!

### Bipartisan Infrastructure Law (BIL)

- Includes funding to upgrade transportation infrastructure, restore coastal/aquatic habitats, protect water quality, improve community resilience, advance environmental justice, and more

### Inflation Reduction Act (IRA)

- Includes \$20B for resilience and conservation solutions for agriculture, forests, and coastal habitats

### NYS Environmental Bond Act

- For climate change mitigation, protection of natural resources, and advancing environmental justice



Credit: The New York Times

## Assistance Programs

### LIS Resilience Planning Support Program

Focus: **Planning and Project Scoping**

Eligible Applicants: Municipalities, Nonprofits, Community Organizations

*Next round will be released  
December 2024*

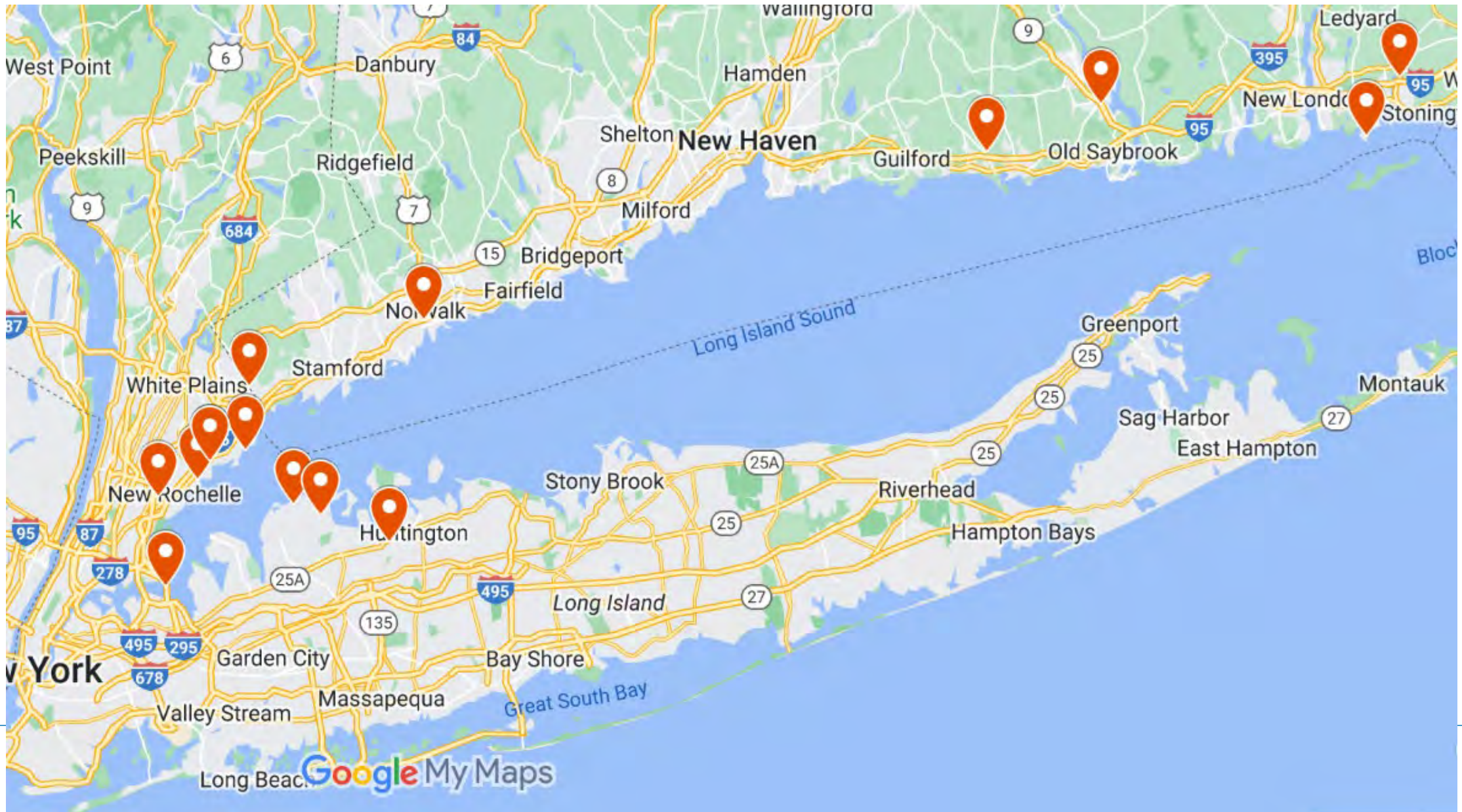
### LIS Resilience Grant Writing Assistance Program

Focus: **Grant Preparation and Writing**

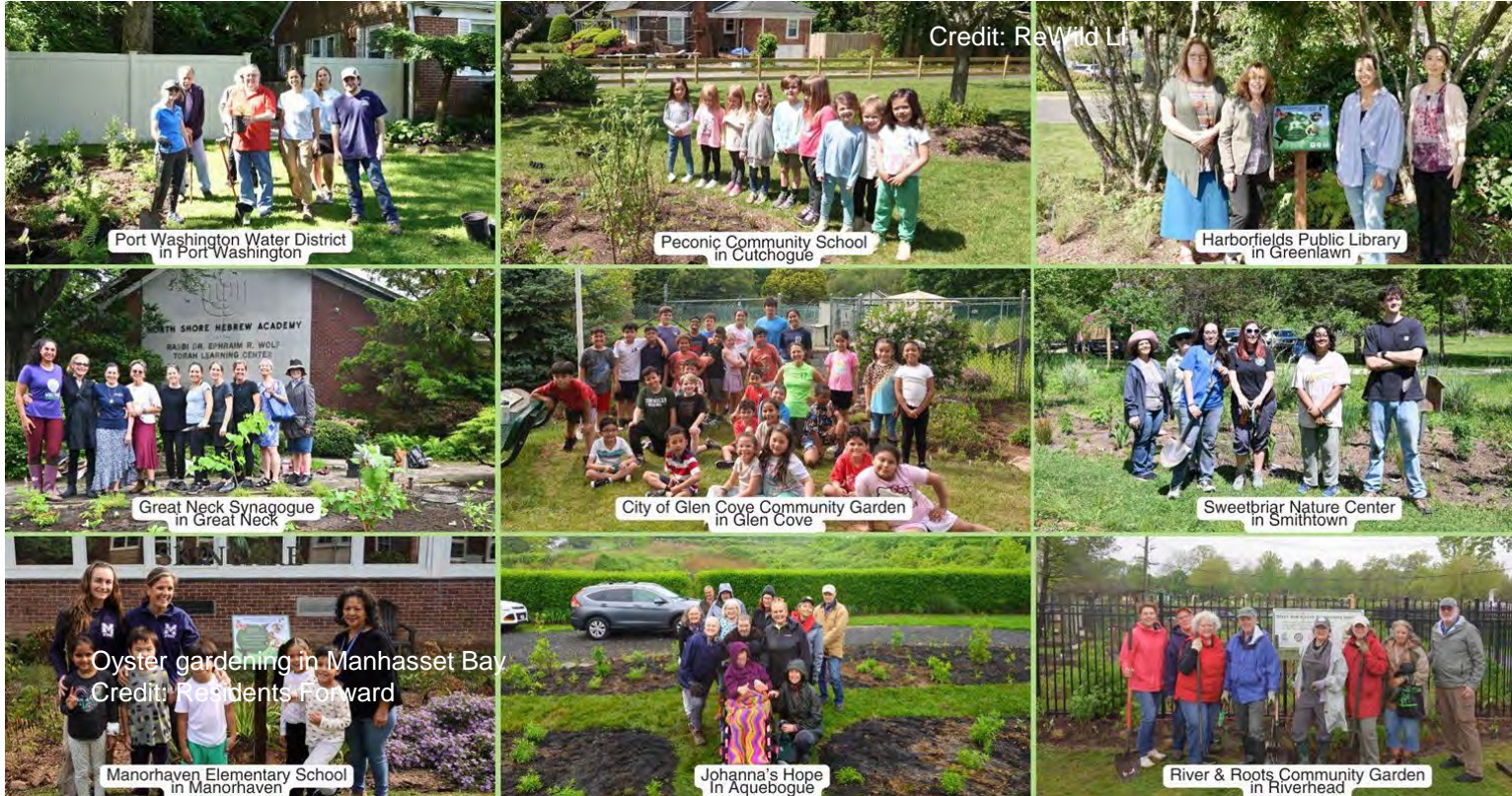
Eligible Applicants: Municipalities, Nonprofits, Community Organizations

*Rolling: Open until all available  
funding has been allocated*

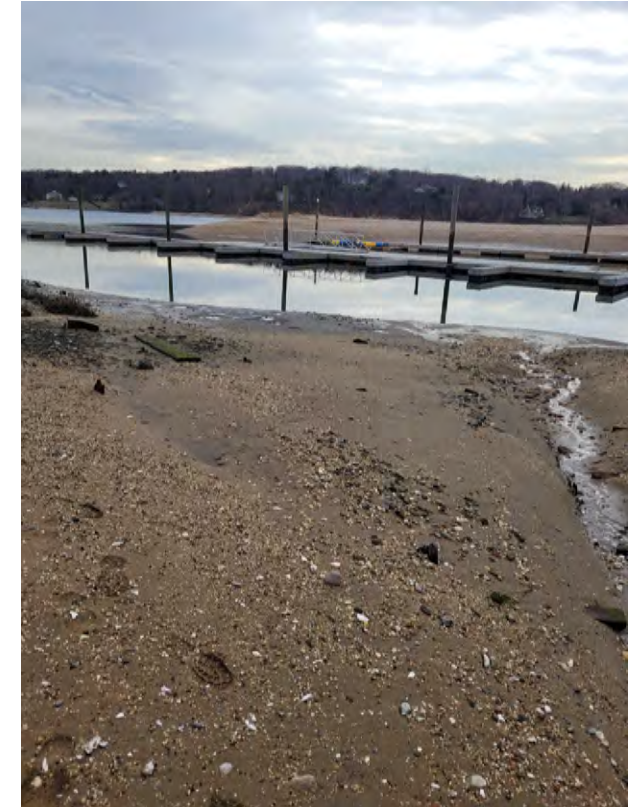
# Planning Support Program - 15 projects!



## ReWild Long Island: Community gardens

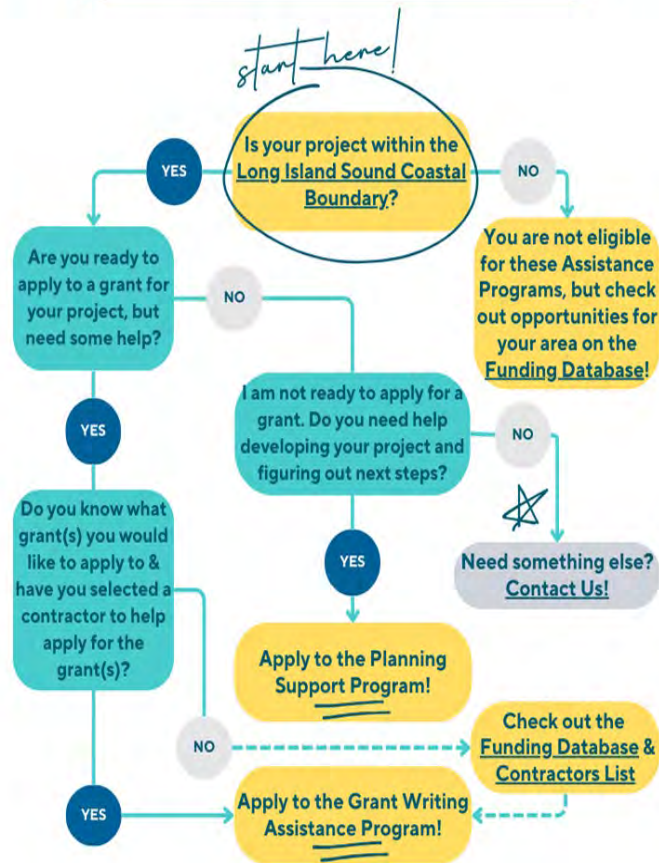


## North Shore Land Alliance: Stormwater Management



## What Assistance Program is right for me?

Click on the image to interact



*September 27th, October 4th & October 18th*



**DEC 10-11, 2024**

**3rd Annual LISS  
Sustainable and Resilient  
Communities Workshop**



**Long Island Sound Study**  
A Partnership to Restore and Protect the Sound



**SAVE THE DATE**

*More details coming soon!*







# Questions?

**Elizabeth Hornstein**

**SRC Extension Professional**

**New York Sea Grant**

**[elizabeth.hornstein@cornell.edu](mailto:elizabeth.hornstein@cornell.edu)**

**(631) 632 3093**





Department of  
Environmental  
Conservation

# Office of Climate Change Updates

Long Island Sound Coastal Resilience Forum - Suffolk County  
October 29, 2024

**Lauren Steinberg**  
Climate Policy Analyst  
DEC Office of Climate Change  
[Lauren.Steinberg@dec.ny.gov](mailto:Lauren.Steinberg@dec.ny.gov)

# Updates

- 6 NYCRR Part 490 Projected Sea-level Rise -*2024 update*
- NYS Extreme Heat Action Plan
- NYS climate change adaptation and resilience planning
- Environmental Bond Act

# 6 NYCRR Part 490 Projected Sea-Level Rise

*2024 update*

# 6NYCRR Part 490, Projected Sea-level Rise

## Community Risk and Resiliency Act (2014)

*as amended by the Climate Leadership and Community Protection Act (2019)*

- DEC to adopt science-based sea level rise projections.
- Part 490 was adopted in 2017.
- An amended Part 490 was adopted in September 2024.
- Part 490 establishes projections of sea-level rise but does not impose any requirements on any entity.

# Adopted 6NYCRR Part 490, Projected Sea-level Rise, 2024

	Region	Long Island						New York City/Lower Hudson						Mid-Hudson					
	Descriptor	Low	Low-medium	Medium	High-medium	High	Rapid Ice Melt	Low	Low-medium	Medium	High-medium	High	Rapid Ice Melt	Low	Low-medium	Medium	High-medium	High	Rapid Ice Melt
Time Interval	2030s	7	8	10	12	14	NA	6	7	9	11	13	NA	5	7	8	10	12	NA
	2050s	13	15	18	21	25	NA	12	14	16	19	23	NA	11	12	14	17	21	NA
	2080s	23	26	32	41	48	83	21	25	30	39	45	83	18	21	26	35	41	83
	2100	27	32	39	54	69	114	25	30	36	50	65	114	21	25	32	46	60	114
	2150	42	50	63	94	185	NA	38	47	59	89	177	NA	32	41	52	82	171	NA

Inches of rise relative to 1995-2014 baseline

[New York State Climate Change Projections Methodology Report](#)

[Part 490 Projected Sea-Level Rise](#)



# Percentage Differences 6NYCRR Part 490, 2024/2017

	Region	Long Island						New York City/Lower Hudson						Mid-Hudson					
	Descriptor	Low	Low-medium	Medium	High-medium	High	Rapid Ice Melt	Low	Low-medium	Medium	High-medium	High	Rapid Ice Melt	Low	Low-medium	Medium	High-medium	High	Rapid Ice Melt
Time Interval	2030s	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2050s	63%	36%	13%	0%	-17%	NA	50%	27%	0%	-10%	-23%	NA	120%	33%	0%	-11%	-22%	NA
	2080s	77%	44%	10%	5%	-17%	NA	62%	39%	3%	0%	-22%	NA	80%	50%	4%	-3%	-24%	NA
	2100	80%	52%	15%	15%	-4%	NA	67%	36%	0%	0%	-13%	NA	91%	39%	0%	0%	-15%	NA
	2150	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

# New York State Adaptation and Resilience Plan *(NYSARP)*



# SOTS Commitment

“Governor Hochul will direct DEC, NYSERDA, and DOS, in coordination with all relevant state agencies, to develop a **comprehensive climate change adaptation and resilience plan** to ensure state entities and localities can equitably adapt to climate change, including assessing impacts on disadvantaged communities, ecosystems, infrastructure, and vulnerable economic sectors.

This statewide planning effort will **supplement ongoing work to collect information and develop the resources** needed to support the design and implementation of cost-effective strategies to reduce current and future climate risks – leveraging federal dollars and Environmental Bond Act investments to undertake dam removals, repairs to aging flood control structures, and advance green infrastructure projects.”

# Precedent Examples

## California

- Unifies existing adaptation efforts under common framework

## Colorado

- Regional approach to adaptation planning

## Massachusetts

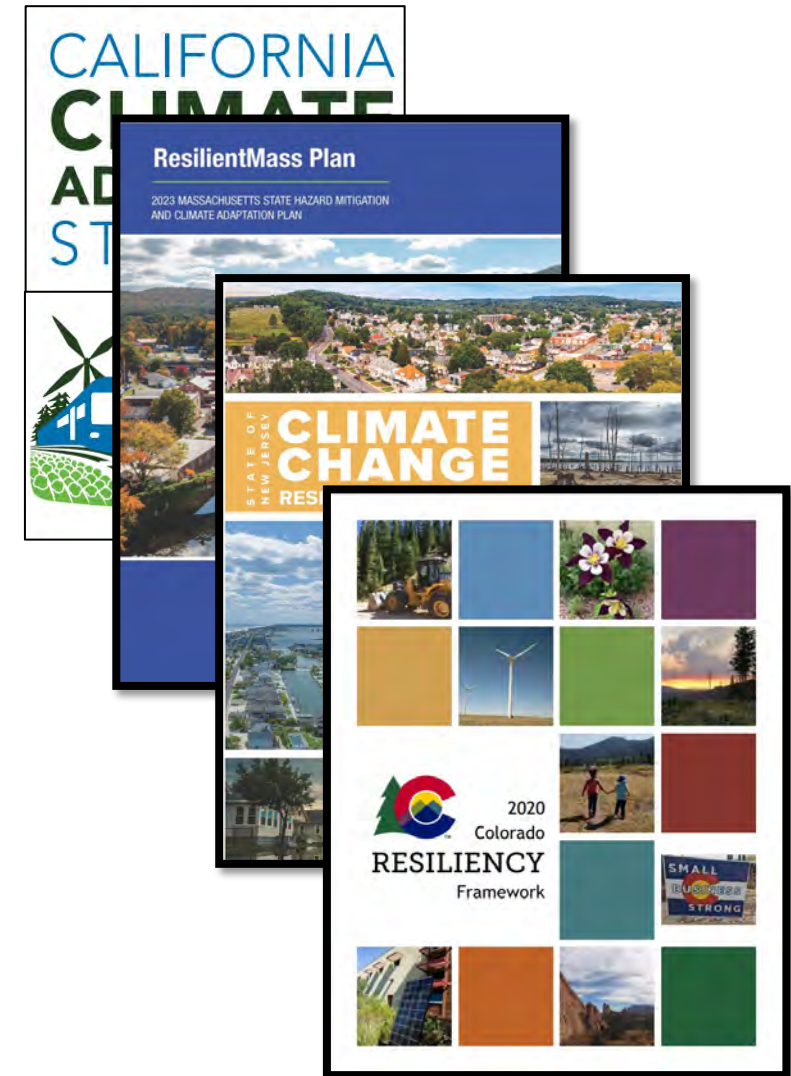
- Layers onto existing hazard mitigation planning process

## New Jersey

- Planning under a common framework and governance

## European Union

- Coordinates and standardizes resources for local adaptation



# New York State Extreme Heat Action Plan

# EXTREME HEAT ACTION PLAN

**LEARN MORE**  
[on.ny.gov/extremeheat](https://on.ny.gov/extremeheat)



 **Extreme Heat Action Planning**

**EXTREME HEAT ACTION PLAN**  
ADAPTATION AGENDA FOR 2024–2030

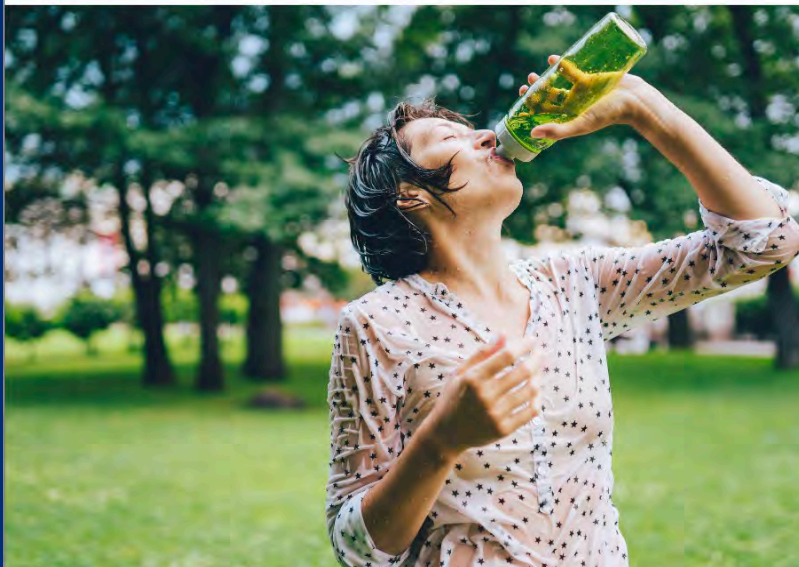
Kathy Hochul, Governor | Sean Mahar, Interim Commissioner, DEC | Doreen Harris, CEO and President, NYSERDA

## Putting Adaptation into Action

- Missions, goals, and principles
- 49 strategies in four action tracks
- Short- and mid-range goals
- Implementation and evaluation




[extreme-heat@dec.ny.gov](mailto:extreme-heat@dec.ny.gov)



**New York State Comprehensive Emergency Management Plan**

**Extreme Heat Annex**

 **Disaster Preparedness Commission**

Prepared by the New York State Disaster Preparedness Commission

June

**EMERGENCY RESPONSE**

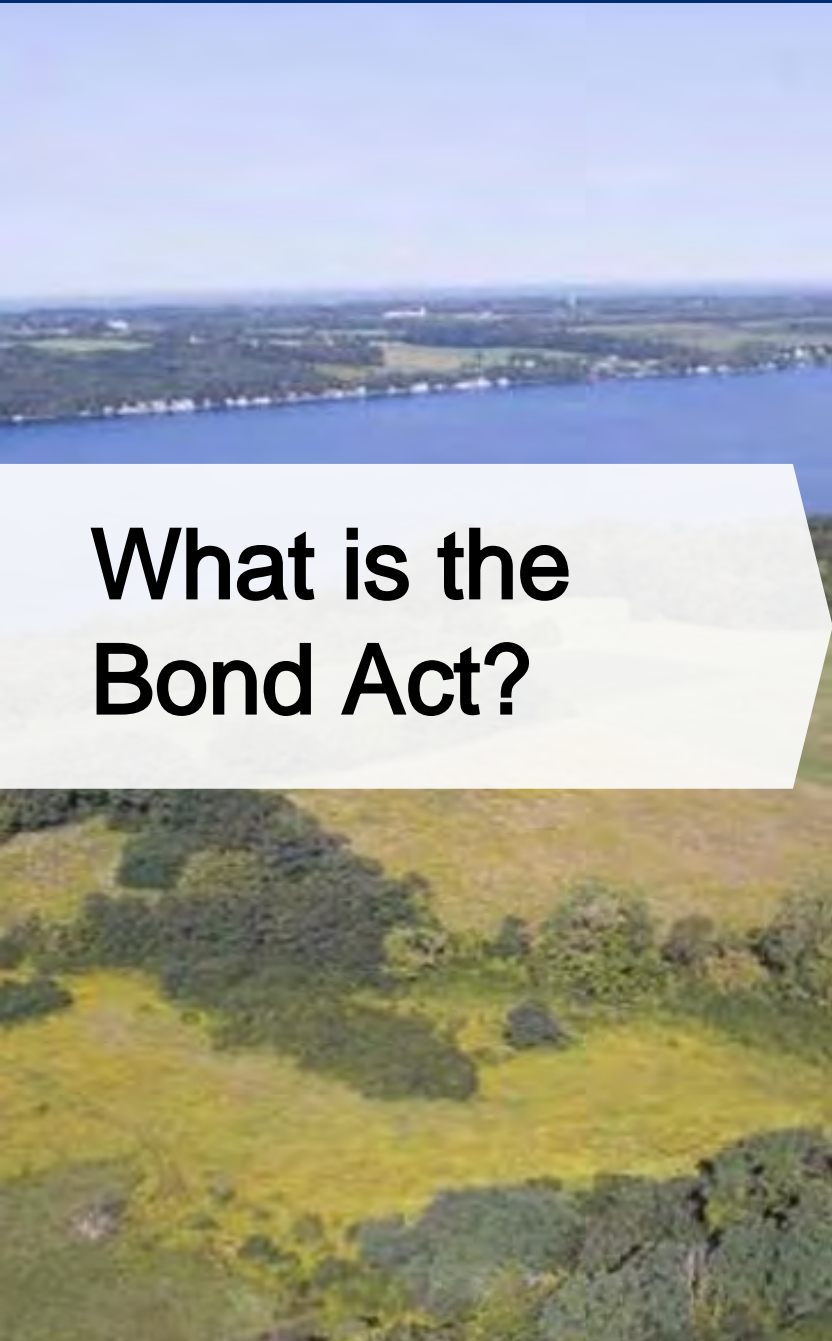


**EXTREME HEAT ACTION PLAN**  
ADAPTATION AGENDA FOR 2024–2030

Kathy Hochul, Governor | Sean Mahar, Interim Commissioner, DEC | Doreen Harris, CEO and President, NYSERDA

**EXTREME HEAT IN NYS REPORT**

**The Clean Water, Clean Air & Green  
Jobs  
Environmental Bond  
Act**



## What is the Bond Act?

# A Historic \$4.2 Billion

Specifically, the Environmental Bond Act authorizes

- **\$1.5 billion** for climate change mitigation;
- **\$1.1 billion** for restoration and flood risk reduction\*;
- **\$650 million** for water quality improvement and resilient infrastructure\*;
- **\$650 million** for open space land conservation and recreation; and
- **\*\$300 million** for other projects not specifically allocated in the Act.



# Environmental Bond Act

- Funding dispersed through 23 programs across several state agencies.
- Eligibility guidelines for program funding released for public comment.

## Funding Committed \$515 million



- ✓ **\$200 million** – EFC WIIA and IMG
- ✓ **\$20 million** – EFC Green Resiliency Grant Program\* (\$20 million CWCAGJ Bond Act and \$40 million CWIA)



- ✓ **\$100 million** – Decarbonization Empire State Plaza
- ✓ **\$32 million** – DEC Nursery Modernization and FMAP Tracking Database



- ✓ **\$68.1 million** – OPRHP Sojourner Truth State Park
- ✓ **\$78.1 million** – OPRHP Lake Sebago State Park
- ✓ **\$13.1 million** – DEC Adirondack Rail Trail and Saranac Lake Depot
- ✓ **\$4 million** – HRVG Albany-Hudson Electric Trail

## Grant Programs currently scoring \$475 million



- ✓ **\$20 million** - DEC WQIP Municipal Stormwater Projects



- ✓ **\$10 million** – DEC Climate Smart Communities
- ✓ **\$100 million** – NYSERDA Cleaner Green Schools
- ✓ **\$300 million** – NYSERDA Zero-emission school buses and charging
  - ✓ *Approximately \$35 Million in approved applications to date*



- ✓ **\$20 million** - WQIP – Removal or Repair of Municipal Dams
- ✓ **\$10 million** - WQIP – Fish and Wildlife Habitat Acquisition, Restoration and Enhancement Projects
- ✓ **\$15 million** - WQIP – Enhancing Aquatic Connectivity through Dam Removal and Culvert Replacement



Services New

ENVIRONMENTAL BOND ACT

FUNDING

# Clean Water, Clean Air, Green Jobs Environment Bond Act

Investing \$4.2 Billion in New York's Environment and Communities

[FUND A PROJECT](#) →

[RESOURCES FOR RESILIENCE](#) →



## Stay Updated

### Funding Finder

**Filter Results**

Eligible Applicants contains:    
 Select count and dropdown to filter by Eligible Applicant.

Project Type contains:    
 Select count and dropdown to filter by Project Type.

Regional Coverage is any of:    
 Select count and dropdown to filter by Region.

[View all 141 Environmental Bond Act Projects](#)

[Eligible Applicants Definitions](#)

[Project Type Definitions](#)

[Project Phase Definitions](#)

Region: New York State  
Project Type: Remediation; Hazardous Waste  
Project Phase: Planning and Design; Construction and Implementation  
Eligible Applicants: Local Government Entity

Non-Agricultural Nonpoint Source Planning Grant Program  
Funding Source: NYS Department of Environmental Conservation (DEC)  
Region: New York State  
Project Type: Wastewater; Green Infrastructure; Nature Based Solutions; Shoreline Projects/Streambank Stabilization; Waterbody Controls; Ecological Restoration; Culverts; Nonpoint Source; Resilience; Water Quality  
Project Phase: Planning and Design  
Eligible Applicants: Local Government Entity; Soil and Water Conservation Districts

Drinking Water Source Protection Program (DWSP2)  
Funding Source: NYS Department of Environmental Conservation (DEC) and Department of Health (DOH)  
Region: New York State  
Project Type: Drinking Water; Water Infrastructure  
Project Phase: Planning and Design  
Eligible Applicants: Local Government Entity

High Hazard Dam Rehabilitation Program  
Funding Source: NYS Department of Environmental Conservation (DEC)  
Region: New York State  
Project Type: Dam Removal  
Project Phase: Planning and Design  
Eligible Applicants: Local Government Entity

ENVIRONMENTAL BOND ACT FUNDING PROJECTS PRIORITIES RESOURCES NEWS



ENVIRONMENTAL BOND ACT  
**Resources for Resilience**

### Community Assistance Teams

[Community Assistance Teams](#) administered by the Environmental Facilities Corporation (EFC) help municipalities address their clean water infrastructure needs. Teams host regional events and connect communities with experts who can help them undertake their critical water infrastructure projects. These Teams also provide on-site or virtual consultations to help communities across the state jump-start planning, submit funding applications, and see their projects through to completion.

### Resilient NY program

[The Resilient NY Program](#) administered by the Department of Environmental Conservation (DEC) improves community resiliency to extreme weather events that result in flooding and ice jam formations. Resilient NY studies will identify the causes of flooding within each watershed, and develop, evaluate, and recommend effective and ecologically sustainable flood and ice jam hazard-mitigation projects. Proposed flood mitigation projects will be identified and evaluated using hydrologic and hydraulic modeling to quantitatively determine which proposed recommendations will likely result in the greatest flood reduction benefits. In addition, the flood resiliency studies will incorporate the latest climate change forecasts and assess ice jam hazards where they have been identified as a threat to public health and safety.

[Sustainable Shorelines / Nature Based Shorelines](#)



- Inter-agency workgroup implementing delivery of funds
- Release of eligibility guidelines for public comment
- Bond Act entities launch grant opportunities

## Next Steps: Implement and Update

Stay updated:  
[environmentalbondact.ny.gov](https://environmentalbondact.ny.gov)  
BondAct@dec.ny.gov



Clean Water,  
Clean Air & Green Jobs  
Environmental Bond Act

# Thank You

## Lauren Steinberg

Climate Policy Analyst

Office of Climate Change

New York State Department of  
Environmental Conservation

625 Broadway

Albany, NY 12233-1030

[Lauren.Steinberg@dec.ny.gov](mailto:Lauren.Steinberg@dec.ny.gov)

Connect with us:

DEC: [www.dec.ny.gov](http://www.dec.ny.gov)

Community Risk and Resiliency Act:  
<https://dec.ny.gov/environmental-protection/climate-change/new-york-response/crra>

Climate Smart Communities:  
<https://climatesmart.ny.gov/>

Facebook: [www.facebook.com/NYSDEC](http://www.facebook.com/NYSDEC)

X (Twitter): <https://x.com/NYSDEC>

Flickr: [www.flickr.com/photos/nysdec](http://www.flickr.com/photos/nysdec)



**Long Island Sound Study**  
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# Creating Resilient Shorelines

Preserve and restore natural coastal defenses, including beaches, dunes, bluffs, and wetlands



# Nature Based Solutions for Coastal Resiliency

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## **What is Ecological Restoration?**

- Invasive Species Removal
- Native Plant Community Restoration
- Stormwater Management

## Addition By Subtraction

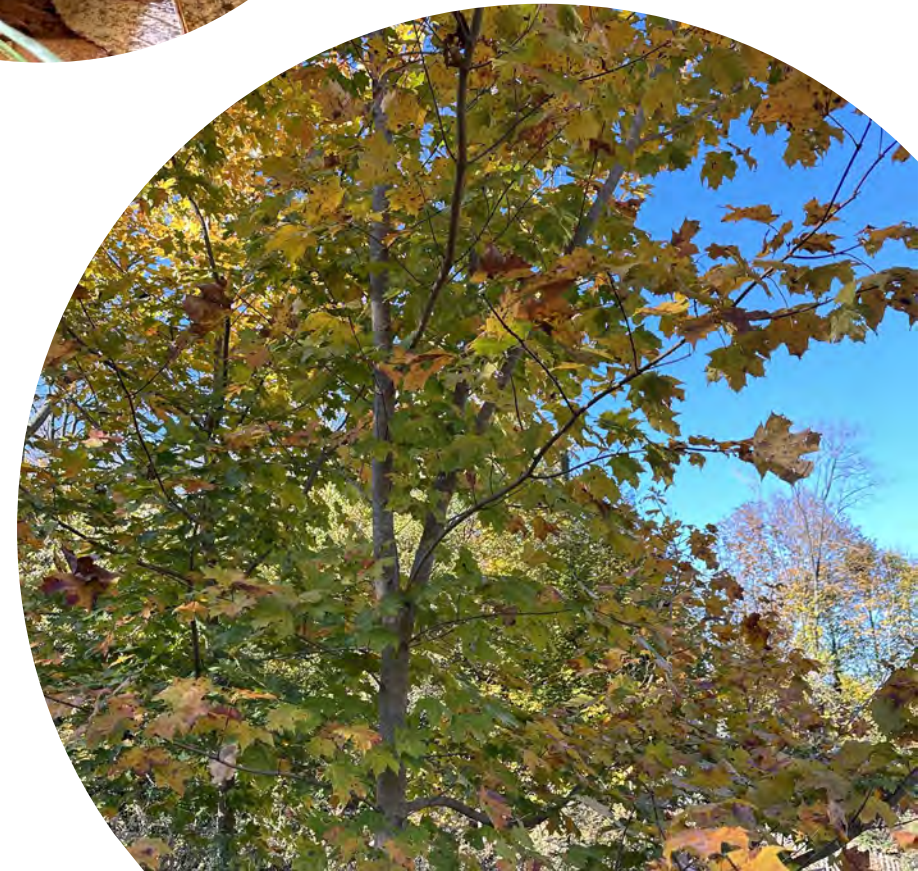
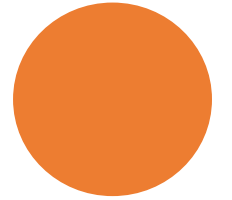
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- Invasive plants crowd out natives and destroy ecosystems
- Connection to impaired watersheds and eroding hillsides



# Wildlife Sweeps and Selective Editing

- Identify and remove invasive species of concern—not “clearing of overgrowth”
- Spread out in a grid formation and search for wildlife signs
- Nests, burrows, coarse woody debris
- Spot the machines



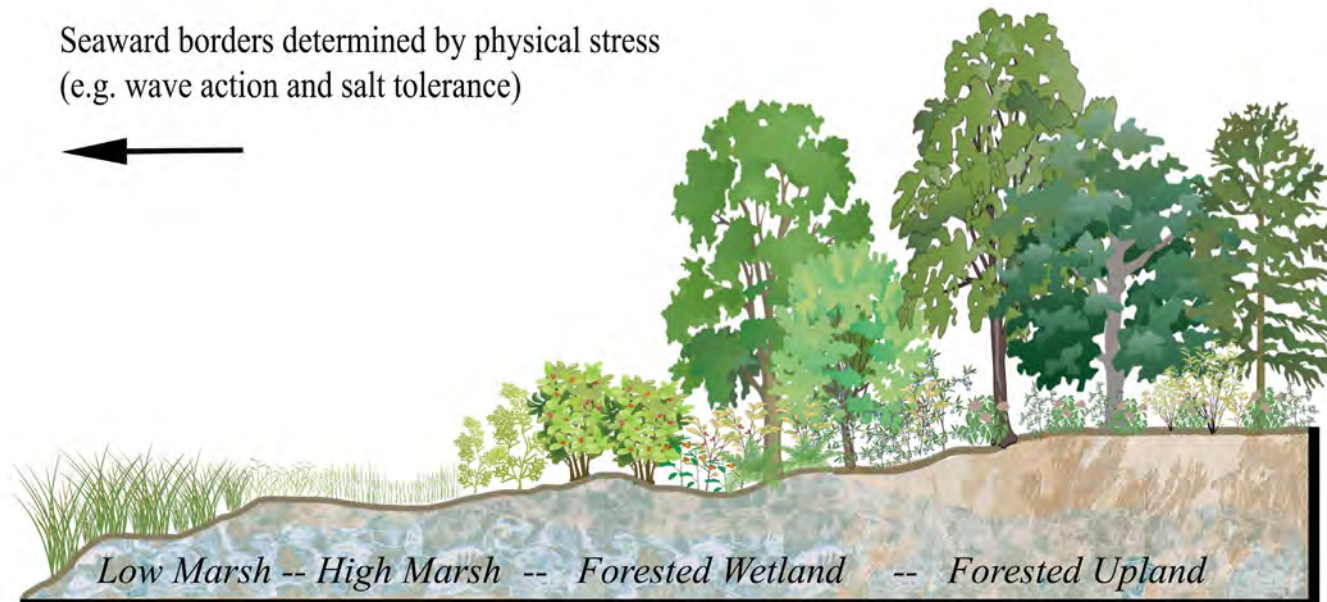
# Planting Native Plant Communities



Seaward borders determined by physical stress  
(e.g. wave action and salt tolerance)



Landward borders determined by competition  
(e.g. flood and shade tolerance)



- Choosing the Best Plants for the Site
- NY Natural Heritage Program Ecological Communities of NYS



# Controlled Wild

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- Making a planting look purposeful
- Competition to prevent flopping
  - 9 inches on center
- Layering



# Stewarding Wild Areas

- Dense plantings of co-associated species
- A garden is never done
  - Sleep, creep, leap!



# Planting Density

- 4'-6' on center planting
  - Community development vs. individual plant health
- Encouraging the development of the mycorrhizal network



# Managing Your Stormwater

- Plants over precast
- Aboveground storage vs. belowground storage
- Defining the contributing area
- Runoff coefficients
- Trees as the powerhouse



# The Fallacy of the Toe Wall

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- Building sandcastles





## Preserving the View (of an eroding shoreline...)

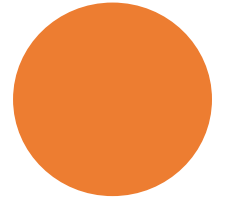
- Unintentional self-sabotage
- Framing the view as a compromise



**Redundancy is Key**

# Bringing Nature Home

- A neat garden is a lifeless garden
  - Leave the leaves and don't deadhead!
- If you have room for one, you have room for three
- Many of your neighbors would actually be into this...





## ENBIORGANIC :

### SANDS POINT PRESERVE (STARTED 8/1/24)

Within a month of discharging into the pond, we measured a startling 50%-60% reduction of polluting nutrients in the water and pond sediment

**Spadefoot is the exclusive licensee of Enbiorganic in NY State**



Sands Pt-September 19, 2024



Sands Pt-September 23, 2024

Thank you!

Contact us:  
[Frank@Spadefootny.com](mailto:Frank@Spadefootny.com)

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# Long Island Sound Study Marsh Viewer

## Map of Study Area

This map displays the 67 marsh parcels that were selected for this study.

"Hover" over a marsh polygon to see its name.

"Click" on a polygon to zoom in, or select from the "Zoom to" Menu to the right. (Move closer to a site to see tax and marsh maps.)

The purpose of the interactive viewer is to illustrate the fate of significant marsh systems on Long Island Sound under future Sea-Level Rise projections. Model results are combined with tax-parcel information and information about marsh ecosystem services are integrated to assist conservation groups in defining and assessing various land-management alternatives.

For more information about the underlying models and data please see the [Modeling Project Website](#)

[help file](#) [disclaimer](#)



MARSH CONSERVATION PLANNING FOR  
OYSTER BAY AND COLD SPRING HARBOR NY



NEIWPC

December 22, 2023

MARSH CONSERVATION PLANNING FOR  
STONY BROOK HARBOR NY  
AND WEST MEADOW CREEK NY



NEIWPC

December, 2023



# Conserving & Restoring Marsh Habitat using the LIS Marsh Viewer

**VICTORIA O'NEILL, COASTAL RESILIENCE,  
AUDUBON CT/NY**



Crab Meadow Marsh. Photo: USFWS

## Historic Threats to Salt Marshes:

- Coastal development
  - Filling in of marshes
  - Change to hydrology
- Invasive plants
- Human disturbance
  - Nutrient input



Saltmarsh Sparrow. Photo: Gordon/Audubon Photography Awards



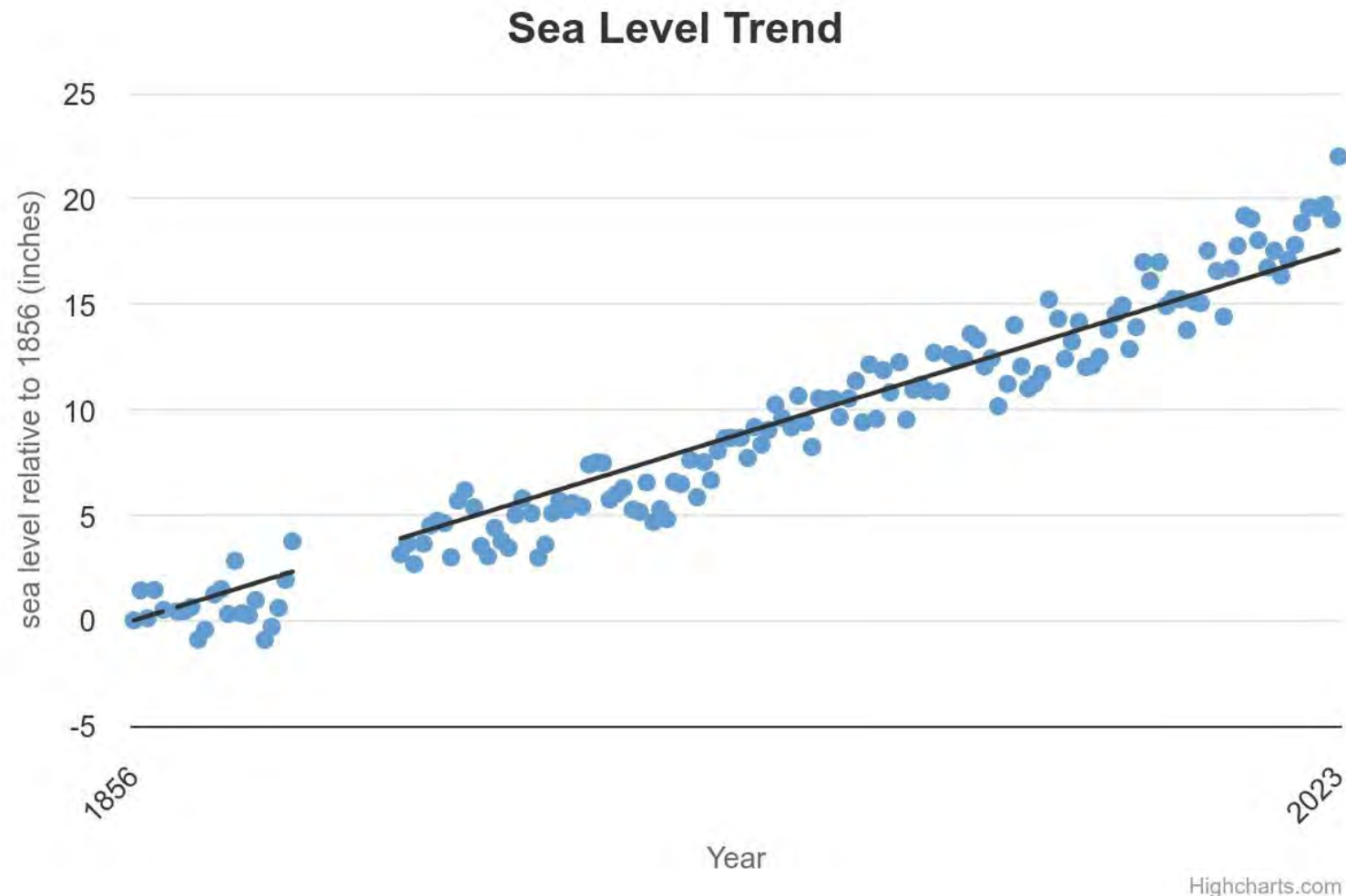
Saltmarsh Snowy Egret. Photo: Chuck Wood/Audubon Photography Awards

## Current Threats to Salt Marshes:

- Sea Level Rise

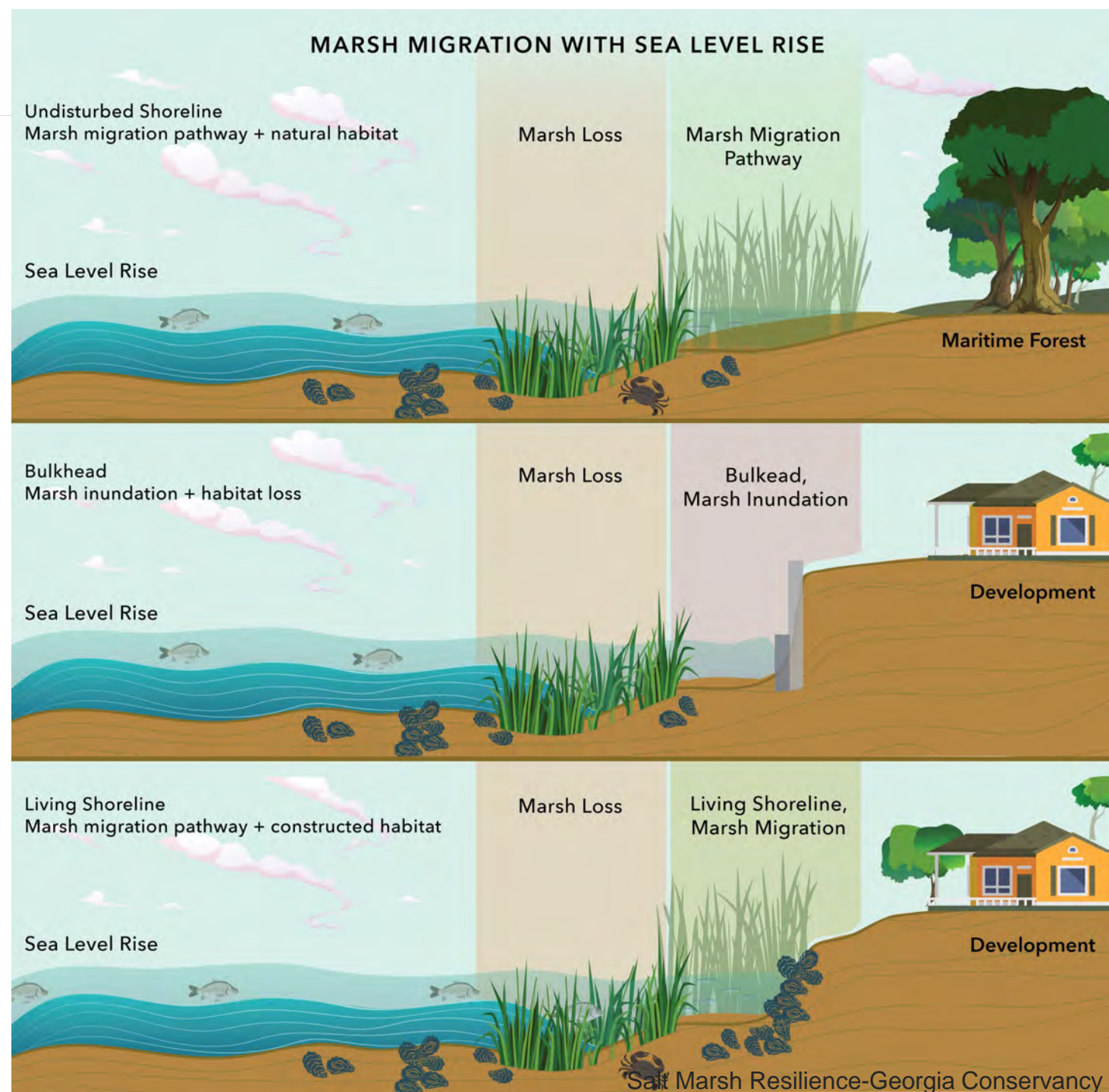
CT Institute for Resilience & Climate Adaptation (CIRCA):  
CT should plan for up to **20 inches of sea level rise by 2050.**

6 NYCRR Part 490, Projected  
Sea-level Rise: NY should  
prepare for up to **25 inches of  
sea level rise by 2050.**



# What is Marsh Migration?

The natural processes of marshes to respond to increased inundation by migrating inland and colonizing areas that were previously at higher elevations





# How do you make salt marshes more resilient to SLR and accommodate for marsh migration?

- Salt Marsh Restoration
- Nature Based Solutions
- Land Protection
- Advocacy/Policy
- Community Conservation Action



Great Meadows Marsh. Photo: Audubon CT

## What is SLAMM (Sea Level Affecting Marshes Model)

- Mathematical model that uses digital elevation data and other information to simulate the dominant processes involved in wetland conversions and shoreline modifications during long-term sea level rise.



# Long Island Sound Marsh Viewer



warrenpinnacle.com/LIMaps/



## Map of Study Area

This map displays the 67 marsh parcels that were selected for this study.

"Hover" over a marsh polygon to see its name.

"Click" on a polygon to zoom in, or select from the "Zoom to" Menu to the right. (Move closer to a site to see tax and marsh maps.)

The purpose of the interactive viewer is to illustrate the fate of significant marsh systems on Long Island Sound under future Sea-Level Rise projections. Model results are combined with tax-parcel information and information about marsh ecosystem services are integrated to assist conservation groups in defining and assessing various land-management alternatives.

For more information about the underlying models and data please see the [Modeling Project Website](#)

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Map Center: [41.00270, -73.22044]



Sunken Meadow Marsh. Photo: Vicky O'Neill, Audubon NY



Sunken Meadow Marsh. Photo: Olivia Olynciw, Audubon NY

## Audubon NY Salt Marsh Restoration Projects

### Sunken Meadow Salt Marsh Restoration Projects-Kings Park, NY

- LISS Stewardship Site, ACJV  
Saltmarsh Sparrow priority site
- Partners: NYS Parks, Save the Sound, NYNHP
- Restore ~78 acres
- 2020 LISFF: completed 60% design
- 2023 LISFF: 100% design & permitting anticipated spring 2025



Crab Meadow Marsh. Photo: Vicky O'Neill, Audubon NY



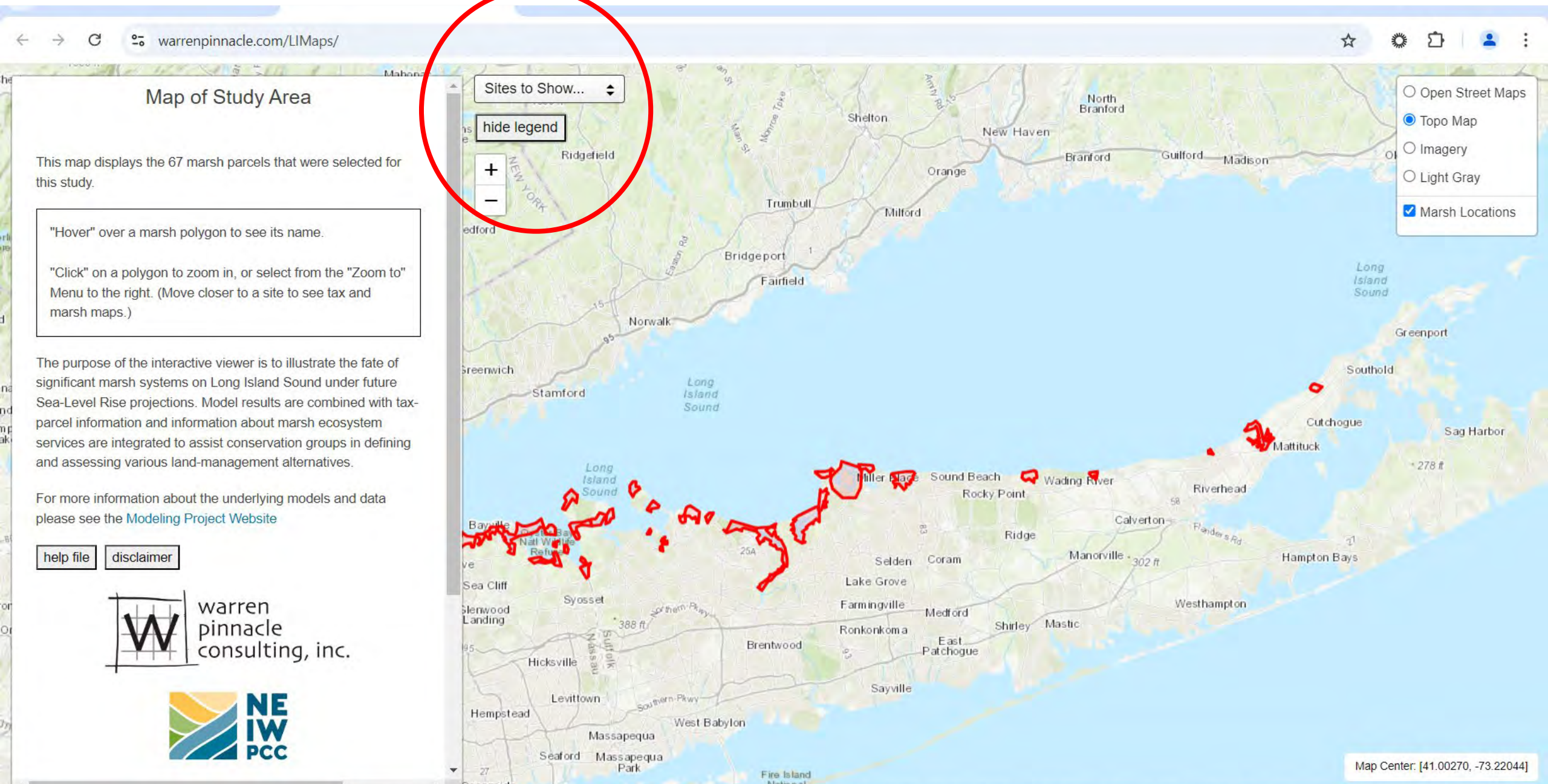
Crab Meadow Marsh. Photo: Vicky O'Neill, Audubon NY

## Audubon NY Salt Marsh Restoration Projects

### Crab Meadow Salt Marsh Restoration Project-Fort Salonga, NY

- LISS Stewardship Site, ACJV Saltmarsh Sparrow priority site, Crab Meadow Hydrology & Stewardship Plan priority
- Partners: Town of Huntington, USFWS
- Restore ~250 acres
- 2023 USFWS: completed baseline marsh data collection
- 2024 USFWS Coastal Program funding: initial feasibility studies

# Long Island Sound Marsh Viewer



## Map of Study Area

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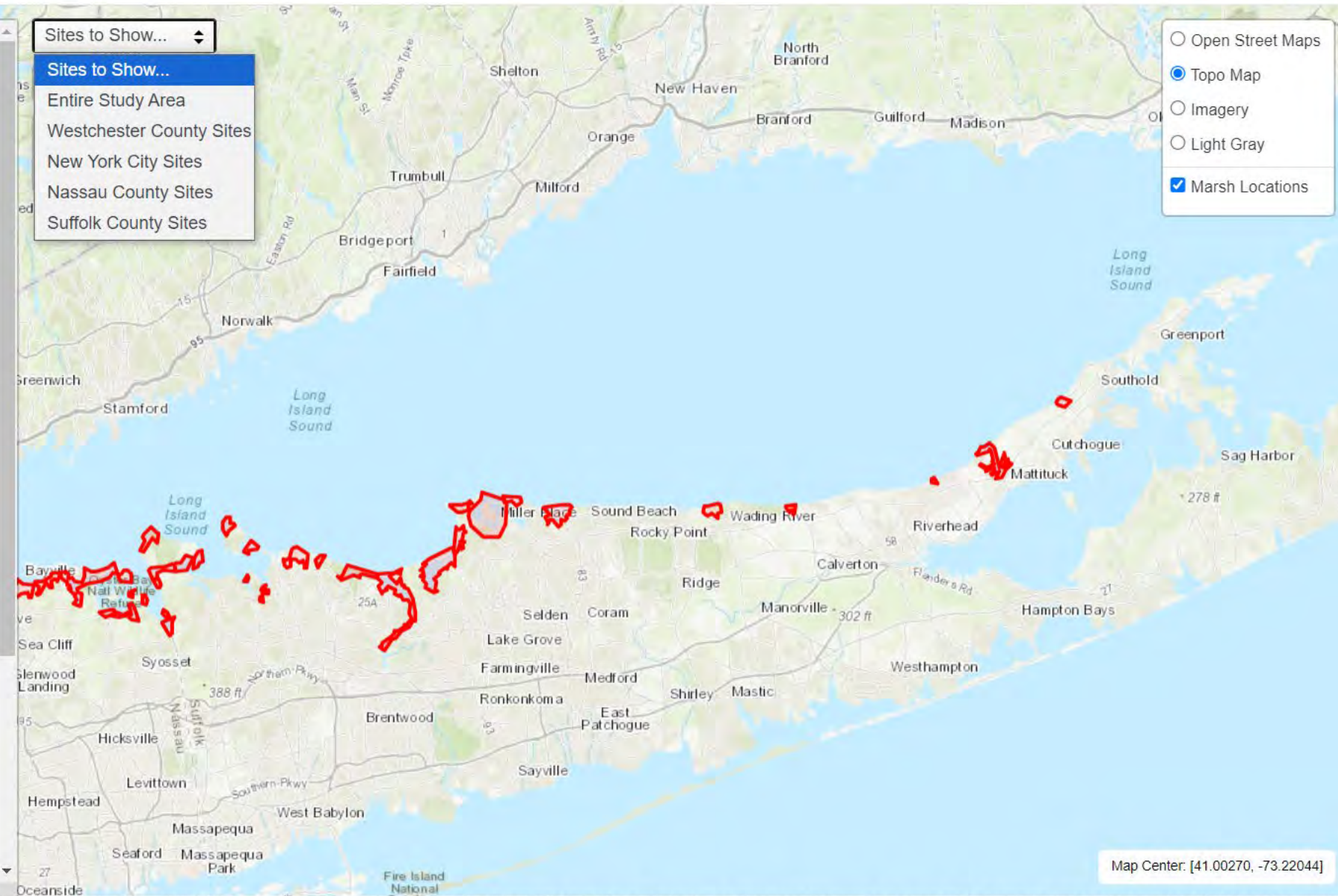
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- Sites to Show...
  - Entire Study Area
  - Westchester County Sites
  - New York City Sites
  - Nassau County Sites
  - Suffolk County Sites

- Open Street Maps
- Topo Map
- Imagery
- Light Gray
- Marsh Locations



Map Center: [41.00270, -73.22044]

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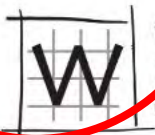
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- Open Street Maps
- Topo Map
- Imagery
- Light Gray
- Marsh Locations



Map Center: [41.00270, -73.22044]





### "Wetland Type" Map for Sunken Meadow Map at 2055, Medium SLR

#### Wetland Type:

- Low Tidal
- Low Marsh
- High Marsh
- Freshwater Non-Tidal
- Freshwater Tidal Marsh
- Flooded Developed Dry Land

[definitions](#)

This map shows a map of marsh types predicted for a given date and SLR scenario. Low SLR would be 38 cm by 2100, Medium: 91cm by 2100, and High: 190 cm by 2100. (Base year is 2002)

[Sunken Meadow fact sheet](#)

**Blue Tax Boundaries are Public Land**  
**Black Tax Boundaries are Private Land**

Suffolk County Real Property Tax Service Agency "AREIS and Tax Map"  
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[no colors](#)

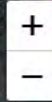
Click on a tax parcel to see data about current and future marsh projections

For more information about the underlying models and data please see the [Modeling Project Website](#)

[help file](#) [disclaimer](#)

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- Open Street Maps
- Topo Map
- Imagery
- Light Gray
- Tax Boundaries
- Probability
- Marsh-Type
- No Overlay

Low SLR, Medium, High SLR

2004 2025 2040 2055 2070 2085 2100

Map Center: [40.90890, -73.26501]

### "Wetland Type" Map for Sunken Meadow Map at 2055, Medium SLR

#### Wetland Type:

- Low Tidal
- Low Marsh
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- Imagery
- Light Gray
- Tax Boundaries

- Probability
- Marsh-Type
- No Overlay

Low SLR, Medium, High SLR



2004 2025 2040 2055 2070 2085 2100



Map Center: [40.90890, -73.26501]

# "Wetland Type" Map for Sunken Meadow Map at 2070, Medium SLR

### Wetland Type:

- Low Tidal
- Low Marsh
- High Marsh
- Freshwater Non-Tidal
- Freshwater Tidal Marsh
- Flooded Developed Dry Land

### Wetland Type:

- Low Tidal is composed of non-vegetated tidal flats and beaches.
- Low Marsh consists of regularly-flooded (daily-flooded) salt marsh
- High Marsh includes irregularly-flooded salt marsh and transitional marshes
- Freshwater Non Tidal are non-saline wetlands such as swamps and inland fresh marshes
- Freshwater Tidal Marshes consist of tidal fresh marshes and tidal swamps
- Flooded Developed lands subject to monthly flooding

**Click this message to dismiss**

This map shows a map of marsh types predicted for a given date and SLR scenario. Low SLR would be 38 cm by 2100, Medium: 91cm by 2100, and High: 190 cm by 2100. (Base year is 2002)

[Sunken Meadow fact sheet](#)

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Low SLR, Medium, High SLR

2004 2025 2040 2055 2070 2085 2100

- Open Street Maps
- Topo Map
- Imagery
- Light Gray
- Tax Boundaries

- Probability
- Marsh-Type
- No Overlay

Map Center: [40.90807, -73.26994]

### "Wetland Type" Map for Sunken Meadow Map at 2070, Medium SLR

#### Wetland Type:

- Low Tidal
- Low Marsh
- High Marsh
- Freshwater Non-Tidal
- Freshwater Tidal Marsh
- Flooded Developed Dry Land

[definitions](#)

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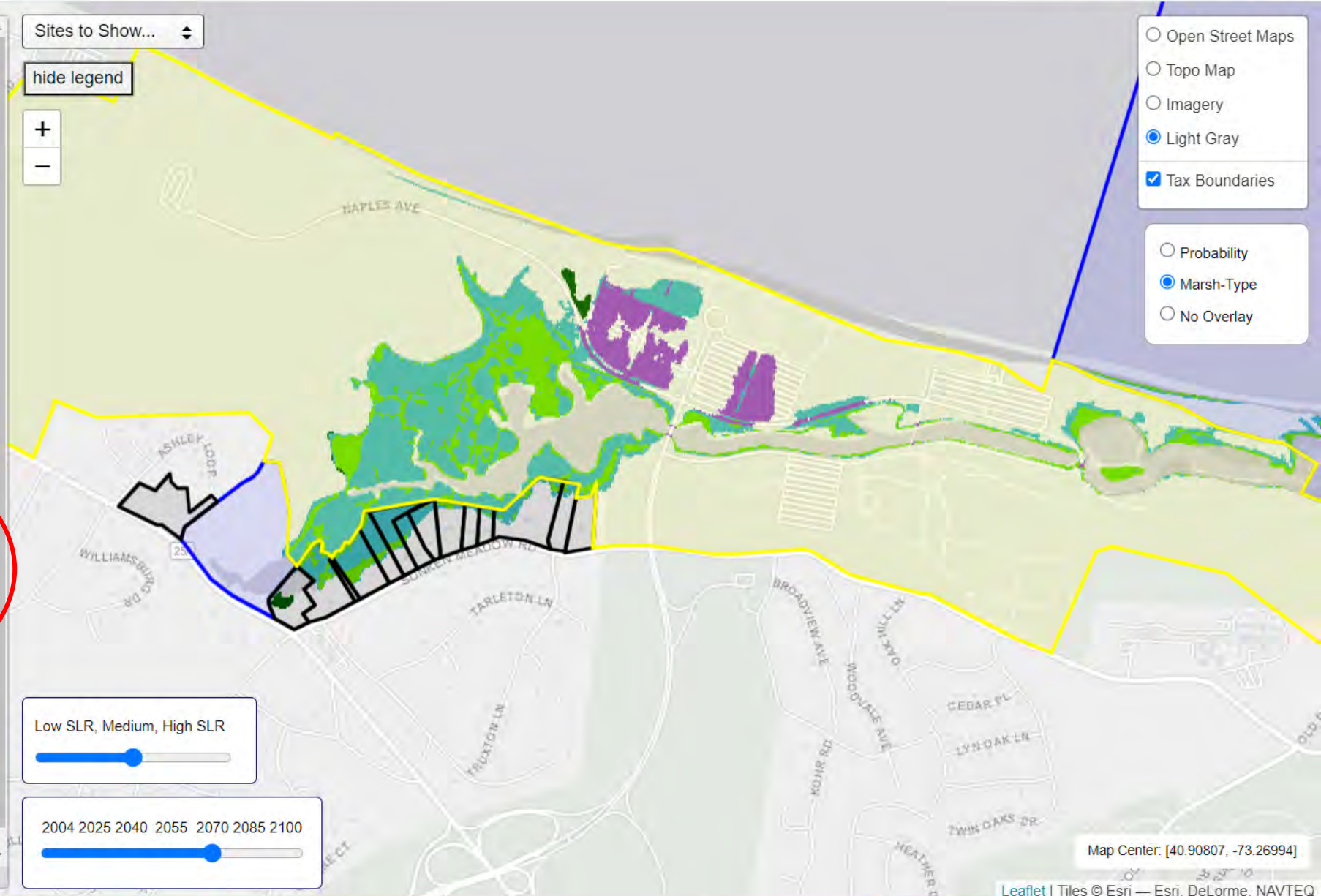
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  - Imagery
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  - Tax Boundaries
- 
- Probability
  - Marsh-Type
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Low SLR, Medium, High SLR

2004 2025 2040 2055 2070 2085 2100



Map Center: [40.90807, -73.26994]

## "Wetland Type" Map for Sunken Meadow Map at 2070, Medium SLR

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Low SLR, Medium, High SLR

2004 2025 2040 2055 2070 2085 2100

Owner: DORENE G SCHNEIDER

141 SUNKEN MEADOW RD, FORT SALONGA NY 11768; Tax ID (SBL):0800004000200008003

Total Acres: 6.7	Current	2055	2100
Fate of Current Existing Marsh Area (acres)	0.97	0.97	0.93
New Marsh in Undeveloped Dry Land (acres)	0	0.52	1.67
New Marsh in Developed Dry Land (acres)	0	0	0
<b>Total Marsh "Expected Value" (acres)</b>	<b>0.97</b>	<b>1.49</b>	<b>2.59</b>

Marsh Ecosystem Service Value (0-100): 23.55

[definitions](#)

Open Street Maps

Topo Map

Imagery

Light Gray

Tax Boundaries

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Probability

Marsh-Type

No Overlay

Map Center: [40.90771, -73.26922]

### "Wetland Type" Map for Sunken Meadow Map at 2055, Medium SLR

#### Wetland Type:

- Low Tidal
- Low Marsh
- High Marsh
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[definitions](#)

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Low SLR, Medium, High SLR

2004 2025 2040 2055 2070 2085 2100

Map Center: [40.90890, -73.26501]

## Future marsh migration at Sunken Meadow Park/Creek

### PROJECTED INUNDATION AND LANDCOVER CHANGES DUE TO SEA LEVEL RISE

Currently (as of 2004, the most recent land cover data available), the Sunken Meadow State Park and Sunken Meadow Creek study area in Kings Park, NY includes approximately 133 acres of wetlands (marshes and unvegetated flats), of which 98 acres are vegetated marshes, while the rest are beaches and fresh water non tidal. Under most possible sea level rise (SLR) scenarios, the majority of current marsh coverage is predicted to keep up with sea level. These marsh lands currently have high elevations compared to sea levels so they can withstand some sea-level rise. However:

- Areas of high-elevation marshes are predicted to be replaced by lower (more saline) marsh, resulting in a change in habitat type within the marsh;
- Increasing areas of marsh may be lost to wetland flats and/or open water; and
- Dryland areas are predicted to be increasingly regularly inundated.



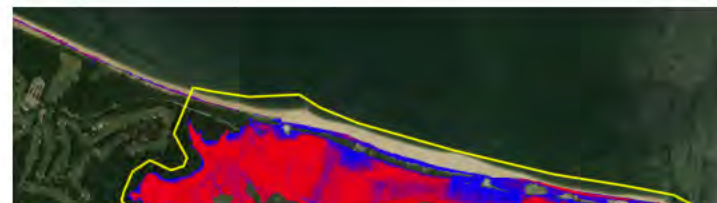
Figure 1. Satellite image of Sunken Meadow area with current marsh coverage (Sources: NWI; Satellite imagery from Google).

A total of 18 tax parcels, in and adjacent to the wetland area, may be affected by increased inundation. The State of New York is the main landowner of the public land currently occupied by marsh, but many privately owned parcels could be affected by increased inundation.

#### ONLINE VIEWER

For more detailed information about each tax parcel, please visit our on-line viewer

<http://warrenpinnacle.com/LIMaps/>





# "Wetland Type" Map for Sunken Meadow Map at 2025, Medium SLR

### Wetland Type:

- Low Tidal
- Low Marsh
- High Marsh
- Freshwater Non-Tidal
- Freshwater Tidal Marsh
- Flooded Developed Dry Land

[definitions](#)

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[Sunken Meadow fact sheet](#)

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  - Imagery
  - Light Gray
  - Tax Boundaries
- Probability
  - Marsh-Type
  - No Overlay

Low SLR, Medium, High SLR



2004 2025 2040 2055 2070 2085 2100



Map Center: [40.90871, -73.26939]

### "Wetland Type" Map for Sunken Meadow Map at 2055, Medium SLR

#### Wetland Type:

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Low SLR, Medium, High SLR

2004 2025 2040 2055 2070 2085 2100

Map Center: [40.90871, -73.26939]

# "Wetland Type" Map for Sunken Meadow Map at 2070, Medium SLR

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- Low Marsh
- High Marsh
- Freshwater Non-Tidal
- Freshwater Tidal Marsh
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[Sunken Meadow fact sheet](#)

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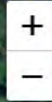
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Low SLR, Medium, High SLR

2004 2025 2040 2055 2070 2085 2100

Map Center: [40.90871, -73.26939]

### "Wetland Type" Map for Sunken Meadow Map at 2100, Medium SLR

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- High Marsh
- Freshwater Non-Tidal
- Freshwater Tidal Marsh
- Flooded Developed Dry Land

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[Sunken Meadow fact sheet](#)

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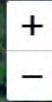
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- Probability
- Marsh-Type
- No Overlay

Low SLR, Medium, High SLR

2004 2025 2040 2055 2070 2085 2100

Map Center: [40.90871, -73.26939]

# "Wetland Type" Map for Sunken Meadow Map at 2025, High SLR

### Wetland Type:

- Low Tidal
- Low Marsh
- High Marsh
- Freshwater Non-Tidal
- Freshwater Tidal Marsh
- Flooded Developed Dry Land

[definitions](#)

This map shows a map of marsh types predicted for a given date and SLR scenario. Low SLR would be 38 cm by 2100, Medium: 91cm by 2100, and High: 190 cm by 2100. (Base year is 2002)

[Sunken Meadow fact sheet](#)

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Click on a tax parcel to see data about current and future marsh projections

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- Light Gray
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- Probability
- Marsh-Type
- No Overlay

Low SLR, Medium, High SLR



2004 2025 2040 2055 2070 2085 2100



Map Center: [40.90871, -73.26939]

# "Wetland Type" Map for Sunken Meadow Map at 2055, High SLR

### Wetland Type:

- Low Tidal
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- High Marsh
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- Freshwater Tidal Marsh
- Flooded Developed Dry Land

[definitions](#)

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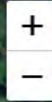
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Low SLR, Medium, High SLR

2004 2025 2040 2055 2070 2085 2100

Map Center: [40.90871, -73.26939]

# "Wetland Type" Map for Sunken Meadow Map at 2070, High SLR

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[definitions](#)

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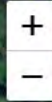
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Low SLR, Medium, High SLR

2004 2025 2040 2055 2070 2085 2100

Map Center: [40.90871, -73.26939]

### "Wetland Type" Map for Sunken Meadow Map at 2100, High SLR

#### Wetland Type:

- Low Tidal
- Low Marsh
- High Marsh
- Freshwater Non-Tidal
- Freshwater Tidal Marsh
- Flooded Developed Dry Land

[definitions](#)

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[no colors](#)

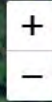
Click on a tax parcel to see data about current and future marsh projections

For more information about the underlying models and data please see the [Modeling Project Website](#)

[help file](#) [disclaimer](#)

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- Open Street Maps
- Topo Map
- Imagery
- Light Gray
- Tax Boundaries
- Probability
- Marsh-Type
- No Overlay

Low SLR, Medium, High SLR

2004 2025 2040 2055 2070 2085 2100

Map Center: [40.90871, -73.26939]



# "Marsh Potential" Map for Sunken Meadow Probability Map at 2025

## Probability of Marsh:

- Zero Probability
- 0.1 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100

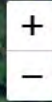
This map shows an estimate of how likely marsh habitat is at each date, given model, data, and sea-level rise uncertainty. Hundreds of model simulations with different assumptions about model inputs and data error were aggregated to produce this map. [Sunken Meadow fact sheet](#)

**Blue Tax Boundaries are Public Land**  
**Black Tax Boundaries are Private Land**  
 Suffolk County Real Property Tax Service Agency "AREIS and Tax Map"  
 Copyright 2019, 2022, County of Suffolk, N.Y.

Click on a tax parcel to see data about current and future marsh projections

Sites to Show...

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- Probability
- Marsh-Type
- No Overlay

2004 2025 2040 2055 2070 2085 2100

Map Center: [40.90871, -73.26939]

### "Marsh Potential" Map for Sunken Meadow Probability Map at 2055

#### Probability of Marsh:

- Zero Probability
- 0.1 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100

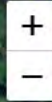
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- Light Gray
- Tax Boundaries
- Probability
- Marsh-Type
- No Overlay

2004 2025 2040 2055 2070 2085 2100

Map Center: [40.90871, -73.26939]

# "Marsh Potential" Map for Sunken Meadow Probability Map at 2100

## Probability of Marsh:

- Zero Probability
- 0.1 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100

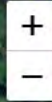
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 Suffolk County Real Property Tax Service Agency "AREIS and Tax Map"  
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Click on a tax parcel to see data about current and future marsh projections

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- Tax Boundaries

- Probability
- Marsh-Type
- No Overlay

2004 2025 2040 2055 2070 2085 2100

Map Center: [40.90871, -73.26939]

### "Wetland Type" Map for Crab Meadow Map at 2025, Medium SLR

#### Wetland Type:

- Low Tidal
- Low Marsh
- High Marsh
- Freshwater Non-Tidal
- Freshwater Tidal Marsh
- Flooded Developed Dry Land

[definitions](#)

This map shows a map of marsh types predicted for a given date and SLR scenario. Low SLR would be 38 cm by 2100, Medium: 91cm by 2100, and High: 190 cm by 2100. (Base year is 2002)

[Crab Meadow fact sheet](#)

**Blue Tax Boundaries are Public Land**  
**Black Tax Boundaries are Private Land**

[no colors](#)

Suffolk County Real Property Tax Service Agency "AREIS and Tax Map"  
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Click on a tax parcel to see data about current and future marsh projections

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- Tax Boundaries
- Probability
- Marsh-Type
- No Overlay

Low SLR, Medium, High SLR



2004 2025 2040 2055 2070 2085 2100



Map Center: [40.91935, -73.32774]

# "Wetland Type" Map for Crab Meadow Map at 2055, Medium SLR

### Wetland Type:

- Low Tidal
- Low Marsh
- High Marsh
- Freshwater Non-Tidal
- Freshwater Tidal Marsh
- Flooded Developed Dry Land

[definitions](#)

This map shows a map of marsh types predicted for a given date and SLR scenario. Low SLR would be 38 cm by 2100, Medium: 91cm by 2100, and High: 190 cm by 2100. (Base year is 2002)

[Crab Meadow fact sheet](#)

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[no colors](#)

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Low SLR, Medium, High SLR



2004 2025 2040 2055 2070 2085 2100



Map Center: [40.91935, -73.32774]

### "Wetland Type" Map for Crab Meadow Map at 2070, Medium SLR

#### Wetland Type:

- Low Tidal
- Low Marsh
- High Marsh
- Freshwater Non-Tidal
- Freshwater Tidal Marsh
- Flooded Developed Dry Land

[definitions](#)

This map shows a map of marsh types predicted for a given date and SLR scenario. Low SLR would be 38 cm by 2100, Medium: 91cm by 2100, and High: 190 cm by 2100. (Base year is 2002)

[Crab Meadow fact sheet](#)

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[no colors](#)

Suffolk County Real Property Tax Service Agency "AREIS and Tax Map"  
Copyright 2019, 2022, County of Suffolk, N.Y.

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- No Overlay

Low SLR, Medium, High SLR



2004 2025 2040 2055 2070 2085 2100



Map Center: [40.91935, -73.32774]

# "Wetland Type" Map for Crab Meadow Map at 2100, Medium SLR

## Wetland Type:

- Low Tidal
- Low Marsh
- High Marsh
- Freshwater Non-Tidal
- Freshwater Tidal Marsh
- Flooded Developed Dry Land

[definitions](#)

This map shows a map of marsh types predicted for a given date and SLR scenario. Low SLR would be 38 cm by 2100, Medium: 91cm by 2100, and High: 190 cm by 2100. (Base year is 2002)

[Crab Meadow fact sheet](#)

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[no colors](#)

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- No Overlay

Low SLR, Medium, High SLR



2004 2025 2040 2055 2070 2085 2100



Map Center: [40.91935, -73.32774]

# "Wetland Type" Map for Crab Meadow Map at 2025, High SLR

## Wetland Type:

- Low Tidal
- Low Marsh
- High Marsh
- Freshwater Non-Tidal
- Freshwater Tidal Marsh
- Flooded Developed Dry Land

[definitions](#)

This map shows a map of marsh types predicted for a given date and SLR scenario. Low SLR would be 38 cm by 2100, Medium: 91cm by 2100, and High: 190 cm by 2100. (Base year is 2002)

[Crab Meadow fact sheet](#)

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[no colors](#)

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[help file](#)

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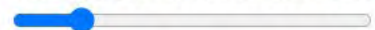


- Open Street Maps
- Topo Map
- Imagery
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- Tax Boundaries
- Probability
- Marsh-Type
- No Overlay

Low SLR, Medium, High SLR



2004 2025 2040 2055 2070 2085 2100



Map Center: [40.91935, -73.32774]



# "Wetland Type" Map for Crab Meadow Map at 2055, High SLR

## Wetland Type:

- Low Tidal
- Low Marsh
- High Marsh
- Freshwater Non-Tidal
- Freshwater Tidal Marsh
- Flooded Developed Dry Land

[definitions](#)

This map shows a map of marsh types predicted for a given date and SLR scenario. Low SLR would be 38 cm by 2100, Medium: 91cm by 2100, and High: 190 cm by 2100. (Base year is 2002)

[Crab Meadow fact sheet](#)

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[no colors](#)

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- Marsh-Type
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Low SLR, Medium, High SLR



2004 2025 2040 2055 2070 2085 2100



Map Center: [40.91935, -73.32774]

### "Wetland Type" Map for Crab Meadow Map at 2070, High SLR

#### Wetland Type:

- Low Tidal
- Low Marsh
- High Marsh
- Freshwater Non-Tidal
- Freshwater Tidal Marsh
- Flooded Developed Dry Land

[definitions](#)

This map shows a map of marsh types predicted for a given date and SLR scenario. Low SLR would be 38 cm by 2100, Medium: 91cm by 2100, and High: 190 cm by 2100. (Base year is 2002)

[Crab Meadow fact sheet](#)

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[no colors](#)

Suffolk County Real Property Tax Service Agency "AREIS and Tax Map"  
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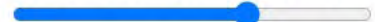


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Low SLR, Medium, High SLR



2004 2025 2040 2055 2070 2085 2100



Map Center: [40.91935, -73.32774]

# "Wetland Type" Map for Crab Meadow Map at 2100, High SLR

## Wetland Type:

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- Low Marsh
- High Marsh
- Freshwater Non-Tidal
- Freshwater Tidal Marsh
- Flooded Developed Dry Land

[definitions](#)

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[Crab Meadow fact sheet](#)

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Low SLR, Medium, High SLR



2004 2025 2040 2055 2070 2085 2100



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no colors

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2004 2025 2040 2055 2070 2085 2100

Map Center: [40.91935, -73.32774]



## What can LIS Marsh Viewer do for you?

- **View the fate of 67 Long Island Sound marsh parcels**
- **Identify property owners**
- **Determine marsh type conversion**
- **Determine flooded infrastructure**
- **Planning for various SLR scenarios and timeframes**
- **Access individual site marsh migration fact sheets**



**Victoria O'Neill**

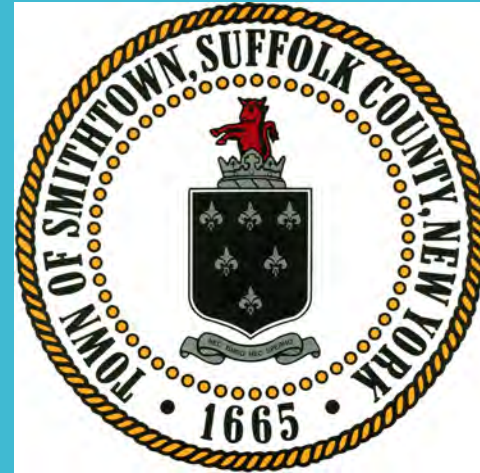
**Director of Coastal Resilience**

**Audubon CT/NY**

**[victoria.oneill@audubon.org](mailto:victoria.oneill@audubon.org)**

**516-922-3200 Ext 8**



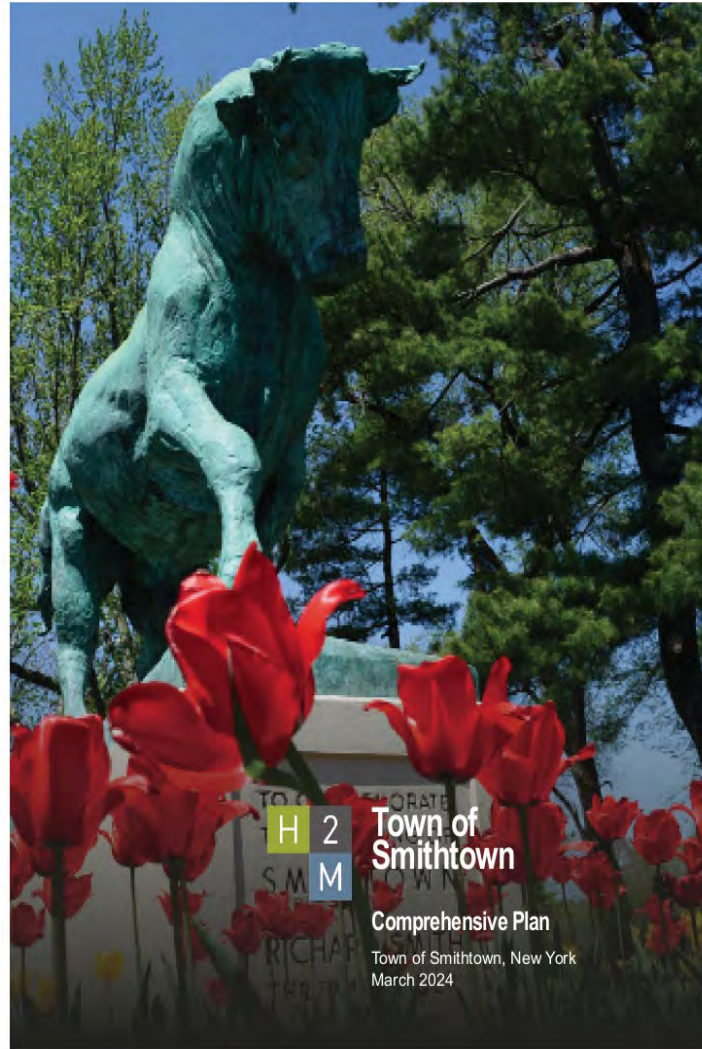


# Town of Smithtown

Bluff Resiliency Efforts

# Plans and Studies:

- Town Comprehensive Plan 2024 Sustainability Chapter
- LWRP 1989
- LWRP 2019(draft)
- Bluff Management Guide 2024 (draft)
- Marsh Conservation Plan 2023
- Mean High Water Study 2023



## Town of Smithtown Local Waterfront Revitalization Program

Adopted:  
Town of Smithtown Town Board, May 2, 1989  
Approved:  
NYS Secretary of State Carl S. Shaffer, August 16, 1989  
Covered:  
U.S. Office of Ocean and Coastal Resource Management, September 7, 1989

## MARSH CONSERVATION PLANNING FOR STONY BROOK HARBOR NY AND WEST MEADOW CREEK NY



NEIWPCC  
December, 2023

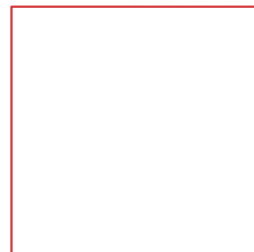
## LOCAL WATERFRONT REVITALIZATION PROGRAM DRAFT

TOWN OF SMITHTOWN  
AUGUST 2019





A Guide to Coastal  
Bluff Erosion Management  
Resources for Smithtown Bluff Owners  
and Managers

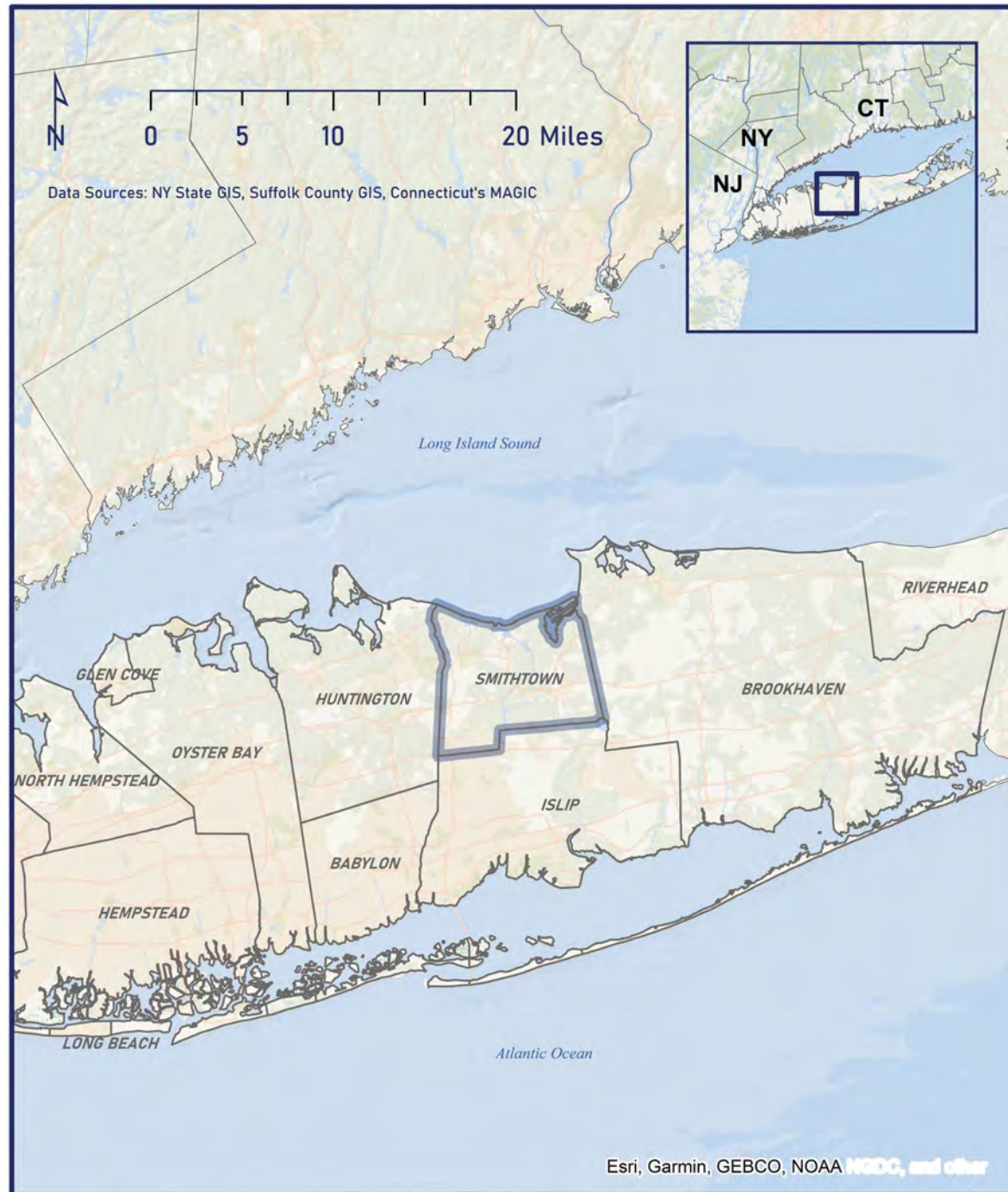


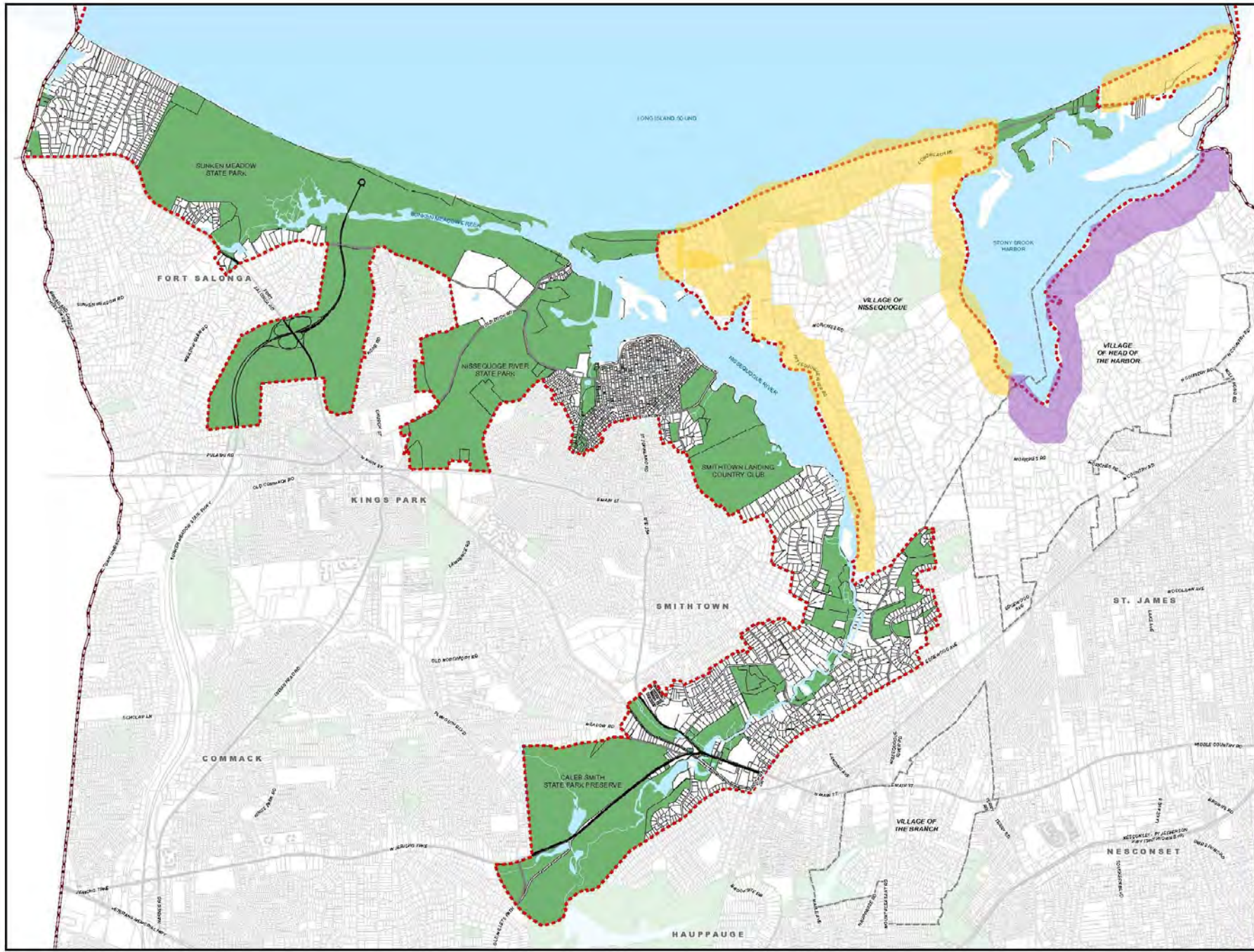
# 8.1 MILES OF SHORELINE on Smithtown Bay

- 1.6 miles of bluff westerly (20%)

- 2.3 miles of bluff centrally located (28%)

- 3.14 mile publicly owned (39%)





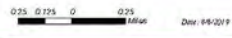
Stony Brook Harbor and the Nissequogue River areas are included in the Town and Village LWRP. This is the result of different jurisdictional authorities exercised by the Town of Smithtown and the Village. The map's designations will more fully describe the different jurisdictions of the Town and Village within these watersheds.

Source: LWRP, New York State Department of State Administration  
 Revisions: Property Lines, Suffolk County Real Property Tax Maps  
 2019.



**LEGEND**

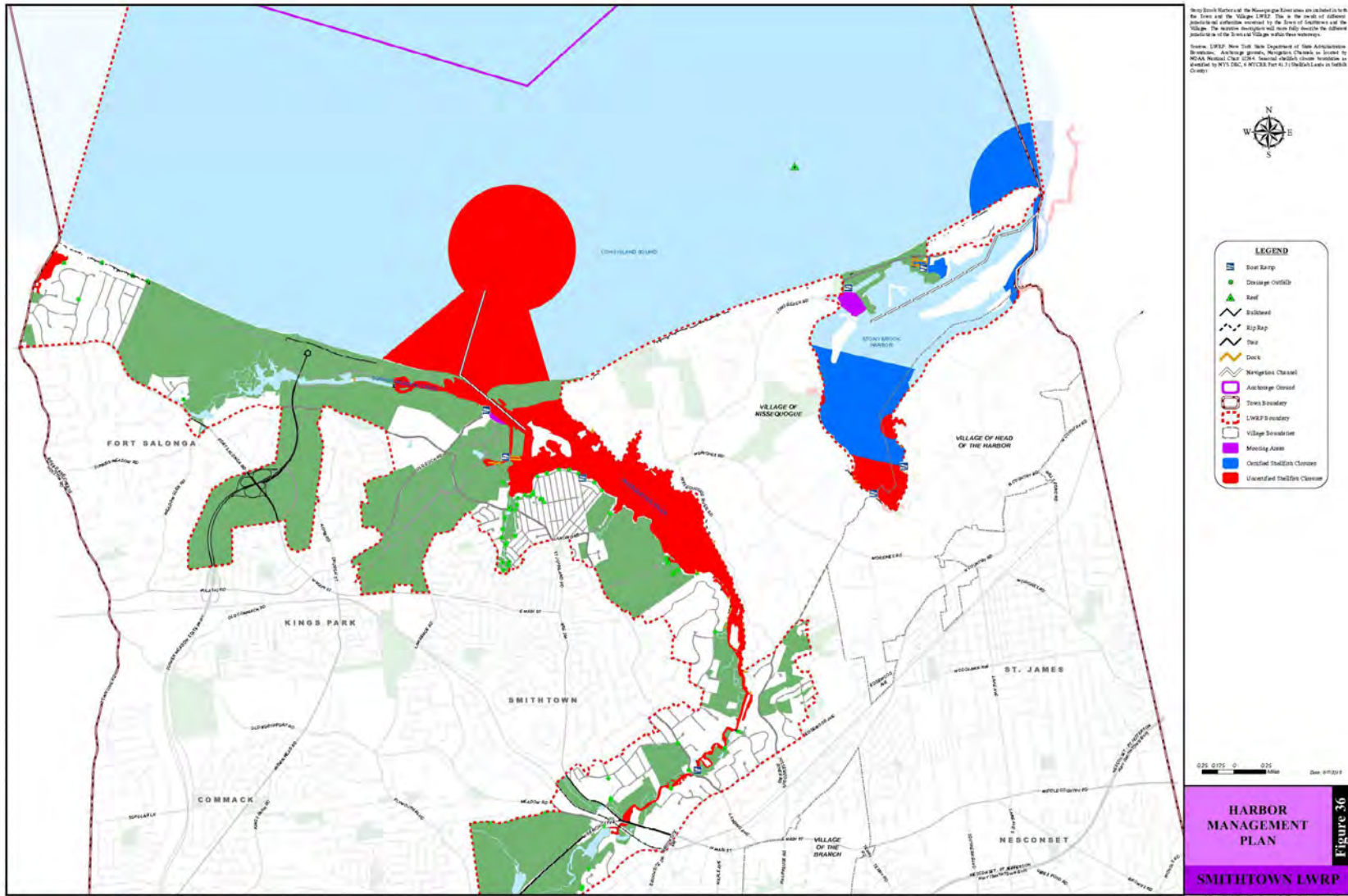
- Thin Parcel
- Town Boundary
- LWRP Boundary
- Village Boundary
- Water
- Open Space



**LWRP BOUNDARY**

**SMITHTOWN LWRP**

Figure 1



Only those portions of the Navigation Channel that are included in both the LWRP and the Village LWRP are in the area of regulated shellfish harvesting. The portion of the Navigation Channel that is not included in both the LWRP and the Village LWRP is not in the area of regulated shellfish harvesting.

Source: LWRP, New York State Department of State Administration Services, Navigation Channel, Navigation Channel as shown by NOAA Nautical Chart 1164. General Shellfish Clearance as shown by NOAA Nautical Chart 1164. General Shellfish Clearance as shown by NOAA Nautical Chart 1164. General Shellfish Clearance as shown by NOAA Nautical Chart 1164.

Figure 36. Harbor Management Plan

WESTERN BLUFF				
Property ID	Address	SCTM	Owner	Sea Wall Present
1	8 Pheasant Run	03-1-2-5.11	Rooney	No
2	7 Pheasant Run	03-1-2-5.10	Whiskytick, LLC	No
3	6 Pheasant Run	03-1-2-5.9	Breslawski	No
4	5 Pheasant Run	03-1-2-5.8	Gardner	No
5	4 Pheasant Run	03-1-2-5.7	Kapoor	No
6	703 Short Beach Rd	03-1-2-6	Niss. Point Beach, Inc.	Bulkhead
7	Boney Ln	03-2-1-1	Niss. Point Beach, Inc.	Bulkhead
8	Boney Ln	03-2-1-2	Cortazar	No
9	897 Short Beach Rd	03-2-1-3	Labiak	No
10	Boney Ln	03-2-1-6.1	Nature Conservancy	No
11		03-2-1-6.2	Nature Conservancy	No
12		03-2-1-7	Nature Conservancy	No
13	25 Triple Oak Ln	03-2-2-1	Wani	No
14	23 Triple Oak Ln	03-2-2-2	Stange	Bulkhead
15	21 Triple Oak Ln	03-2-2-3	B Cortazar Enterprises, LLC	No

Bulkhead is not present = 12 tax lots (approx. 4,205 linear feet)

Bulkhead is present = 3 tax lots (approx. 570 linear feet)

**\*Approximately 12% (570 linear feet on 3 tax lots) of the shoreline is hardened along the western littoral current feeding Short Beach**

EASTERN BLUFF				
Property ID	Address	SCTM	Owner	Sea Wall Present
16	Triple Oak La	03-2-2-23	Wallis	Bulkhead
17	2 Wallis Ln	03-2-2-24	Wallis	Bulkhead
18	4 Wallis Ln	03-3-1-1.5	Mirza	Bulkhead
19	6 Wallis Ln	03-3-1-1.7	6 Wallis Lane, LLC	Rock Wall
20	28 Widerness Rd	03-4-1-1.1	Moghaddasi	Bulkhead
21	2 Richard Path	03-4-1-4	Cosgrove	Bulkhead
22	4 Richard Path	03-4-1-5	Conlon	Bulkhead
23	6 Richard Path	03-4-1-6	Goldkind	Bulkhead
24	8 Richard Path	03-4-1-7	Anberry Realty, LLC	Bulkhead
25	10 Richard Path	03-4-1-8	O'Rourke	No
26	12 Richard Path	03-4-1-9	Forchar	Bulkhead
27	5 Fox Point Dr	03-4-2-1.3	Tarzia	Rock Wall
28	1 Hunters Way	03-4-2-1.4	Fondacardo	No
29	2 Hunters Way	03-4-2-1.5	Louro	Pending Application
30	4 Yens Way	03-4-2-3.2	DeSimone	No
31	3 Yens Way	03-4-2-3.3	Nuli	Rock Wall
32	2 Yens Way	03-4-2-3.4	Ahmed	Pending Application
33	538 Long Beach Rd	03-4-2-5.1	Ardito	Rock Wall
34	1 Bluff Rd	03-4-2-5.10	Rubman	Rock Wall
35	2 Bluff Rd	03-4-2-5.15	Scott	Rock Wall
36	3 Bluff Rd	03-4-2-6.7	Harris	Rock Wall
37	4 Bluff Rd	03-4-2-5.17	Bluffs Realty, LLC	Rock Wall
38	Bluff Rd	03-4-2-6.4	Milano	No
39	546 Long Beach Rd	03-4-2-5.16	Edeball	No
40	Long Beach Rd	03-5-1-6	Town of Smithtown	No

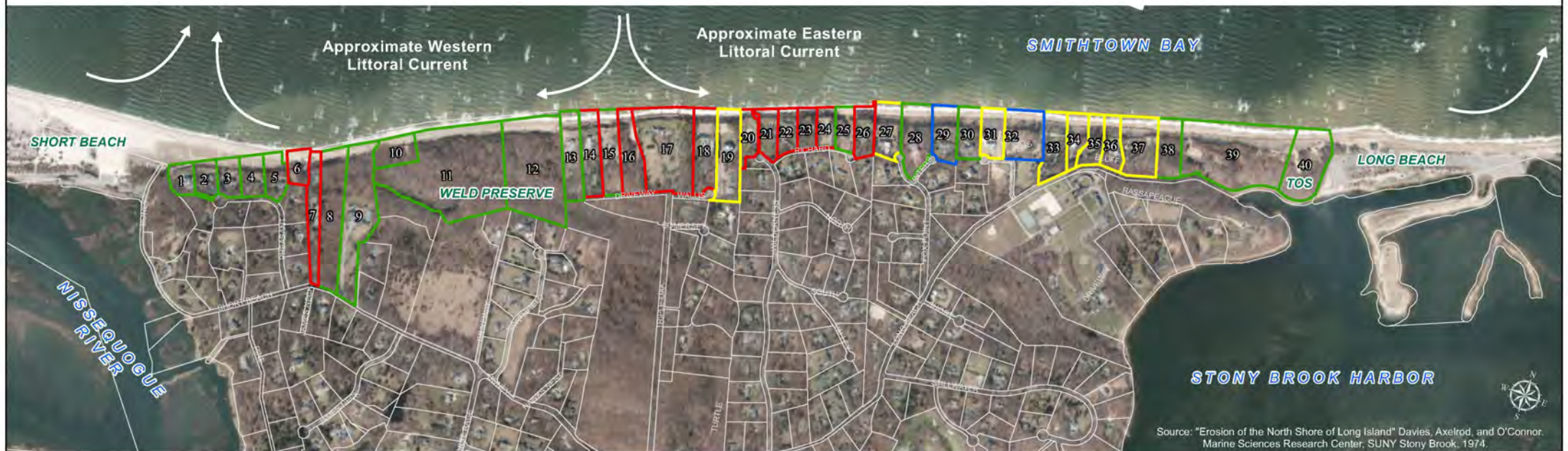
Bulkhead is present = 9 tax lots (approx. 2,280 linear feet)

Rock Wall is present = 8 tax lots (approx. 1,990 linear feet)

Bulkhead is not present = 6 tax lots (approx. 2,590 linear feet)

Application Pending = 2 tax lots (approx. 685 linear feet)

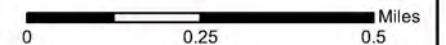
**\*Approximately 57% (4,270 linear feet on 17 tax lots) of the shoreline is hardened along the eastern littoral current feeding Long Beach**



### SEA WALL ANALYSIS ALONG SMITHTOWN BAY Village of Nissequogue

2020 Aerial  
Scale: 1" = 1,000'

- Bulkhead is present
- Rock Wall is present
- Sea Wall is not present
- Pending Application (sea wall currently not present)



Smithtown Planning Department  
February 22, 2021

Source: "Erosion of the North Shore of Long Island" Davies, Axelrod, and O'Connor. Marine Sciences Research Center, SUNY Stony Brook, 1974.



Figure 15. Beach Narrowing in Front of Bulkheads

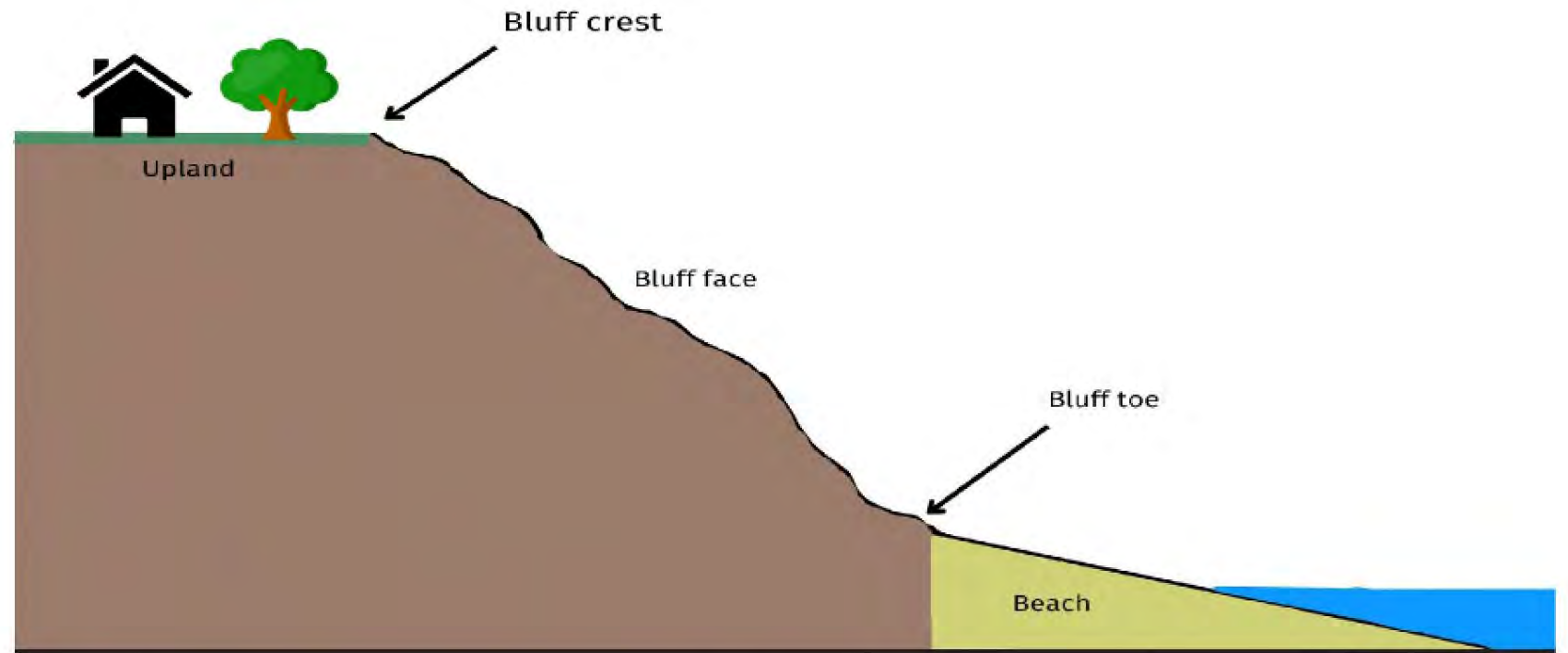


## Bluffs:

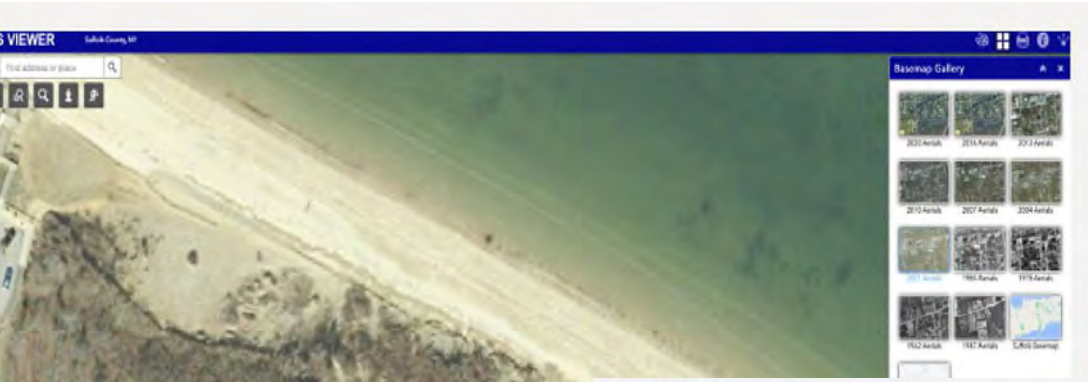
- Crest
- Face
- Toe

## Erosion:

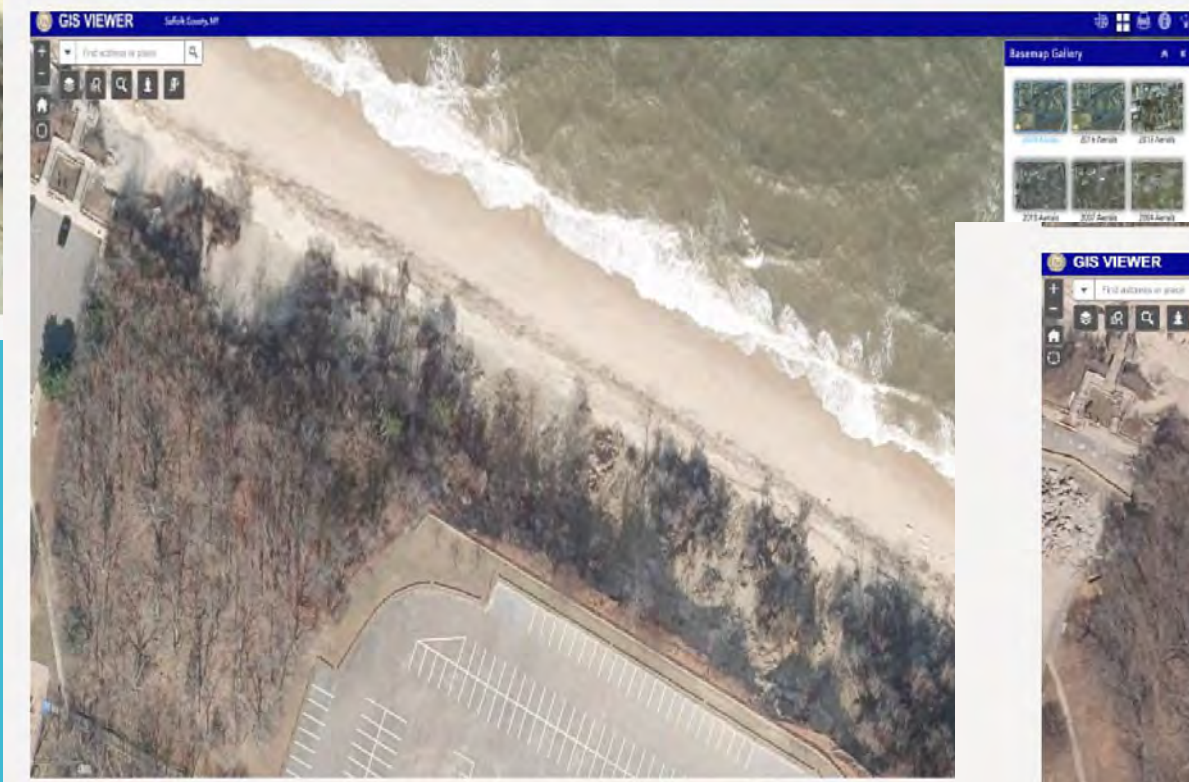
- Wave Action
- Wind
- Surface Water



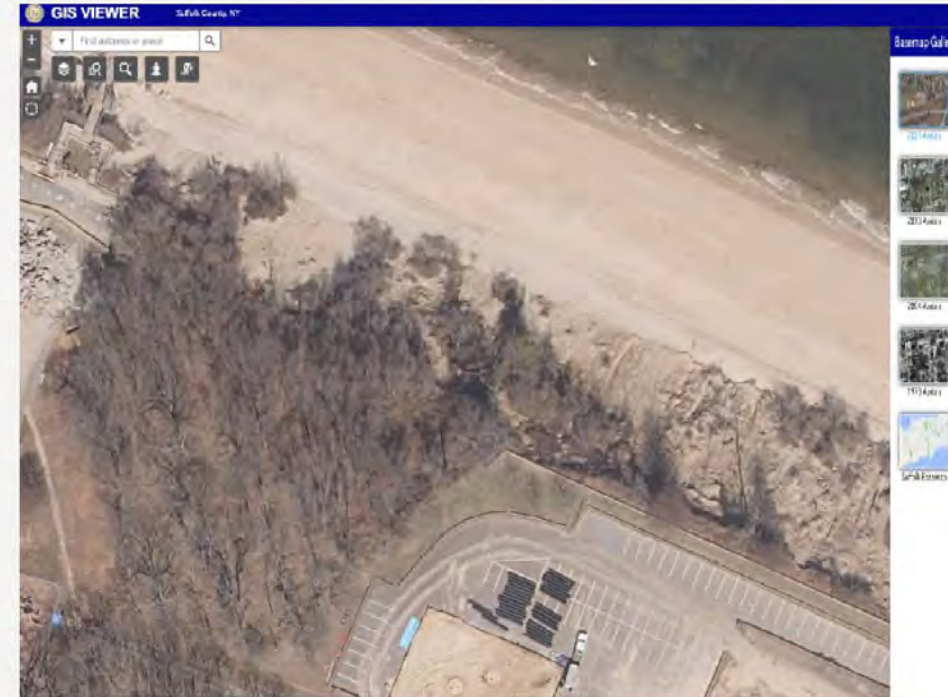
# Callahan's Beach Town Park Erosion Study



2001



2020



2023

Aerial imagery of Callahan's Beach in 2001 (top), 2020 (middle), and 2023 (bottom). In the 2023 imagery, construction activity for restoration is visible.

# Historical Erosion Rates

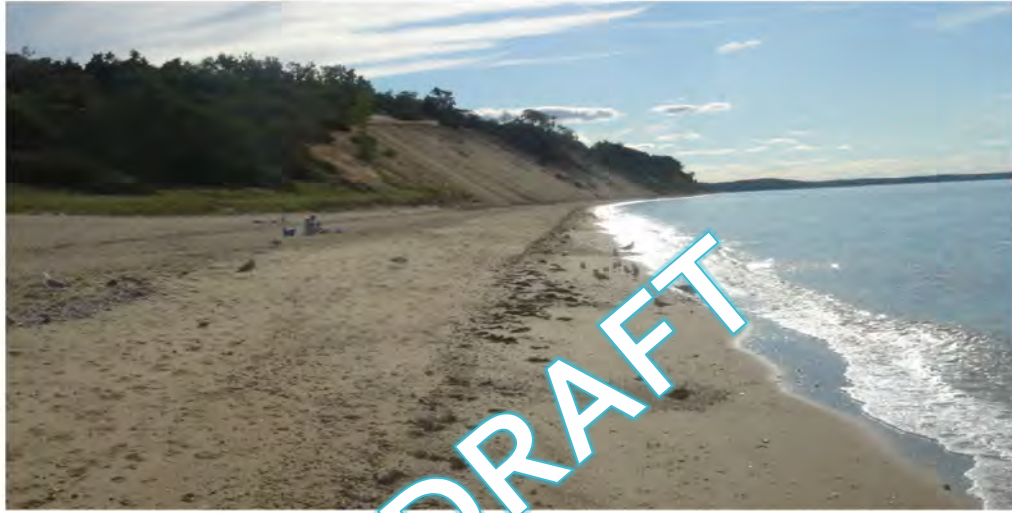
## **Smithtown Bay, Village of Nissequogue:**

- 1 Yens Way: 34' over 54 years (0.6' per year)
- 21 Triple Oak Lane: 20' over 22 years (0.9' per year)
- 10 Richards Path: 75' over 32 years (2.3' per year)

## **Long Island Sound, Fort Salonga**

- Sunken Meadow: 26' over 54 years (0.5' per year)
- Beach Hill Drive: 67' over 37 years (1.8' per year)
- Bonnie & Sound Road: 8' over 22 years (0.4' per year)

**In this study, sites with a bulkhead on-site or site-adjacent generally experienced the highest rates of erosion.**



# A Guide to Coastal Bluff Erosion Management

Resources for Smithtown Bluff Owners  
and Managers



## Chapter 2: Toolkit for Conserving Bluffs and Managing Erosion

Part 1: Proactive Design Considerations

Part 2: Structure Relocation

Part 3: Nature-based Approaches

Part 4: Lower-impact Approaches

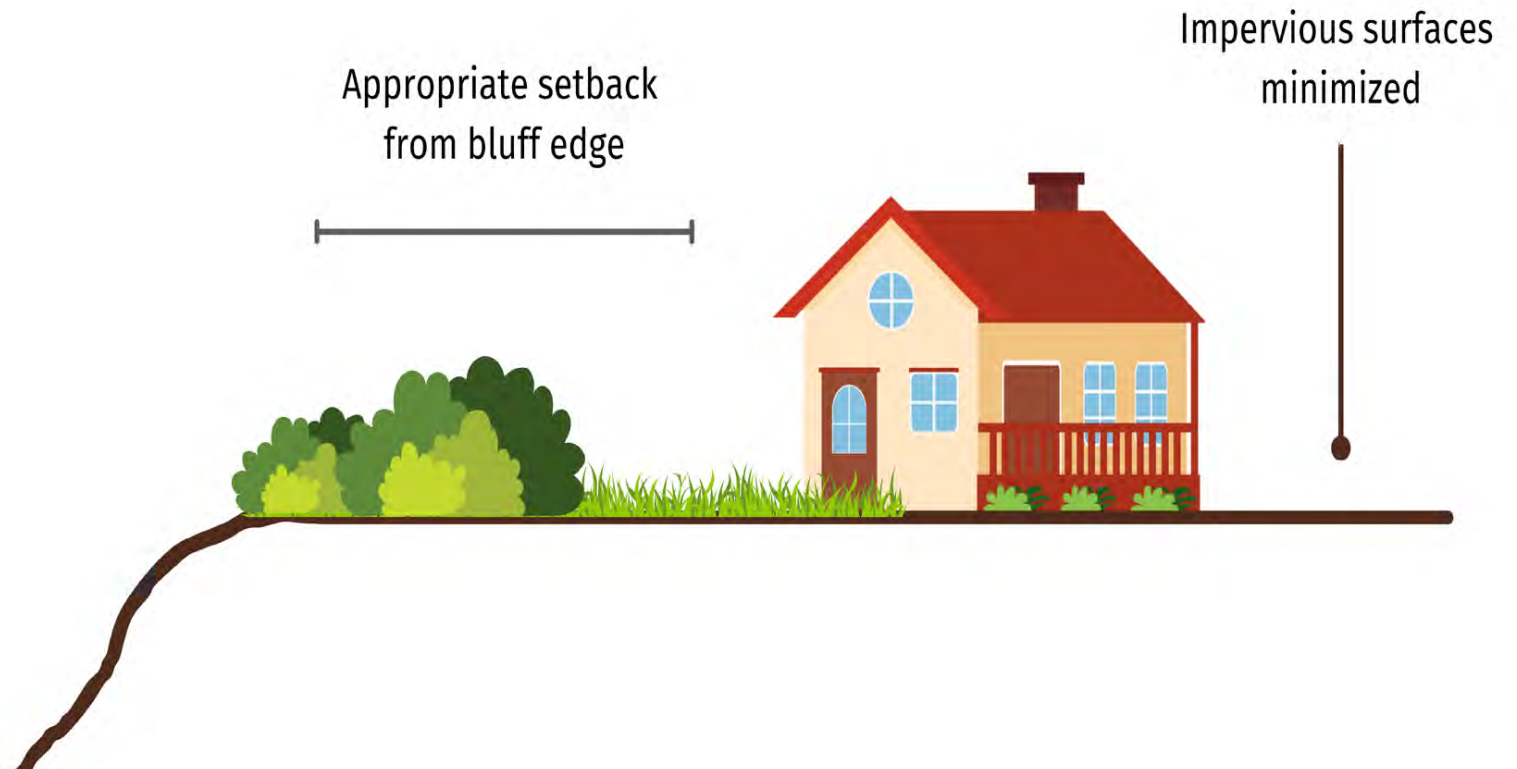
Part 5: Structural Bluff Interventions and Hardened Infrastructure

Part 6: Coordination of Efforts



# Proactive Design Considerations

- **Provide Appropriate Setbacks**
- **Smart Structure Placement**
- **Minimize Impervious Surfaces**



# Structure Relocation

Tool Strengths	Tool Limitations
Can be less costly than shore protection or bluff stabilization	Cost of relocation may exceed value of the structure
Often the most reliable, effective method of protecting structures long-term	Long-term effectiveness depends on new setback distance and rate of bluff recession
Lower long-term maintenance costs than bluff stabilization	Property size may not accommodate the desired setback distance
Minimal to no negative impact to public & adjacent properties	



# Nature Based Approaches

- Encourage and Enhance Native Deep-rooted plants
- Employ Green Infrastructure Design Principles
  - Consider Living Shorelines to manage Bluff Toe erosion

Tool Strengths	Tool Limitations
Roots and topgrowth protect the bluff top from erosion	Does not address certain root causes of bluff instability, such as slope angle or groundwater drainage
Relatively low cost	Plant establishment takes time & moderate to high up-front monetary investment
Improves coastal habitat quality and ecosystem function	Plant installation and care on bluff face can be challenging or impractical, depending on bluff steepness
Improves and complements bluff aesthetics	



Northern Bayberry



American Beach grass  
Beach Goldenrod



Panicum Grass

# Lower Impact Approaches

- **Surface Water Management**
- **Groundwater Drainage Improvements**
- **Locate Septic Leaching Pools far from Top of Bluff**



## Tool Strengths

## Tool Limitations

Costs vary, but are generally much lower than higher-intensity bluff interventions, such as regrading or shoreline hardening

Does not address erosion from wave action at the bluff toe

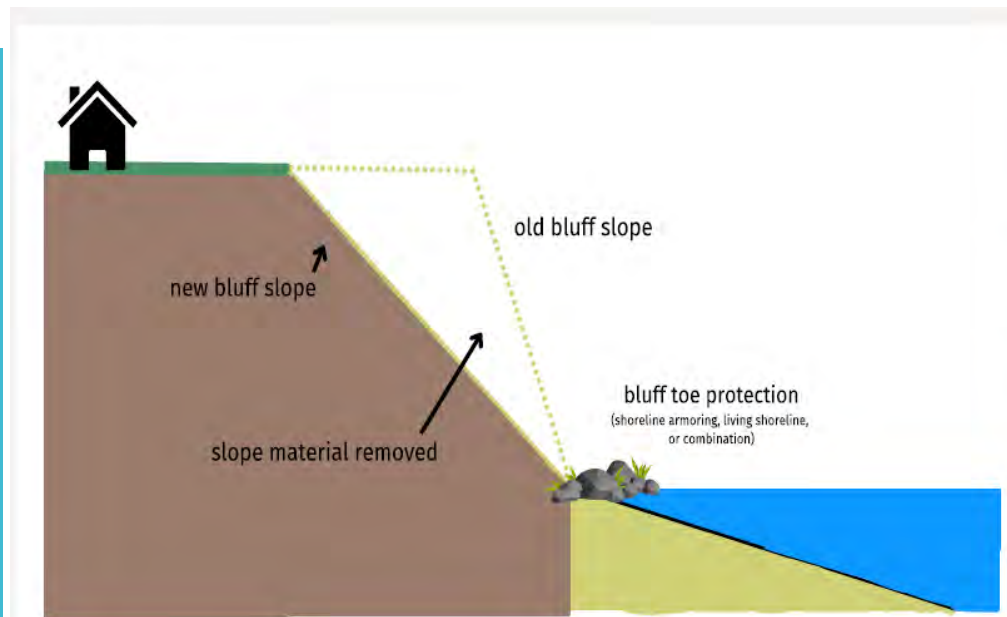
If drainage is properly redirected, negative impacts to neighboring properties and the public can be largely avoided

Does not provide erosion control benefits to adjacent properties that are not part of the project

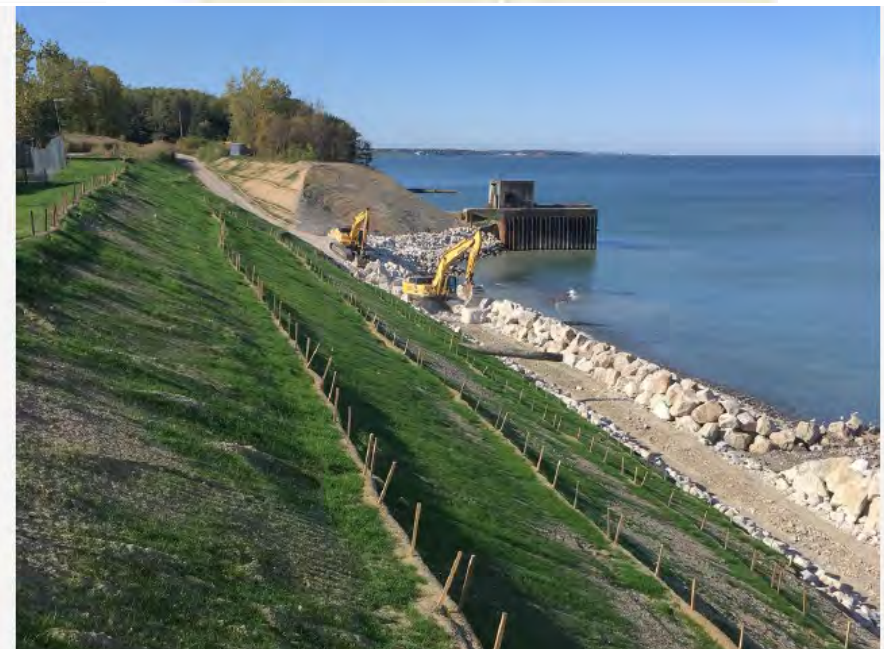
Approach may involve minor impacts to natural sediment transport processes



# Structural Bluff Interventions and Hardened Infrastructure



Tool Strengths	Tool Limitations
Can address imminent threats to bluff top structures from bluff failure	Does not alone address instability at bluff toe; should be paired with bluff toe protection as needed
End result can maintain natural sediment transport processes if bluff toe is not hardened	Relatively high engineering and regulatory complexity
Can be a relatively long-term solution to bluff instability	High-cost





- **David A. Barnes RLA, AICP**
- Environmental Protection Director
- Department of Environment and Waterways
- Town of Smithtown
- 124 W. Main Street, Smithtown, NY 11787
- (631) 360-7514
- [DBarnes@Smithtownny.gov](mailto:DBarnes@Smithtownny.gov)
  
- Special Thanks to: Smithtown Planning Dept and  
James Duffy, Coastal Resilience Program Manager, National Wildlife Federation  
Vidya Balasubramanyam, Research, Science and Program Director, Coastal States Organization

Coastal Technologies Corp (CTC) is a Long Island based company that has engineered and patented a wide range of coastal resilience and restoration products designed to achieve vital environmental goals alone or in combination with other methods.

CTC has collaborated with governmental agencies such as US Fish & Wildlife, NYC DEP, USDA and NGOs such as Ducks Unlimited, the Coalition to Restore Coastal Louisiana and the Sands Point Preserve Conservancy. Pilots and research trials have been conducted with academic partners including MIT, CUNY, Cornell Cooperative Extension and others.

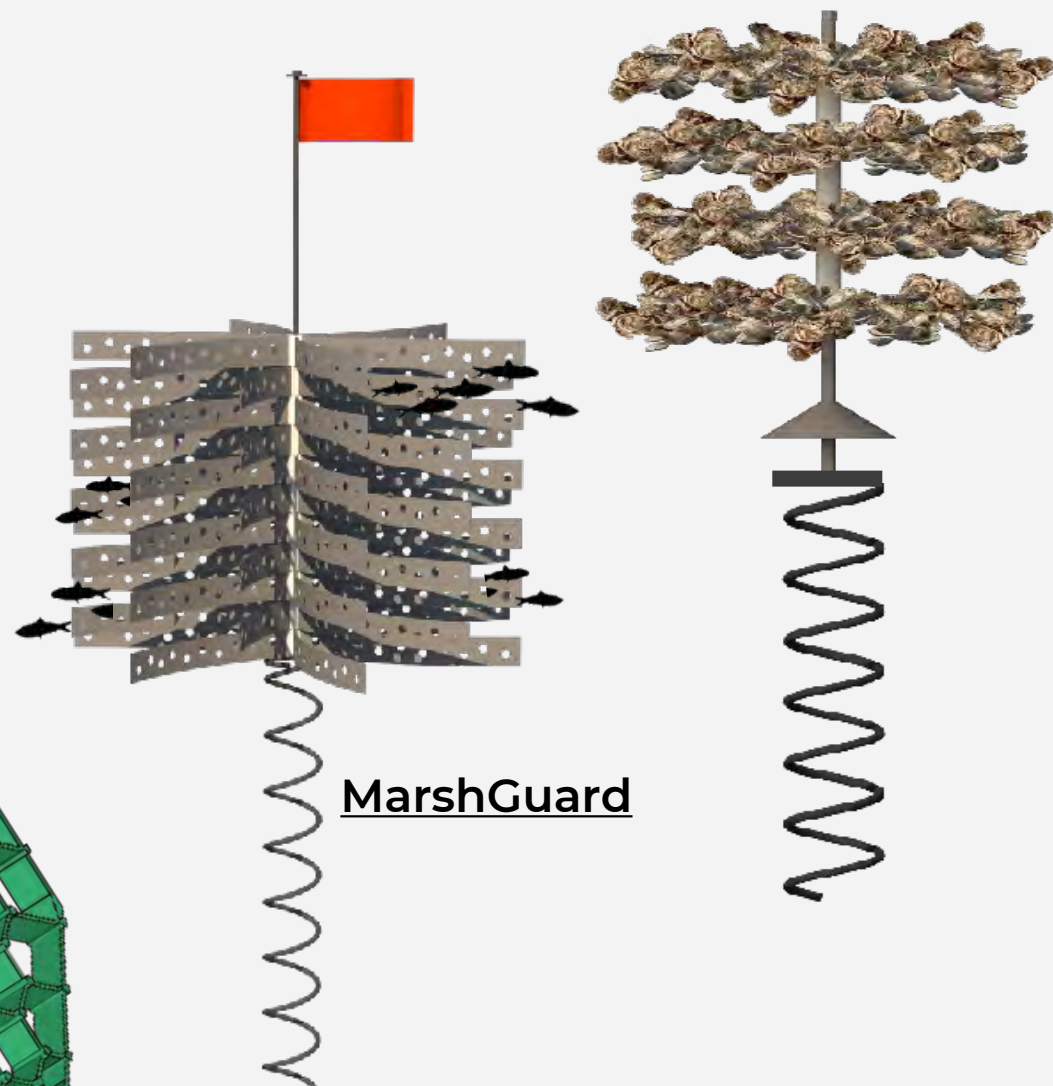
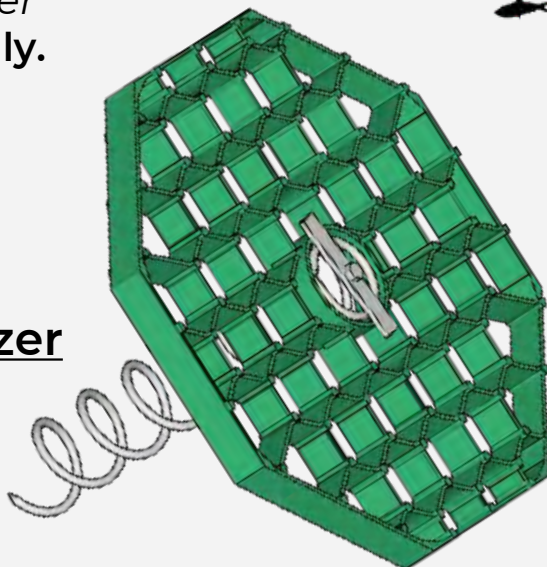
The *Cliff Stabilizer*, *MarshGuard* and *Oyster Stacks* systems are available commercially.

Specification & Data sheets are provided upon request.



Patented in the USA  
Patent Pending Internationally in  
Europe, Britain, China, Japan, Mexico,  
Australia, Korea, Canada & 192 Countries

Cliff Stabilizer



MarshGuard

Oyster Stacks

# Oyster Stacks™ System

- *Oyster Stacks* creates unequalled reef habitat while preventing the causes of oyster mortality, such as predation, subsidence & siltation.
- Reef can be produced quickly and economically.
- Scalability is unlimited. No sourcing of used shell or curing is required.
- Devices contains natural and inert materials.
- They are easily installed and fully adjustable in-the-field.
- The slate plates are extremely attractive for natural oyster recruitment or tank setting.
- Devices can function as “seeding armatures” to form permanent oyster reef structures, or can be deployed as temporary, removable and reusable reef.
- *Oyster Stacks* can be “set” and relocated to areas where establishment of new oyster populations are desired.



## Flax Pond Marine Lab Pilot: June 25th to October 25th

- *Oyster Stacks* successfully recruited free-swimming oyster larvae. Each plate contained hundreds of oysters. The oysters on a single *Oyster Stacks* device can filter up to 30,000 gallons of water per day.
- Photo shows 4 months of intertidal growth. Growth was “exceptional”.
- No predation, siltation or subsidence were observed.



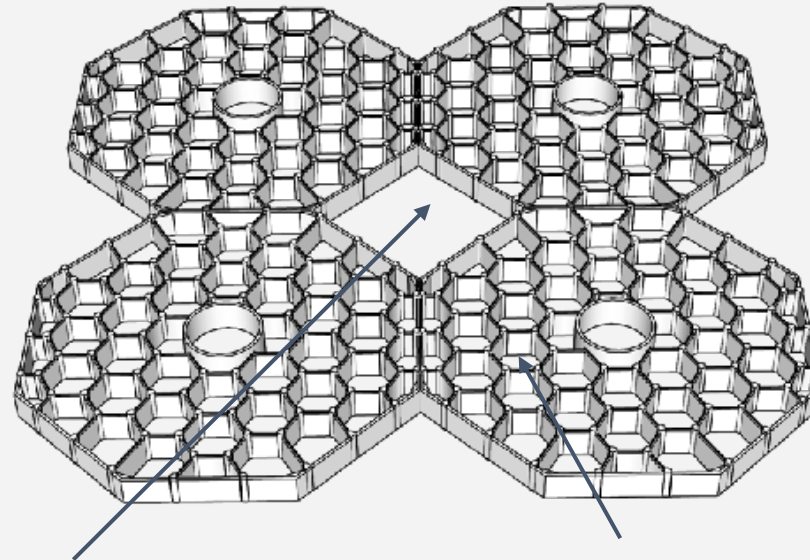
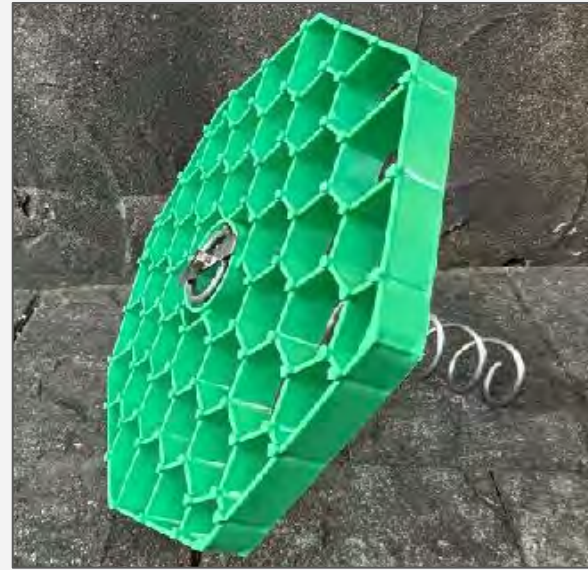
# Ribbed Mussel Pilot: NYC DEP Bergen Basin CSO Bioremediation

- *Oyster Stacks* were modified to recruit ribbed mussels for combined raw sewage outflow bioremediation in NYC.
- Mussels filter finer particles including pathogens and contaminants oysters cannot.
- Data/Results to be available Spring 2025



# Cliff Stabilizer™ System

- *Cliff Stabilizer devices are engineered to stabilize and vegetable bluff faces, shores, river banks, berms, road cuts, etc. that are subject to rapid erosion.*
- The devices lock-down sediments instantly halting erosion.
- The grid's cubbies and spaces shelter and hold plugs, bareroot, container shrubs and seeds against the escarpment.
- The plants, protected from erosive forces have time to establish root systems, to permanently stabilize these slope.
- Installation is simple and devices are removable after plants have established to be used again.
- *Cliff Stabilizer are marine-grade HDPE and will last for multiple applications.*



The "open squares" are planted with container shrubs and woody vegetation

The "cubbies" are planted with grasses & smaller herbaceous vegetation



# Nissequogue LI Private Bluff Resilience Project: “Before”

- This private coastal bluff was eroding approx 1’ foot per year.
- Deep gullies lined the bluff face.
- Erosion caused large alluvial fans to accumulate at the base.
- Strong storms could erode several feet at a time.
- Patio deck had already fallen down the escarpment.
- Invasive mugwort provided little stabilization or habitat
- A plan utilizing traditional methods & pitch would have resulted in 31’ feet of lost cliff-top property.

**Crown Collapse**

**Gullies & Rills**

**Invasive Mugwort**

**Eroded Sediments**





## Nissequogue LI Private Bluff Resilience Project: “After”

- 35,500 sq feet of bluff has been stabilized.
- Over 4 dozen native plants have been deployed
- The densest, most diverse ecosystem on LI has been created.
- The Spring growing season will set forth a growth that will have species both competing & cooperating resulting in greater vigor. This is illustrated by the findings of the *“Miyawaki Method”*.
- Additional, the staircase footings are also secured by the plants.



## Results and Benefits:

- The *Cliff Stabilizer* installation and plantings were completed in under 4 weeks, halting decades of bluff loss.
- The devices will be removed in 18-24 months for a “once-and-done” stabilization.
- 20’ feet of cliff-top land was preserved from an earlier less-steep design.
- Over 4 dozen native, bluff-evolved plants were deployed. A productive “*vertical garden*” was created enriching the client’s lifestyle and enjoyment of nature.
- The neighboring bluffs remains vulnerable. A single step causes landslides of sandy sediment, while the stabilized bluff can be walked on with no issues.
  - The significant plant mass will continually absorb excess nutrients before they can enter the LI Sound.

## Nutrient Runoff Absorption & Sequestering:

- Nitrogen - 2 tons
- Phosphorus - .5 tons
- Carbon - 27 tons



# Long Island Native Species: Plugs, Containers & Seed Blends

- The native plant species guide used at the Nissequogue Bluff Project was developed in collaboration with the *Cape May USDA Plant Material Service* and the *Ernst Conservation Seed Company*.
- The *USDA* facility's mission is the identification and commercialization of new coastal resilience plant materials.
- CTC encourages and has made the "Seed Blends" freely available for purchase from *Ernst Conservation Seeds*.
- The *Upper Blend* includes more wildflowers designed to crowd out invasives. The *Lower Blend* is more salt tolerant.
- The mixes are known as:
  - "Coastal Technologies Upper Bluff Mix - *CTC\_00101*"
  - "Coastal Technologies Lower Bluff Mix - *CTC\_00102*"

Plugs - Bluff Face
Coastal Sweet Pepperbush ( <i>Clethra alnifolia</i> )
Arrowwood Viburnum ( <i>Viburnum dentatum</i> )
Coastal Panicgrass ( <i>Panicum amarum</i> )
Saltmeadow Cordgrass ( <i>Spartina patens</i> )
Purple Lovegrass ( <i>Eragrostis spectabilis</i> )
American Beach Grass ( <i>Ammophila breviligulata</i> )
High Tide Switchgrass ( <i>Panicum virgatum</i> )
Little Bluestem ( <i>Schizachyrium littorale</i> )
Saltmarsh rush ( <i>Juncus gerardii</i> )
Saltmarsh bulrush ( <i>Scirpus robustus</i> )
Containers - Bluff Face
Red Chokeberry ( <i>Aronia arbutifolia</i> )
Sweet-fern ( <i>Comptonia peregrina</i> )
Virginia Rose ( <i>Rosa Virginiana</i> )
Beach Plum ( <i>Prunus maritima</i> )
Bayberry ( <i>Morella pensylvanica</i> ) ( <i>Myrica</i> )
Creeping Juniper ( <i>Juniperus horizontalis</i> )
Seaside Goldenrod ( <i>Solidago sempervirens</i> )
Groundsel tree ( <i>Baccharis halimifolia</i> )
Bearberry ( <i>Arctostaphylos uva-ursi</i> )
Bigleaf marsh-elder ( <i>Iva frutescens</i> )
Shining Sumac ( <i>Rhus copallinum</i> )
Virginia Creeper ( <i>Parthenocissus quinquefolia</i> )
Lowbush Blueberry ( <i>Vaccinium angustifolium</i> )
Salt Tolerant Trees - Toe Protection
Gray Dogwood ( <i>Cornus racemosa</i> )
Pitch Pine tree ( <i>Pinus rigida</i> )
Bear Oak ( <i>Quercus ilicifolia</i> )
Eastern Red Cedar ( <i>Juniperus virginiana</i> )
Red Pine ( <i>Pinus resinosa</i> )

Upper Bluff Seed Mix
Autumn Bentgrass ( <i>Agrostis perennans</i> )
Butterfly Milkweed ( <i>Asclepias tuberosa</i> )
Smooth Aster ( <i>Aster laevis</i> )
Calico Aster ( <i>Aster lateriflorus</i> )
Heath Aster ( <i>Aster pilosus</i> )
Purple Coneflower ( <i>Echinacea purpurea</i> )
Purple Lovegrass ( <i>Eragrostis spectabilis</i> )
Ox-Eye Sunflower ( <i>Heliopsis helianthoides</i> )
Round Head Bushclover ( <i>Lespedeza capitata</i> )
Wild Bergamot ( <i>Monarda fistulosa</i> )
Deertongue ( <i>Panicum clandestinum</i> )
Tall White Beardtongue ( <i>Penstemon digitalis</i> )
Hoary Mountain Mint ( <i>Pycnanthemum incanum</i> )
Narrow Leaf Mt. Mint ( <i>Pycnanthemum tenuifolium</i> )
Black Eyed Susan ( <i>Rudbeckia hirta</i> )
Little Bluestem ( <i>Schizachyrium scoparium</i> )
Early Goldenrod ( <i>Solidago juncea</i> )
Gray Goldenrod ( <i>Solidago nemoralis</i> )
Rough Dropseed ( <i>Sporobolus asper</i> )
Sand Dropseed ( <i>Sporobolus cryptandrus</i> )
Lower Bluff Seed Mix
Autumn Bentgrass ( <i>Agrostis perennans</i> )
Purple Lovegrass ( <i>Eragrostis spectabilis</i> )
Deertongue ( <i>Panicum clandestinum</i> )
Little Bluestem ( <i>Schizachyrium scoparium</i> )
Rough Dropseed ( <i>Sporobolus asper</i> )
Sand Dropseed ( <i>Sporobolus cryptandrus</i> )

## Upcoming: Port Jefferson Village East Beach Bluff 2025

- Pilot will be conducted on a 1,950 sq feet site riddled with deep gullies.
- Stabilization is scheduled for Spring 2025



# MarshGuard™ System

- *MarshGuards are engineered with flexible protrusions that absorb the energy of water currents.*
- A small pilot of MarshGuards were deployed to protect vulnerable bulrush plugs at Lake Pontchartrain.
- Previous plantings had been uprooted by waves and boat wakes.
- The restoration functioned to heal a shore blowout caused by Hurricane Ida.
- US Fish & Wildlife asked “*How many days will the install take?*” The devices were installed in under 10 minutes.



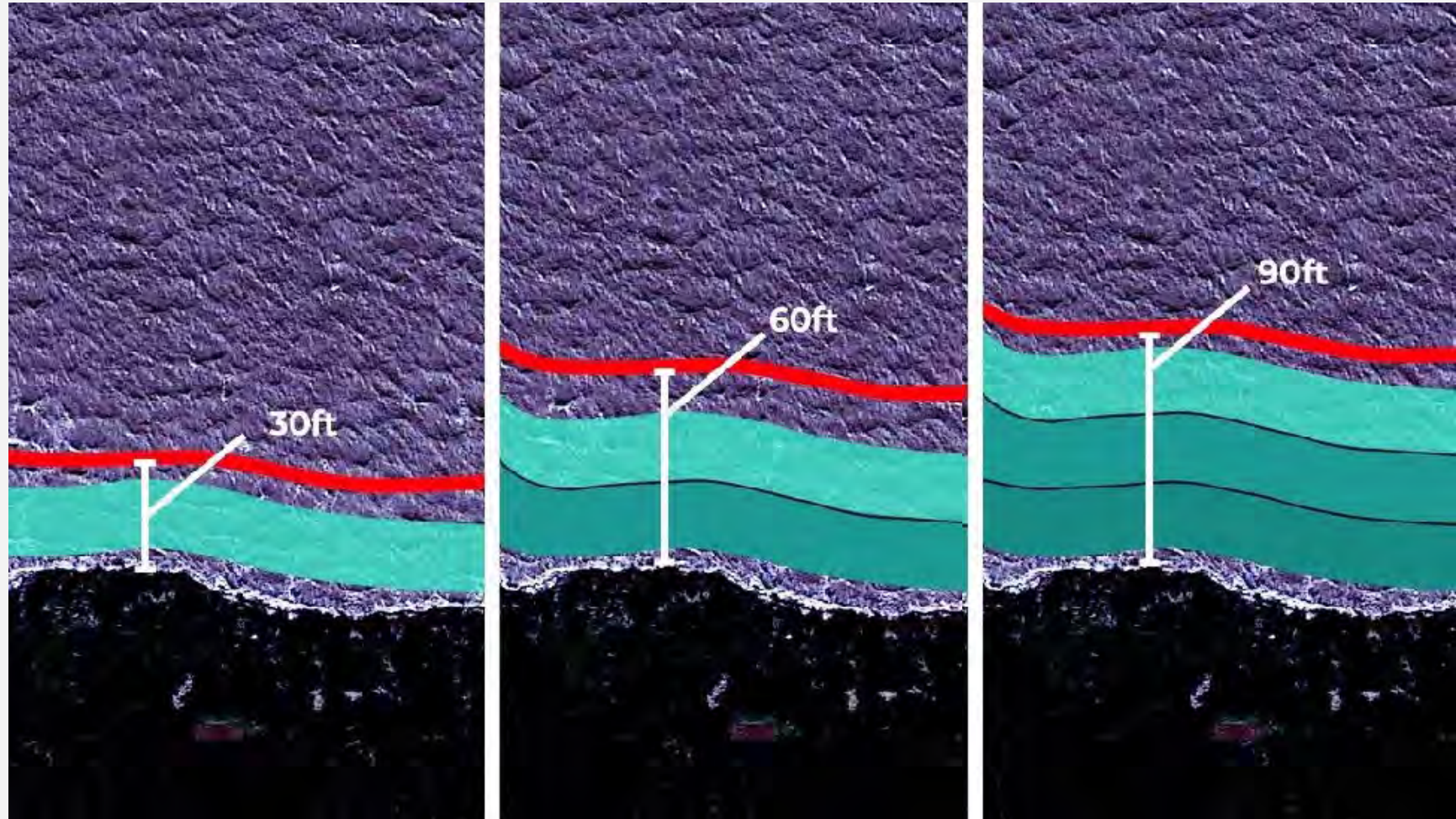
## Passive Sediment Deposition & Mosquito Ditch Filling

- *MarshGuard* promotes deposition & reduce wave and boat wave erosion in living shoreline restoration projects which are plagued by high plant loss.
- Testing for passive wetland mosquito ditch filling in Staten Island and New Jersey is being conducted by US Fish & Wildlife, NYC DEP and Ducks Unlimited.
- Devices are reusable and easily adjustable in-the-field.



# Wetland Shoreline Building: Array Repositioning Method

- *MarshGuard* devices can be deployed as a movable array.
- The array mitigates wave & boat edge erosion, protecting vulnerable plantings until root systems can stabilize.
- A *MarshGuard* array slows currents causing sediment to fall out of suspension, increasing sediment elevation.
- As the array is moved, the new elevated area can be planted with the next phase of plantings.
- This method allows shoreline to be progressively built back to desired goals.



## Upcoming: West Meadow MarshGuard Project & Educational Program 2025







**These systems offer new abilities to fortify and restore our shores & bluffs.**

**For further information about CTC technologies and product availability please contact:**

**Nick Thatos, CEO**

**[nicholas@coastalprotectiontechnologies.com](mailto:nicholas@coastalprotectiontechnologies.com)**

**George Thatos, Co-Founder**

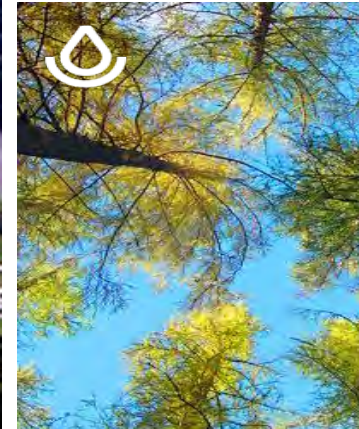
**[george@coastalprotectiontechnologies.com](mailto:george@coastalprotectiontechnologies.com)**

**Website: [coastalprotectiontechnologies.com](http://coastalprotectiontechnologies.com)**

**Thank you!!**



Natural  
Resources  
Conservation  
Service



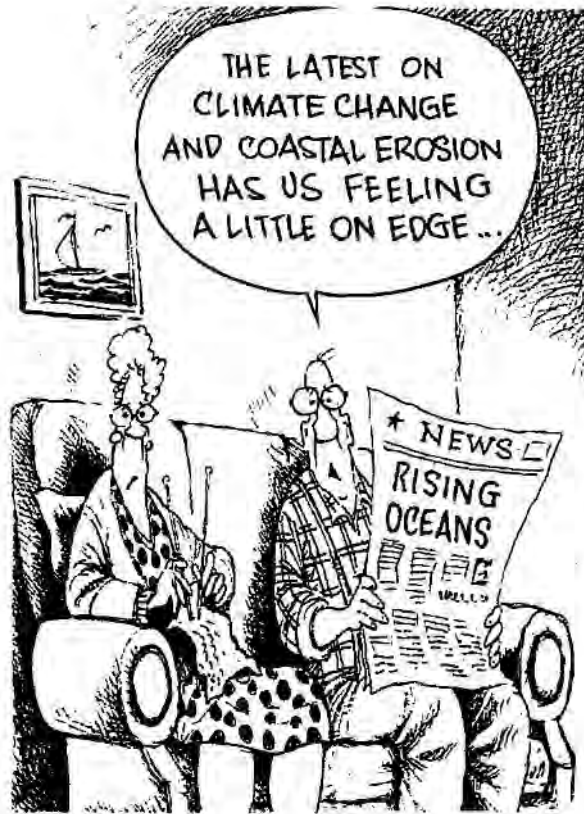
## Using an Integrated Planting Approach to Stabilizing Coastal Bluffs

Presenter: Christopher Miller, Manager/Plant Specialist

Natural  
Resources  
Conservation  
Service

[nrcs.usda.gov/](https://nrcs.usda.gov/)

# Climate Change Anxiety!



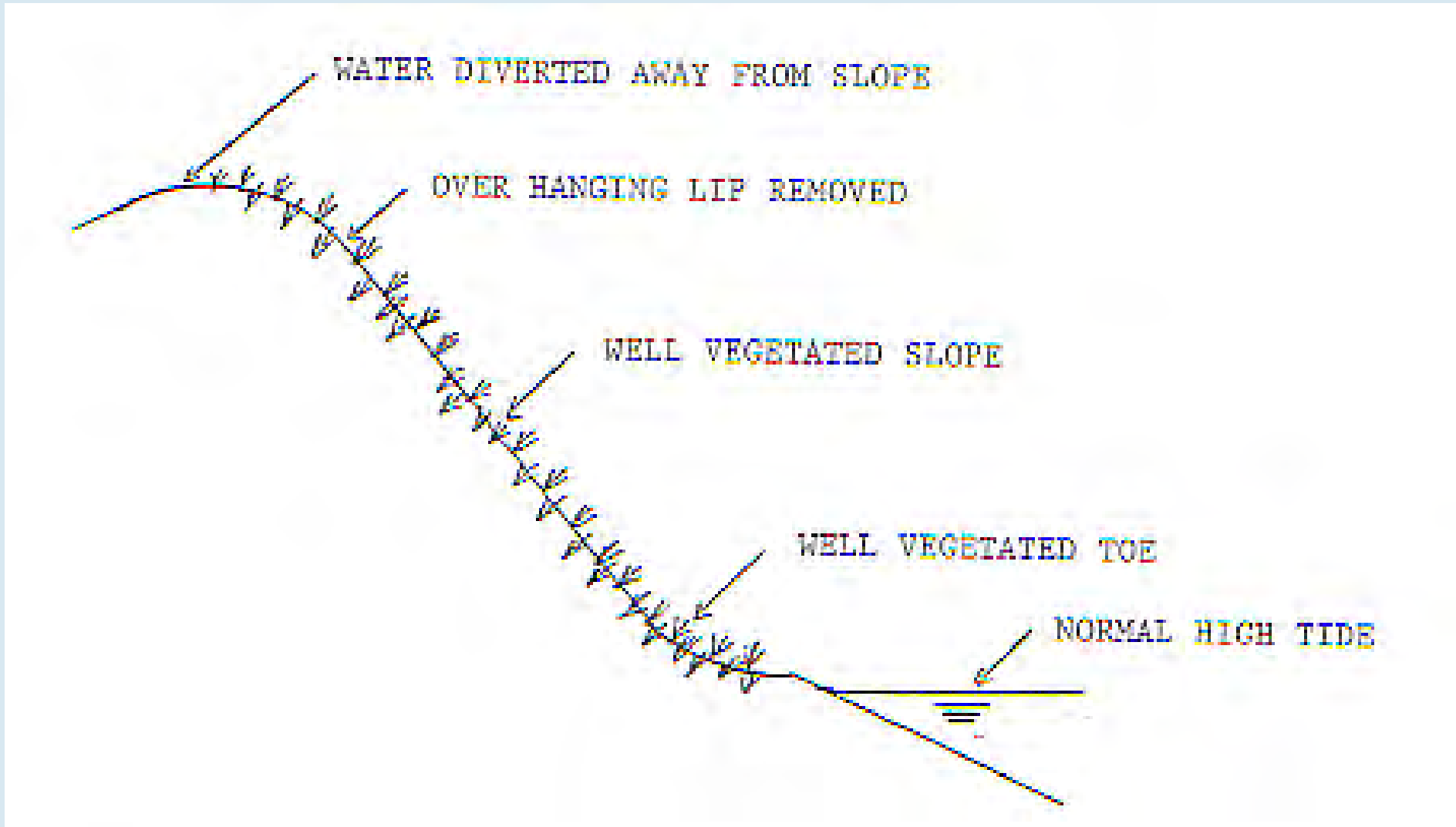
DAVE GRANLUND © www.davegranlund.com



# Plant Adaptation-What makes a Resilient Coastal Plant?

1. Ability to rebound from scour or damage. (Stump sprouting, root suckering, rhizomes).
2. Ability to tolerate fresh/saltwater flooding for extended periods as well as alternating wet/dry conditions.
3. Heat/drought tolerance
4. Spread rapidly by seed or rhizomes
5. Adaptable to varying environmental (some shade/full sun) and soil conditions. (acid, low nutrient, low organic matter soils)

# Bluff Treatment-Idealized Approach



# Traditional Approach



- Use of a turfgrass mix with erosion control fabric
  - Not the best approach for long term sustainability of the site.



# Stabilization with American Beachgrass





# A Hands-Off Approach?



# Integrated Approach for Slope Stabilization

- The integrated approach incorporates using a combination of seed as well as woody and herbaceous plant material in various forms.
  - Unrooted cuttings (willow, shrub dogwood, cottonwood, Viburnum, Elderberry)
  - Bare root seedlings/culms
  - Deep plugs/tubelings
  - containerized

# Soil Bioengineering

- **Soil Bioengineering**: The practice of utilizing plant materials alone in such a way as to perform a structural function of stabilization
- **Biotechnical Stabilization**: Utilizing a combination of plants, geotextile fabrics, synthetic products, and/or structural measures for stabilization.

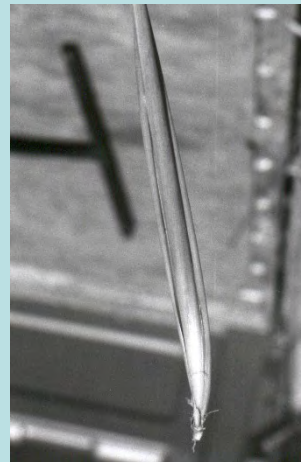
# Unrooted Cuttings

- 1/4"-3/8" diameter
- 8"-12" length
- Perform better in moist soils
- May be planted through erosion control fabric



# Rooted (bare root) plants

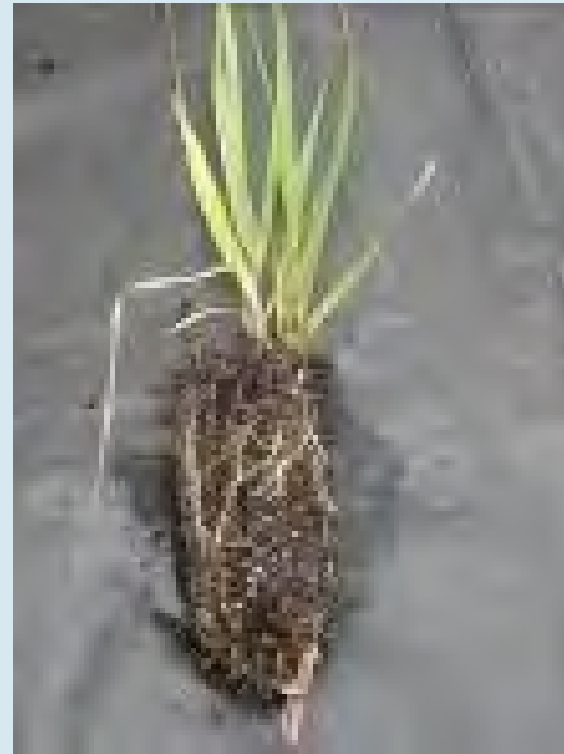
- field dug, bare root
- 3/8" at root collar
- Root gel (Terrasorb) increases survival in higher, drier bank zones



# Tubelings



Deep plug



# Containerized Plants

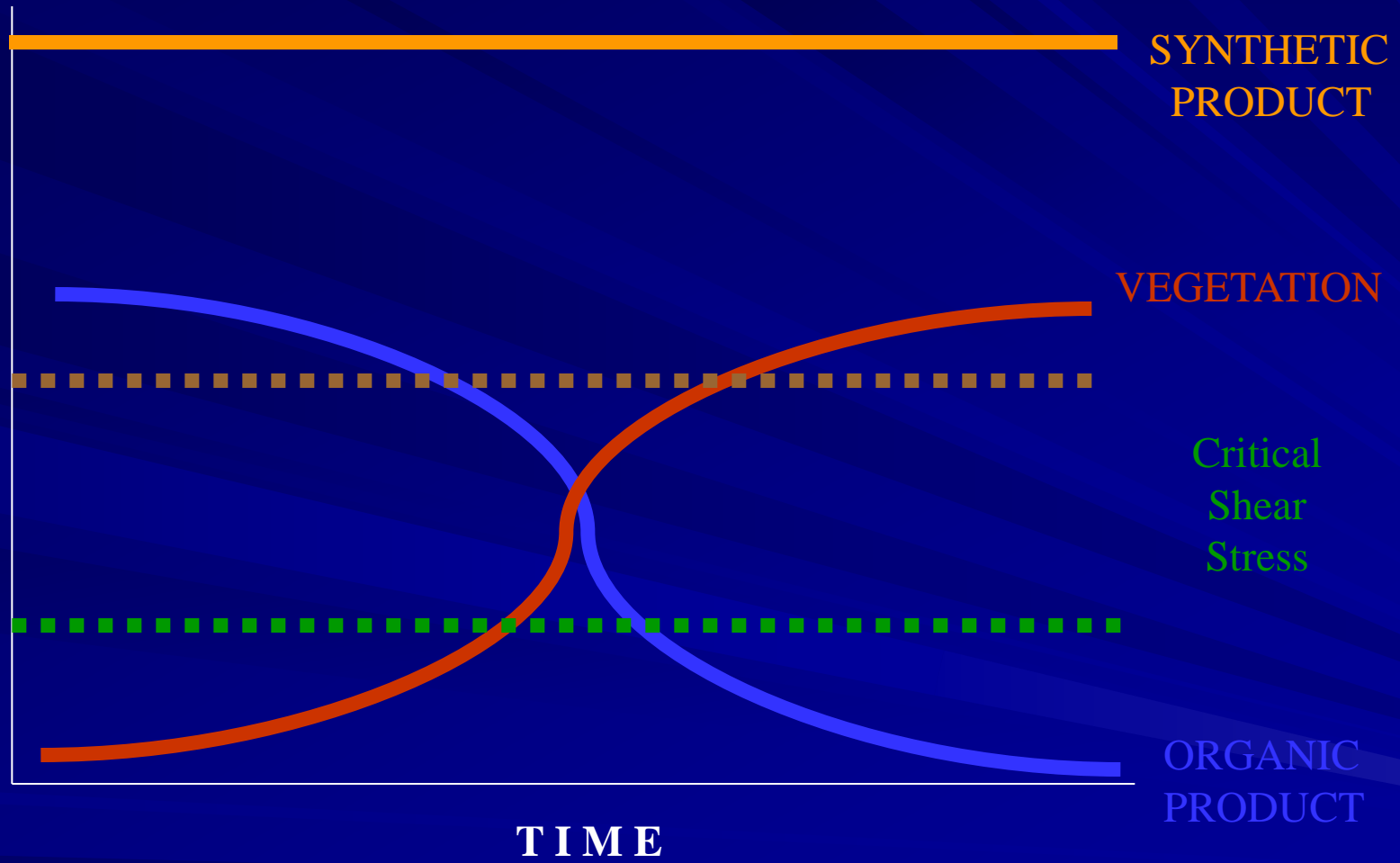


# Soil Bioengineering

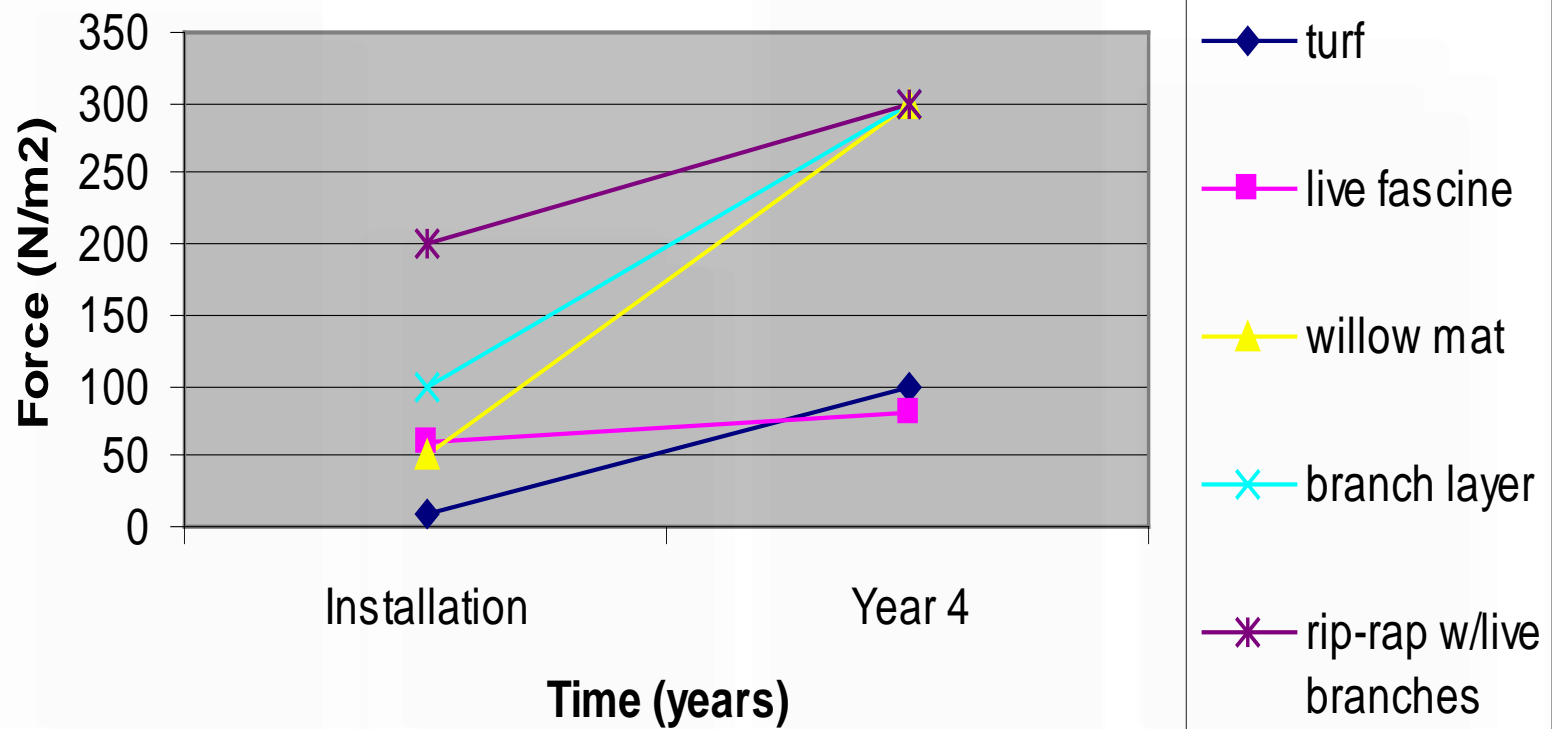




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## Shear Stress Tolerance



# Use of Native Plants for Stabilization

## Long Island, NY Native Bluff & Shore Species: Plugs & Containers

Grass & Herbaceous Plugs - Bluff Face	Shrub Containers - Bluff Face	Shade Tolerant Vine - Under Stairway
Coastal Sweet Pepperbush ( <i>Clethra alnifolia</i> )	Red Chokeberry ( <i>Aronia arbutifolia</i> )	Virginia Creeper ( <i>Parthenocissus quinquefolia</i> )
Arrowwood Viburnum ( <i>Viburnum dentatum</i> )	Sweet-fern ( <i>Comptonia peregrina</i> )	
Coastal Panicgrass ( <i>Panicum amarum</i> )	Virginia Rose ( <i>Rosa Virginiana</i> )	Salt Tolerant Trees - Toe Protection
Saltmeadow Cordgrass ( <i>Spartina patens</i> )	Beach Plum ( <i>Prunus maritima</i> )	Gray Dogwood ( <i>Cornus racemosa</i> )
Purple Lovegrass ( <i>Eragrostis spectabilis</i> )	Bayberry ( <i>Morella pensylvanica</i> ) ( <i>Myrica</i> )	Pitch Pine tree ( <i>Pinus rigida</i> )
American Beach Grass ( <i>Ammophila breviligulata</i> )	Creeping Juniper ( <i>Juniperus horizontalis</i> )	Bear Oak ( <i>Quercus ilicifolia</i> )
High Tide Switchgrass ( <i>Panicum virgatum</i> )	Seaside Goldenrod ( <i>Solidago sempervirens</i> )	Eastern Red Cedar ( <i>Juniperus virginiana</i> )
Little Bluestem ( <i>Schizachyrium littorale</i> )	Groundsel tree ( <i>Baccharis halimifolia</i> )	Red Pine ( <i>Pinus resinosa</i> )
Saltmarsh rush ( <i>Juncus gerardii</i> )	Bearberry ( <i>Arctostaphylos uva-ursi</i> )	
Saltmarsh bulrush ( <i>Scirpus robustus</i> )	Bigleaf marsh-elder ( <i>Iva frutescens</i> )	
	Shining Sumac ( <i>Rhus copallinum</i> )	

- The strategy of highly diverse over-planting allows competition to naturally select the species that can best occupy each environment micro-niche.
- Over-planting spurs vigorous growth through both competition and mutualism. This is illustrated by "**Miyawaki Reforestation**" principals.
- Grasses and herbaceous plugs provide fast root stabilization and are the initial colonizers.
- Shrubs will form longer lasting rooting colonization and provide the richest ecosystem habitat.
- Vine species will be deployed under stairwells where shade would prevent most bluff species from establishment.
- Small salt-tolerant scrub tree species will be deployed at the bluff toe to provide resilience from wave notch erosion

# Coastal Bluff Stabilization

## Full Sun/Drought tolerant Herbaceous Species

- American beachgrass (*Ammophila breveligulata*)
- Coastal panicgrass (*Panicum amarulum*)
- Switchgrass (*Panicum virgatum*)
- Saltmeadow cordgrass (*Spartina patens*)
- Coastal little bluestem (*Schizachyrium scoparium* var. *littorale*)

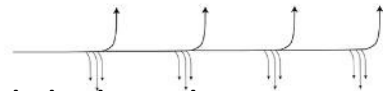


# Coastal Resilient - Grasses

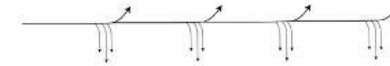
## Root Architecture



Ammophila-beachgrass



Spartina spp. cordgrass



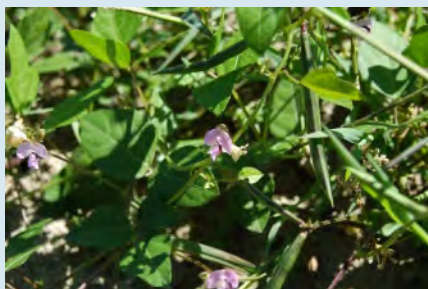
Source: Structures for Coastal Resilience, Harvard School of Design.

# Climate Resilient-Wildflowers/ Forbs

- *Asclepias incarnata, syriaca, tuberosa*, milkweeds
- *Euthamia graminifolia*, Grass-leaved goldenrod
- *Monarda fistulosa*, Wild Bergamot
- *Pycnanthemum muticum/tenuifolium* Broad/  
narrow-leaved mountain mint
- *Rudbeckia laciniata*, Green-headed coneflower
- *Solidago rugosa*, Wrinkleleaf goldenrod
- *Solidago sempervirens*, Seaside goldenrod
- *Symphotrichum lanceolatum, pilosum, puniceum*  
Lance-leaved American Aster

# Secondary Dunes/Steep Coastal Slopes

- High diversity leads to high resilience
- Secondary dunes/slopes can support more species, so in a healthy dune there should be a diverse mix of native species e.g.
  - Saltmeadow cordgrass (*Spartina patens*)
  - Coastal panicgrass (*Panicum amarum* var. *amarulum*)
  - Coastal little bluestem (*Schizachyrium littorale*)
  - Seaside goldenrod (*Solidago sempervirens*)
  - Trailing wild bean (*Strophostyles helvola*)
  - Beach pea (*Lathyrus japonicus*)



## Long Island, NY Native Seeding Species: Hand Sown/Hydroseeding

Annuals, Biennials & Perennials - Grasses, Herbeaceous & Wildflowers	
<b>Upper Bluff Mix</b>	
Autumn Bentgrass ( <i>Agrostis perennans</i> )	Black Eyed Susan ( <i>Rudbeckia hirta</i> )
Butterfly Milkweed ( <i>Asclepias tuberosa</i> )	Little Bluestem ( <i>Schizachyrium scoparium</i> )
Smooth Aster ( <i>Aster laevis</i> )	Early Goldenrod ( <i>Solidago juncea</i> )
Calico Aster ( <i>Aster lateriflorus</i> )	Gray Goldenrod ( <i>Solidago nemoralis</i> )
Heath Aster ( <i>Aster pilosus</i> )	Rough Dropseed ( <i>Sporobolus asper</i> )
Purple Coneflower ( <i>Echinacea purpurea</i> )	Sand Dropseed ( <i>Sporobolus cryptandrus</i> )
Purple Lovegrass ( <i>Eragrostis spectabilis</i> )	
Ox-Eye Sunflower ( <i>Heliopsis helianthoides</i> )	<b>Lower Bluff Mix</b>
Round Headed Bushclover ( <i>Lespedeza capitata</i> )	Autumn Bentgrass ( <i>Agrostis perennans</i> )
Wild Bergamot ( <i>Monarda fistulosa</i> )	Purple Lovegrass ( <i>Eragrostis spectabilis</i> )
Deertongue ( <i>Panicum clandestinum</i> )	Deertongue ( <i>Panicum clandestinum</i> )
Tall White Beardtongue ( <i>Penstemon digitalis</i> )	Little Bluestem ( <i>Schizachyrium scoparium</i> )
Hoary Mountain Mint ( <i>Pycnanthemum incanum</i> )	Rough Dropseed ( <i>Sporobolus asper</i> )
Narrow Leaved Mountain Mint ( <i>Pycnanthemum tenuifolium</i> )	Sand Dropseed ( <i>Sporobolus cryptandrus</i> )
<p><b>These seed mixes will become available for purchase at Ernst Seed Company, for any use, and will be labeled as <i>CTC Upper Bluff</i> and <i>CTC Lower Bluff</i> blends. It is 100% native and excludes even “naturalized” foreign species.</b></p>	

- “Seeding” the bluff creates a reservoir which will remain viable for decades.
- This limits invasive weeds by filling the small spaces that weeds exploit to take hold. Invasives, such as mugwort, have shallow roots and crowd out stabilizing species.
- The vast diversity provides hosting for bee, moth and butterfly larvae and sustenance for birds, insects, etc.
- Wildflower roots weave into other root systems and provide greater resilience and a mutualistic ecosystem.
- The habitat created by over 4 dozen native species will be the most diverse ever restored on any coastal bluff.



# Diversified Planting



# Native Warm Season Grass Species

High Tide Switchgrass



'Atlantic' Coastal Panicgrass



Southampton Prairie Cordgrass



Eastern gamagrass

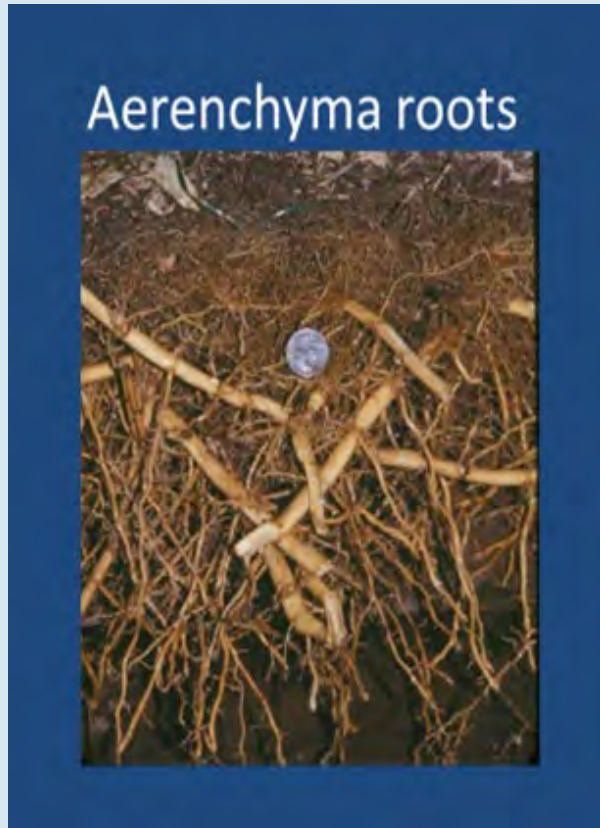


# Native Warm Season Grasses

- Switchgrass plug root development within 3 months.
- Tolerate periods of drought well.
- Deep root system allows for soil/bank reinforcement



Eastern Gamagrass



Willow



Switchgrass



**It's ALL in the ROOTS!**

**Anaerobic adapted roots**

Photos courtesy of Dr. Ken Staver, UMD-Wye Research and Education Center

## STRUCTURES OF COASTAL RESILIENCE

Rockefeller Foundation Funded After Superstorm Sandy

Narragansett Bay Team-Harvard School of Design

Think out of the “box” for Natural Based Designs

One potential solution “**Attenuation Forest**”

Utilize trees and shrubs that create a dense rhizomatic substrate with copse-like (thicket, grove) arrangement that creates a layer of growth that will attenuate and mitigate storm surge.

Disturbance creates injury which encourages more new sprouting/coppicing (root suckering/stump sprouting)

# Resilient Salt Tolerant Trees and Shrubs

## Tree Species

*Acer negundo*-boxelder  
*Acer saccharinum*- silver maple  
*Liquidambar styraciflua*-sweet gum  
*Populus deltoides*- E. cottonwood  
*Prunus virginiana*-chokeberry  
*Quercus nigra*-water oak  
*Quercus palustris*- pin oak  
*Quercus phellos*-willow oak  
*Robinia pseudoacacia*-black locust  
*Salix nigra*-black willow  
*Sassafras albidum*-sassafras

## Shrub Species

*Amelanchier canadensis*-serviceberry  
*Amorpha fruticosa* – indigo bush  
*Baccharis halimifolia*- groundsel  
*Clethra alnifolia*-sweet pepperbush  
*Cornus spp.*-shrub dogwood  
*Ilex spp.*-inkberry, smooth  
winterberry holly  
*Morella spp.*-wax myrtle, bayberry  
*Prunus maritima*-beach plum  
*Rosa virginiana*-Virginia rose  
*Rhus spp.*-sumac  
*Sambucus canadensis*-elderberry  
*Viburnum spp.*



Source: Elkin, R.L. *Beyond Restoration: Planting Coastal Infrastructure*

# Woody Plant Functions Soil Bioengineering Systems

- Root reinforcement - root tensile strength mechanically reinforces soil.
- Soil moisture depletion - remove excess soil water through evapotranspiration.
- Buttressing and Arching - anchored & embedded stems/roots counteract downslope shear forces.
- Flexible stems deflect erosive energy



**'Ruby' redosier dogwood**  
(*Cornus serecia*)

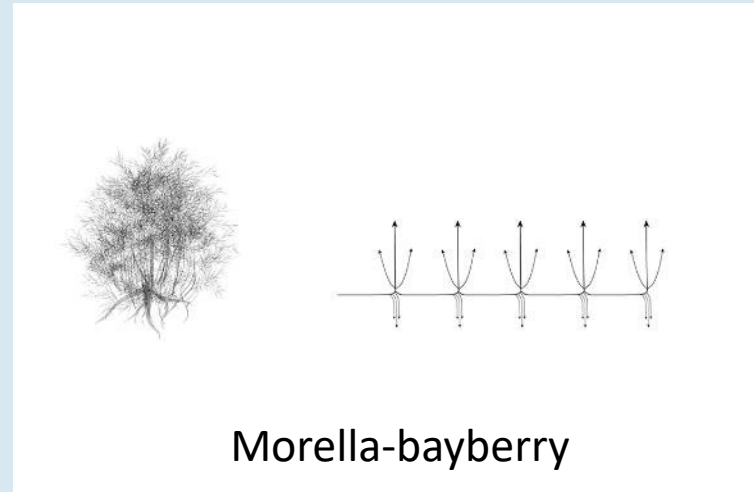
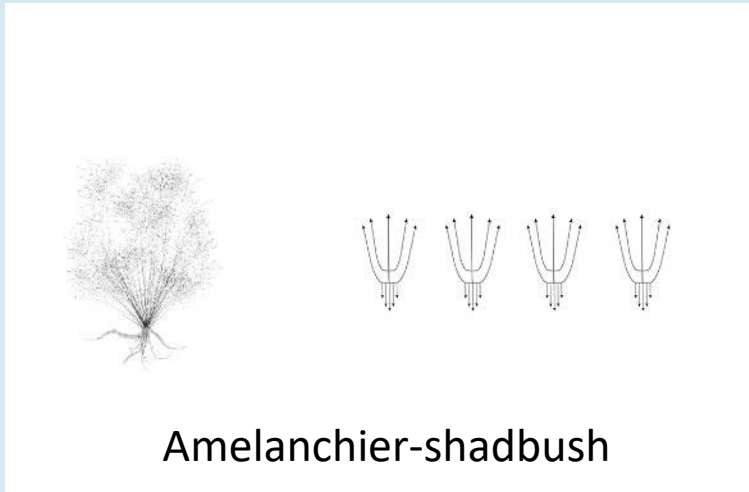
**Developed because of its  
prolific layering ability.**





# Coastal Resilient Trees and Shrubs

## Root Architecture



Source: Structures for Coastal Resilience, Harvard School of Design.

# Dwarf Sumac (*Rhus copallina*)





Bayberry

**BEACH PLUM:** This long-lived native species thrives in environments with salt, drought and frequent disturbances, where their neighbors are often short lived.



# Beach Plum fruit



# Groundsel Bush



# Sweetfern (Comptonia peregrina)



# Maritime Forests/Shrublands

## Threatened and Fragmented Plant Community

### A. Highly recommended and preferred by migratory songbirds:

Common Name	Scientific Name	Nutrient Content <sup>1</sup>			Antioxidant Properties <sup>2</sup>			
		Fat	Carbs	Energy	Antho. <sup>a</sup>	Vit E <sup>b</sup>	Phenols	TAC <sup>c</sup>
Arrowwood Viburnum	<i>Viburnum dentatum</i>	*High	High	High	High	High	High	High
Virginia Creeper	<i>Parthenocissus quinquefolia</i>	Med	High	High	Med	Low	High	High
Gray Dogwood	<i>Cornus racemosa</i>	High	Med	High	Low	N/A	Med	Low
Silky Dogwood	<i>Cornus amomum</i>	Low	High	Med	Med	N/A	Med	Low
Red Osier Dogwood	<i>Cornus sericea</i>	*Med	Med	High	Low	N/A	Med	Low

### B. Recommended and eaten by many migratory songbirds:

Serviceberry	<i>Amelanchier spp.</i>	*Low	High	Med
Common Elderberry	<i>Sambucus canadensis</i>	Low	High	Med
Spicebush	<i>Lindera benzoin</i>	High	Low	High
Pokeweed	<i>Phytolacca americana</i>	Low	High	Low
Flowering Dogwood	<i>Cornus florida</i>	Med	Med	High
Chokecherry	<i>Prunus virginiana</i>	*Low	High	Low
Highbush Blueberry	<i>Vaccinium corymbosum</i>	*Low	High	Low

#### *Antioxidants and Birds*

Birds during migration experience oxidative stress when they burn fats to fuel their flights. Fruits with *high antioxidant capacity* can help to alleviate these stresses.

*Vitamin E* and *phenols in fruits*, especially colored compounds called *anthocyanins* that give fruits their bright purple-maroon coloration, are good dietary sources of antioxidants for birds.



**Suggested citation:** Smith, S. B. and S. R. McWilliams. 2015. Recommended plantings for migratory songbird habitat management. Rochester, NY: Rochester Institute of Technology and University of Rhode Island. 2 p.



# Additional Desirable Shrub Species

**C. Recommended and eaten by a few migratory songbirds and overwintering birds:**

Northern Bayberry	<i>Myrica pennsylvanica</i>	*High	High	High
Winterberry	<i>Ilex verticillata</i>	*Low	High	Med
Black Chokeberry	<i>Aronia melanocarpa</i>	Low	High	Med
Mapleleaf Viburnum	<i>Viburnum acerifolium</i>	*Low	Low	Med
Nannyberry	<i>Viburnum lentago</i>	*Low	Med	Low

**Suggested citation:** Smith, S. B. and S. R. McWilliams. 2015. Recommended plantings for migratory songbird habitat management. Rochester, NY: Rochester Institute of Technology and University of Rhode Island. 2 p.

# BMPs for Coastal Resilience

- Select plant species that are tolerant to salinity changes and increased temperature.
- Planting flood and salt tolerant plants inland from wetland systems to prolong viability to rising waters and increased flood frequency (in tidal systems).
- Maintain and enhance diversity of plantings to help with changing salinity and flooding conditions.
- Source: Maryland's Adaptation Website: [www.dnr.state.md.us/climatechange](http://www.dnr.state.md.us/climatechange)



JILL DIETERICH



# Maidstone Landing Erosion Control

# How it started:

- ▶ The Maidstone Landing community was struggling to controlling the amount of erosion occurring on the beaches of the Maidstone Landing Property.
- ▶ Tom Mohrman secured a **permit** to install a bulkhead at the site but realized that a more natural approach would benefit the community.
- ▶ At this point he approached Suffolk County Soil and Water Conservation District for help executing the project and for financial support.

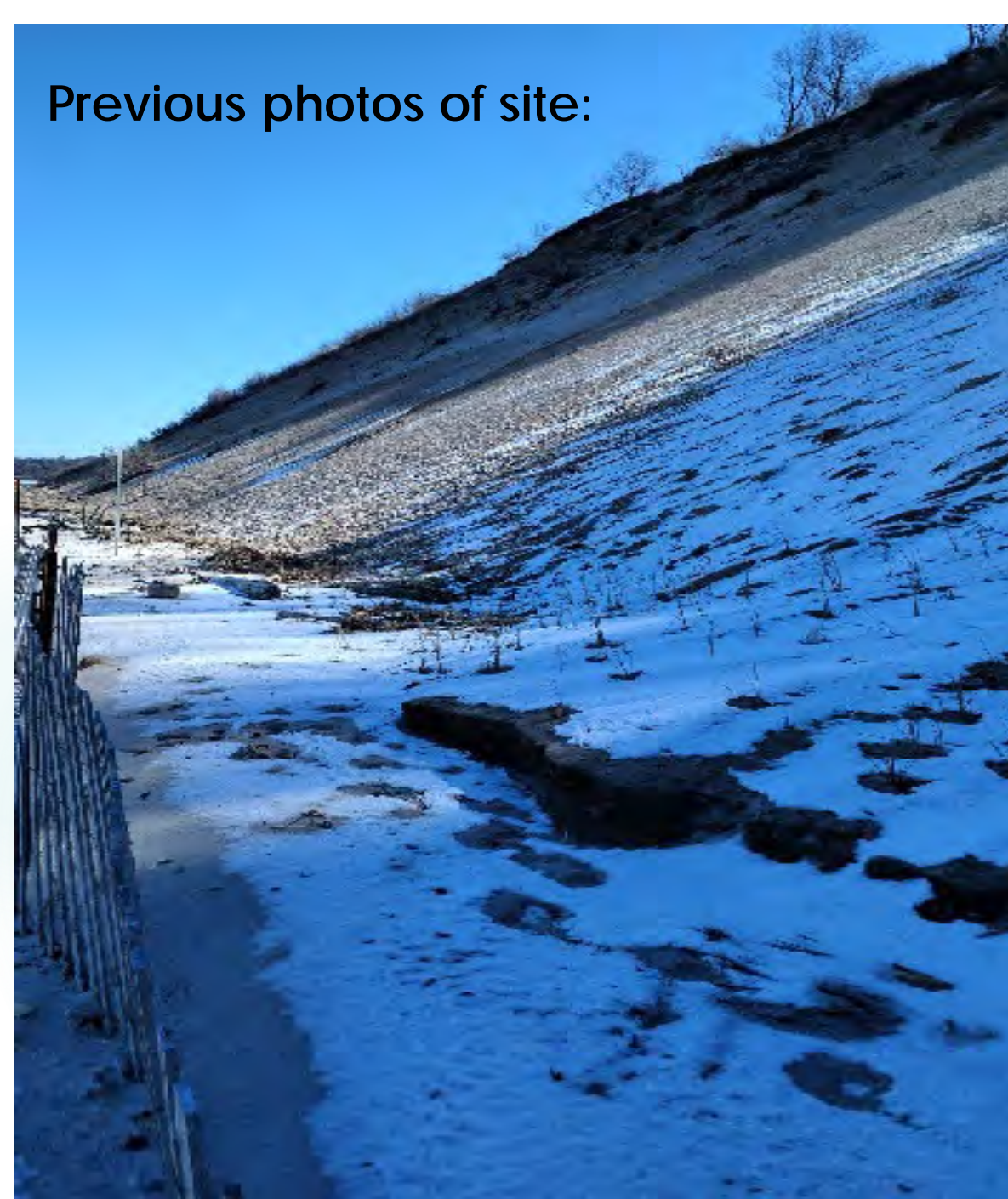


# Our Site:

- ▶ The Maidstone Landing property is a privately owned community abutting two public beach areas; Iron Pier and Hallockville State Park.
- ▶ bluff degradation due to storms, 4x4 trucks and beachgoers.



Previous photos of site:



# Mission statement

- ▶ The goal of this project is to assist the residents to secure their bluff naturally as well as provide technical and financial support to mitigate bluff erosion at this site.
- ▶ Suffolk County Soil and Water Conservation District was able to provide \$7,250.00 for :
  - ▶ Snow fencing and wood stakes
  - ▶ Two types of American Beach Grass plugs (approx. 3000 plugs)
  - ▶ Two large educational signs



*Spartina Alterniflora*



*ammophila breviligulata*  
(American Beach Grass)

# Our first planting: Earth Day Cleanup

186

On April 19<sup>th</sup> the Riverhead Charter School students came to the site for an earth day cleanup and beachgrass planting.

- Atlantic Turtle Group educational presentation
- Beach cleanup
- Beachgrass planting with students and volunteers, *2,500 plugs*.





# Timeline:

- ▶ April 19, 2024: First Planting (2,500 plants)
- ▶ April 23, 2024 :100 feet of fencing
- ▶ May 3, 2024: 200 feet of fencing
- ▶ May 24, 2024: 200 feet of fencing
- ▶ May 28, 2024: 250 plants
- ▶ September 11, 2024: 250 plants



May 3, 2024



May 21, 2024



June 18, 2024



July 3, 2024



August 7, 2024



October 17, 2024



Today:





# Budget: \$7,250.00

195

Date:	Description:	Cost:
4/19/2024	2 rolls of snow fence, 50 stakes, zip ties	\$395.93
4/23/2024	50 flats of 2 types of beach grass	\$2,025.00
5/3/2024	4 rolls of snow fence	\$319.96
5/24/2024	4 rolls of snow fence	\$319.96
5/28/2024	250 Plants	\$310.50
9/4/2024	250 Plants	\$300.00
	Cost for two signs estimation:	\$1,765.00
Total:		<b>\$5,436.35</b>

**Total:  
10 Rolls of 50 ft snow fence  
50 Wooden stakes  
3,000 Plants  
2 Educational Signs**

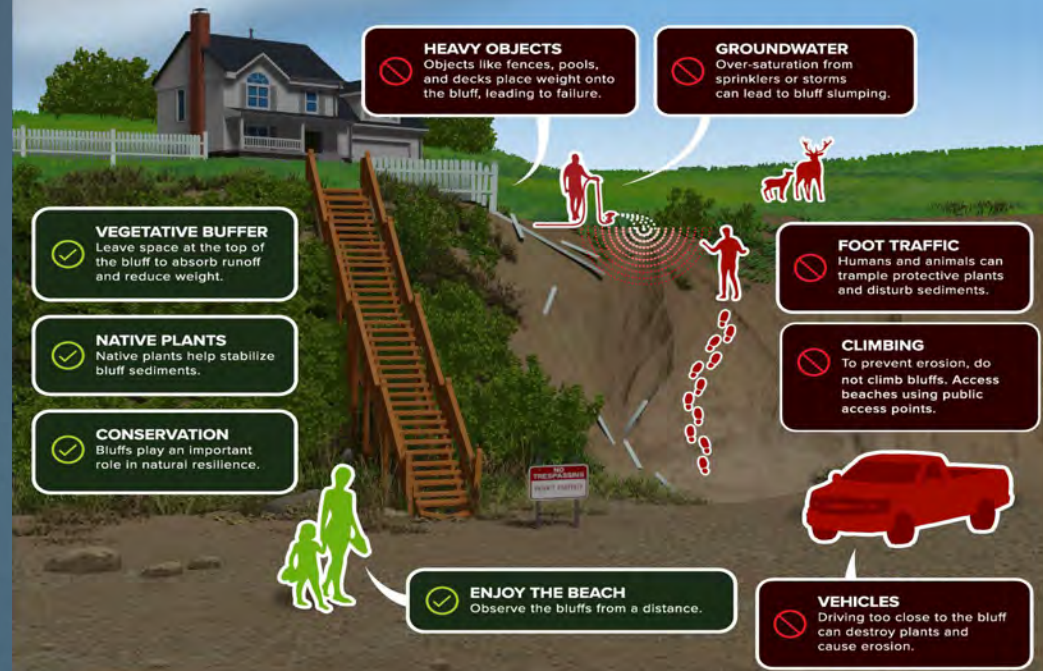
# Protecting Coastal Bluffs of Long Island



## DID YOU KNOW?

The bluffs along Long Island's shorelines were deposited by advancing and retreating glaciers during the last ice age over 18,000 years ago. Composed of loose sediments that range from very small clays to large boulders, the bluffs are vulnerable to erosive forces such as wind, waves, and other influences.

**We must do our part to protect these unique bluffs!**



CREATED BY



IN PARTNERSHIP WITH



Educational Signage:

Example:



# Flyover data:

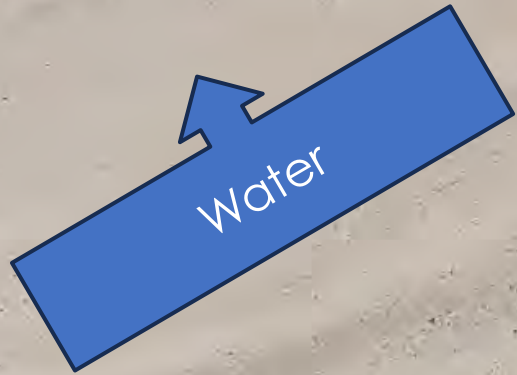
197



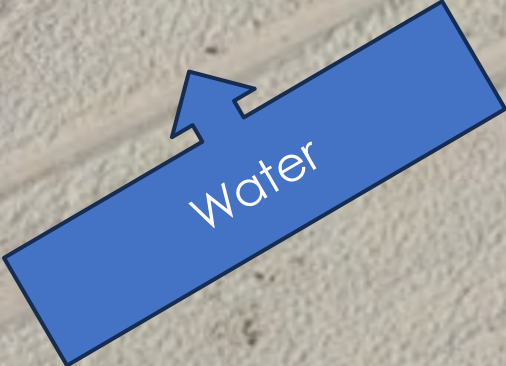
Suffolk County's Fire, Rescue and Emergency Services



Flyover data: March 12, 2024



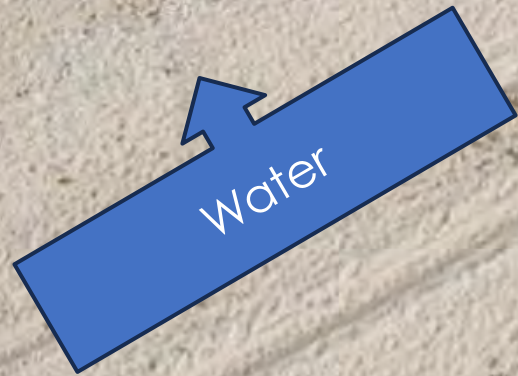
# Flyover data: June 3, 2024



199



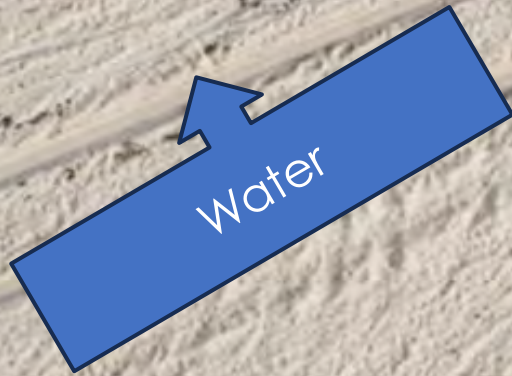
Flyover data: July 2, 2024



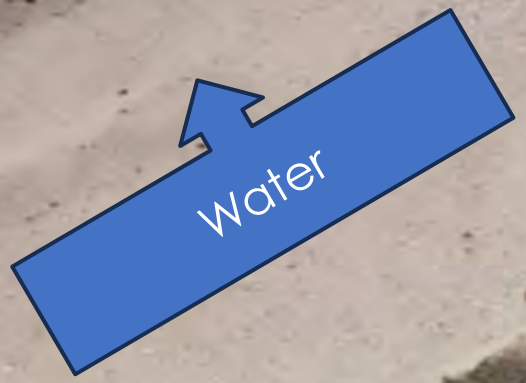
200



Flyover data: August 17, 2024



Flyover data: September 3, 2024





# Comparing 3/12 to 9/3: Significant Growth!



# Fencing placement

204



The fence was placed in a zigzag pattern to help slow down the wind and reduce erosion.

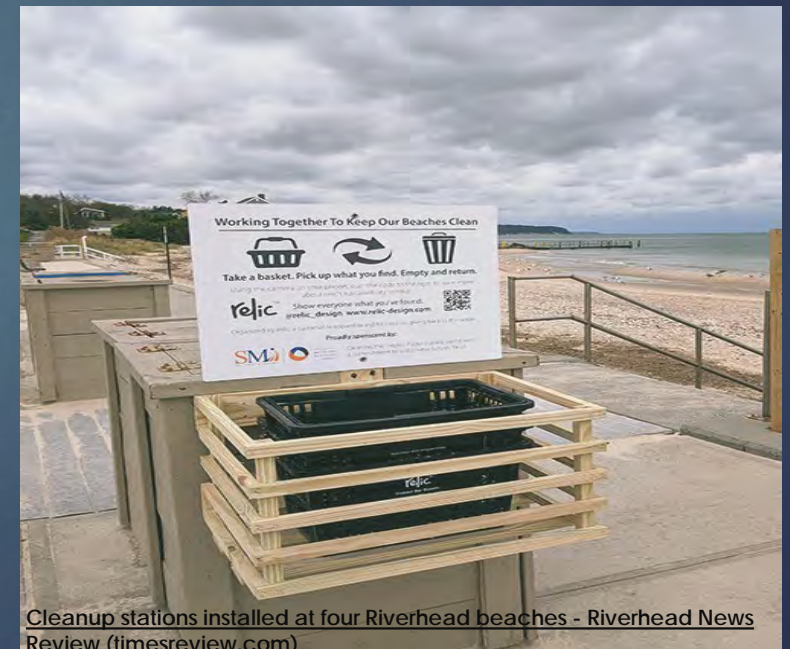
This is an important part of bluff restoration because it controls the movement of the sand and provides stability and strength. The fence will trap sediment and slow down water flow, helping to prevent soil from being washed away.

# Improvements to Iron Pier: Fish and baskets

- ▶ Tom Mohrman was able to secure funding from National Grid to install a fish shaped trash receptacle to promote recycling at Iron Pier.
- ▶ Tom also secured funding for baskets that can be taken on the beach for collecting trash during daily beach walks.



Giant fish at Jamesport beach is red w...  
Island Times (litimes.org)



Cleanup stations installed at four Riverhead beaches - Riverhead News Review (timesreview.com)

# Unexpected Challenges:

206

- ▶ Storms destroying the Fences
- ▶ Inconsistency with drone flyover times
- ▶ Learning curve on trying to find the best plants for this site



Contact Info:

207

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Environmental Planner

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631-852-3036





PARTNERING AGENCIES:



Maidstone Landing

Thank you!

Questions?



**Long Island Sound Study**

A Partnership to Restore and Protect the Sound



**Thank you!**

Please provide feedback to help us plan our events in the future.



**Long Island Sound Study**  
A Partnership to Restore and Protect the Sound

# Lunch

**Joining us for the field trip?**

We will take a bus over to Iron Pier  
Beach/Maidstone Landing at 1:30 pm

