

Summary Report of the National Park Service- Fire Island National Seashore's Bay Shoreline Management Workshop

May 13–14, 2021: An online Webinar Workshop



West side of Sailors Haven Marina (1969 shoreline in purple)

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Executive Summary

Climate change has manifested itself on Fire Island in a number of ways. Sea level rise (SLR), rising groundwater, increased storm intensity and frequency are impacting Fire Island National Seashore's natural/cultural resources, infrastructure, as well as the threatening private property. There has been a recognition that management practices need to adapt and evolve for Fire Island's future. Both the National Park Service and Fire Island National Seashore (the Seashore) along with local communities are interested in pursuing nature-based solutions at bayside erosional hot spots to build resiliency and restore ecosystem services that have been damaged and/or lost. As a first step in implementing nature-based solutions on Fire Island, the Seashore hosted a two-day workshop that brought together subject matter experts, the National Park Service, and Fire Island stakeholders to better understand the current conditions and nature-based solution options that are available. The virtual workshop took place on May 13–14, 2021, was organized by the National Park Service and co-hosted by The Nature Conservancy, National Wildlife Federation, and Point O'Woods Association. This summary report provides the context for the workshop and an overview of the workshop purpose and goals, presentations, discussion that occurred during breakout sessions, recommendations and next steps.

Introduction

Fire Island National Seashore lies along the south shore of Long Island in Suffolk County, New York. The Seashore encompasses over 19,500 acres of upland, tidal, and submerged lands along a 26-mile stretch of the 32-mile barrier island, part of a much larger system of barrier islands and bluffs stretching from New York City to the very eastern end of Long Island at Montauk Point. On Fire Island, interspersed among the federal lands within the Seashore are 17 residential communities that predate the Seashore's authorization in 1964. Resort development on Fire Island began as early as 1855, with several of the communities having been established prior to the 1930s. The Seashore's enabling legislation includes provisions for private land to be retained and developed.

The various land ownership and competing missions amongst the seven layers of jurisdiction [federal, state, county, two towns (Brookhaven and Islip), and two Villages (Saltaire and Ocean Beach)] operating within the Seashore, has led to different land management uses and development. This land use pattern and the associated mosaic of current land management practices, combine with the impacts of climate change, namely rising sea level, rising groundwater, and increasing frequency and intensity of coastal storms has led to the current situation along the bayside of Fire Island.

Most of the communities on Fire Island have hardened the bay shoreline with bulkheads and practice dune and beach nourishment supported by the federal government to protect private property on the ocean side of Fire Island. On lands managed by the National Park Service, natural processes are encouraged. A few hardened structures exist on the bayside, and dune and beach nourishment on the ocean side is not typically practiced. Over time, erosional hot spots on the bayside have emerged resulting in the loss of salt marshes, tidal and upland habitats. Erosion is exacerbated in areas where hardened structures, like bulkheads, are adjacent to natural tracts of land. Dune and beach nourishment activities as well as breach closures have hindered cross-island sediment transport. These activities combined with dredging in the bay (typically utilizing upland placement of dredged material) have resulted in a sediment starved ecosystem. In addition, SLR and the accompanying groundwater rise have resulted in increasing erosion rates, saltwater intrusion, tree and vegetation die-offs, increasing flooding and standing water, and a narrowing of the island, all of which increases the island's vulnerability to storm events.

As climate change impacts continue to alter Fire Island's natural resources and threaten the built environment on federal and private property, there is broad consensus that management practices need to adapt and evolve for Fire Island's future. One of the focal areas identified in the Integrated Coastal Climate Change Vulnerability Assessment (Ricci et al. 2020) was "Island Change on the Bayside" which included recommendations to evaluate nature-based solutions. The National Park Service and Fire Island communities are interested in pursuing nature-based solutions (NBS)¹ at bayside erosional hot spots to build resiliency and restore ecosystem services that have been lost.

The first step toward implementing nature-based solutions on Fire Island was this 2021 Bay Shoreline Management Workshop (see Appendix 1 for the Agenda). The workshop was organized by a planning led by the National Park Service and co-hosted by The Nature Conservancy, National Wildlife Federation, and Point O'Woods Association. Workshop participants included subject matter experts, and the varied Fire Island stakeholders brought together to better understand the current conditions and shoreline management options that are available.

The planning team identified a variety of subject matter experts with perspectives from government, academia and private project management to help stimulate discussion on the efficacy of nature-based solutions and to help identify methods that would be appropriate to and could withstand the conditions of the Great South Bay. By design, presentations included both theoretical and more practical considerations. Workshop presentations were capped at twenty minutes total consisting of fifteen minutes with a 5-minute question and answer period.

The presentations (see Appendix 2 for Abstracts of all presentations) provided context. Through the presentations, participants learned about Fire Island and its complexity, examples of bay shoreline management successes and failures in other locations, resource damage and loss of ecosystem services at bayside erosional hotspots and discussed potential nature-based methods for selected areas on Fire Island (see Figures 1-6 below). After the presentations, participants attended one of five Breakout Sessions (see Discussion/Breakout Groups section below).

¹Nature Based Solution is a broad term used to describe a range of shoreline management techniques that utilize natural ecosystem components, sometimes combined with engineered components, in an effort to manage a shoreline. This definition includes unaltered natural ecosystems as well as engineered systems designed to prevent erosion by restoring or recreating a subset of natural ecosystem features. The latter is often referred to as a living shoreline.

Purpose of the Workshop

The workshop aimed to help participants understand the benefits and costs of nature-based solutions available for protecting and restoring the environment, ecosystem services, and human-built infrastructure and buildings.

Workshop Goals

- Present information to help Fire Island National Seashore staff and stakeholders better understand the current state of the science related to bayside erosion issues on the northside of Fire Island.
- Focus on identified erosional hotspots of concern to the Seashore and other stakeholders and evaluate the feasibility, costs, and benefits of nature-based shoreline erosion control projects at those locations, prioritize locations for nature-based erosion control projects and identify working groups interested in specific sites.
- For each potential project location, understand and identify the conditions that influence the site and identify project goals (e.g. habitat restoration/protection, restoring a functional ecosystem, protecting infrastructure and private property).
- Gather input from subject matter experts to help identify the best practices in design and construction and maintenance to meet the goals of the nature-based solution at each site and given the conditions within the Great South Bay (see Figure 1).
- Identify potential design programs, funding sources, and a path toward implementation for each project.

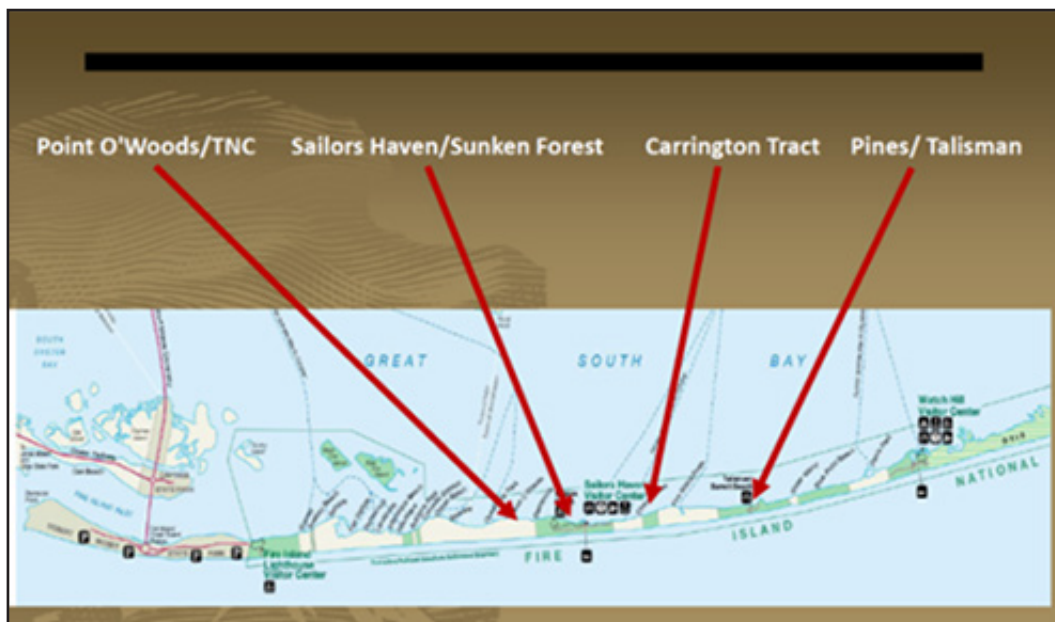


Figure 1—Selected erosional hot spots for Breakout Discussions



Figure 2—Sailors Haven West Side Shoreline 2021 (Purple line shows 1969 shoreline)



Figure 3—Sailors Haven East Side Shoreline 2021 (Red line shows 1969 shoreline)



Figure 4—Talisman/Barrett Beach Shoreline 2021 (Red line shows 1969 shoreline)



Figure 5—Carrington Tract Shoreline 2021 (Red line shows 1969 shoreline)



Figure 6—Point O'Woods Shoreline 2021 (No historic shoreline available)

Summary of Presentations

An important goal of the workshop was to present information to participants on the Seashore's bayside erosion issues, the science of bayside erosion, and examples of shoreline protection/restoration methodologies. All the presentation abstracts are included in Appendix 2.

Workshop participants considered the following presentations:

The Flood Adaptation Hierarchy: A hierarchical decision-making framework for shoreline management

Alison Branco, PhD, Director of Coastal Programs, The Nature Conservancy in New York

Dr. Branco proposed a hierarchical decision-making framework intended to encourage landowners, public officials, and project planners to select flood risk reduction options that best balance the needs of people and nature. Her framework prioritizes the preservation of natural processes, the needs of nature to adapt to climate change, and the need for communities to reduce risk, rather than defer it.

Overview of Fire Island National Seashore

Kaetlyn Jackson, Park Planner, Fire Island National Seashore

Ms. Jackson introduced some of the specific challenges of protecting Fire Island, an extensive barrier beach ecosystem that attracts 2.2 million visitors a year, including the layers of stakeholders that require Fire Island to be managed collaboratively to ensure that future generations can enjoy its unique resources.

Fire Island Climate Change Vulnerability Assessment and NPS climate adaptation related to shoreline management including natural and nature-based features

Amanda Babson, Coastal Landscape Adaptation Coordinator, Interior Region 1, National Park Service

Dr. Babson shared recommendations from the Integrated Coastal Climate Change Vulnerability Assessment for Fire Island National Seashore. She set the context of NPS policy relevant to shoreline management and climate adaptation using Natural and Nature-based Features (NNBF) which must be appropriately designed for local conditions.

Historic Shorelines and Conditions on the Bayside at the Four Potential Project Locations

Jordan Raphael, Park Biologist, Fire Island National Seashore

Mr. Raphael documented the extensive bayside erosion already occurring within several federal tracts on Fire Island. Erosion has caused loss of important habitat, such as saltmarshes and rare maritime forests.

Geomorphological Evolution of the Fire Island Barrier Island and Drivers Affecting Bayside Coastal Development

Dr. Norbert Psuty—Professor Emeritus, Sandy Hook Cooperative Research Programs, New Jersey Agricultural Experiment Station, Rutgers University

Dr. Psuty summarized aspects of coastal geology, such as the drivers of sediment supply, coastal wave and current energy, and recent sea level rise. Interaction of localized sediment transport systems and man-made impacts have caused sediment accumulations and sediment deficits along bay shores.

Back-Barrier Restoration: A focus on Building Resiliency and Ecosystem Function

Bartholomew Wilson, P.G., Ph.D., Geologist/Project Manager, Coastal Delaware, National Wildlife Refuge Complex, USFWS

Dr. Wilson offered perspectives from USFWS's experience with the restoration of back-barrier ecosystems in the North and Mid-Atlantic, with a focus on the changing environment. Study sites include locations in Rhode Island, New Jersey, Delaware, and Virginia.

Learning from Past Projects: Step in the Right Direction

Bhaskar Subramian, Chief, Shoreline Conservation Service, Maryland Department of Natural Resources

Dr. Subramian addressed practical aspects of living shoreline projects in diverse site conditions. He presented lessons learned since 1985 in Maryland and how adaptive management has resulted in better project performance, enhancement of overall knowledge and improvements in the design/implementation of such projects over time.

Living Shoreline Design Principles for Long Island: Theory and Practice

Chris Pickerell, Marine Program Director and Steve Schott, Marine Botany/Habitat Restoration Specialist, Marine Program, Cornell Cooperative Extension, Riverhead, NY

Cornell University's Cooperative Extension has helped plan and install innovative living shorelines on Long Island that integrate coastal plants, native shellfish and natural materials (such as stone and wood) to achieve desired project goals. This approach has been utilized in other parts of the US, but these methods are fairly new in New York. The team presented an overview of its work to date including lessons learned,

future directions and opportunities for innovation within the Fire Island barrier beach ecosystem.

Living Shorelines in High Energy Environments

Jon K. Miller – Stevens Institute of Technology

Mr. Miller reviewed the challenges of implementing living shoreline projects in high-energy environments and some of the techniques used in such situations. Such projects frequently include rock, concrete or wood in addition to sediment and/or vegetation and are commonly referred to as hybrid living shoreline projects. At even higher energy levels, the size of the structural elements generally increases, and the structures begin to resemble more traditional coastal infrastructure.

Engineering With Nature®—Overview and Approach

Safra Altman, Research Ecologist, ERDC's Coastal Ecology Team Lead

Dr. Altman described the U.S. Army Corps of Engineers (USACE) initiative called Engineering With Nature® (EWN) that uses natural processes and systems to target a broad range of economic, environmental, and social benefits. He reviewed the guiding principles, and highlights of, EWN projects.

Permitting a Living Shoreline—NY State Dept. of Environmental Conservation (DEC) Requirements and Strategies for Success

Alexa Fournier, Coastal Resiliency Program Manager, New York State Department of Environmental Conservation, Division of Marine Resources

Ms. Fournier presented an overview of how living shoreline projects are permitted by New York's DEC and offered strategies to successfully navigate this process. She provided guidance documents currently available for developing living shoreline designs, discussed the importance of determining the best design to meet the project goals and also the need for maintenance and monitoring post-construction.

Discussion/Breakout Groups

One of the most important aspects of the workshop was to ensure that there would be a robust and focused discussion of the presentations and ideas and concerns about implementing projects on the bayside shoreline of the Seashore. There was a breakout discussion during each of the two days of the virtual workshop.

The workshop's list of attendees was specifically limited to stakeholders and subject matter experts. A participant list of 35–40 people was targeted for the workshop to promote robust and meaningful discussions while still having adequate representation from necessary groups. Similarly, the organizers decided on 5 breakout groups, each with approximately 8 people.

Each breakout group followed a pre-determined discussion outline with a designated facilitator and note taker to ensure the group stayed engaged throughout the session when considering various topics. Google JamBoard was used to capture the group discussions; and a notetaker was assigned to each group and all participants were invited to add to the board.

The breakout groups on the first day discussed project implementation considerations. The breakout on the second day discussed the four specific locations that the Seashore is considering for project implementation. See Appendix 3 for full results of each Breakout Group from both days.

First day guiding questions:

- 1) **What are the priority issues/variables inherent to addressing rapid shoreline erosion in higher-energy back bay systems?**
 - a) What variables are often overlooked when designing projects to address back bay shoreline erosion?
- 2) **What are the primary data gaps?**
 - a) Which climate projections/scenarios are most appropriate?
 - b) What other scenario might be more useful?
 - c) How have projects in other geographies acquired these data?
 - d) Which variables are the most important to consider in developing projects to address shoreline erosion in back bay systems?

Following the end of the breakout sessions, groups met collectively for a final closeout session where each group's facilitator shared the results of their discussion. Each group was able to share their JamBoard with the larger group. (Appendix 3 includes Summaries of the Breakout Groups on each day of the Workshop including links to the JamBoard notes)

Day One Summary: categories of combined comments from all five breakout groups

1) What are the priority issues/variables inherent to addressing rapid shoreline erosion in higher-energy back bay systems?

- Policies/Jurisdiction/Permitting
- Sediment Supply/Sediment Transport
- Habitat compatibility/High energy environment/Storms/Tidal range
- What sites should be considered? How will the sites be chosen? What is the time frame for implementing a project?
- Design considerations
- Need to look at the appropriate SLR scenario
- How do we address existing structures/infrastructure
- Need to have community engagement and support
- Available tools/technology
- Pre-Post Monitoring, track erosion rates/wave climate
- Tied to the Fire Island to Montauk Point Reformulation project

a) What additional variables are missing from list (pre-drafted list of primary variables)?

- Hydrodynamic Variables—Fetch, wind, waves, energy
- Ecological Variables—compatible with habitats
- Terrestrial Parameters
- Models of sea level rise are imprecise—what are the predictions of future conditions?
- Consider time scale around a project—how long should it last? Agreeing on time scale
- Need to know more about ice impact at this location (ice scour)
- SAV distribution—could impact permitting, sand placement etc.

2) What are we missing?

a) System Parameters

- Erosion History
- Sea Level Rise
- Tidal Range
- Fetch/energy

b) Hydrodynamic Variables

- Wind
- Waves
- Wakes
- Current/drift
- Ice scour
- Storm surge

c) Ecological parameters

- Water quality
- Soil type
- Sunlight exposure

d) Terrestrial parameters

- Upland slope
- Shoreline slope
- Width
- Nearshore slope
- Offshore depth
- Soil bearing capacity

e) Additional Characteristics

- Length of project effectiveness
- Permits/regulatory
- Constructability
- Native/invasive species
- Debris impact
- Project monitoring

f) What are the primary data gaps?

- Community interactions/needs both mainland Long Island and Fire Island communities
- Will FI be allowed to rollover
- What is the sediment budget
- Modeling different scenarios of fetch and SLR and how it is tied to island geomorphology
- Capacity for modeling on a small scale
- Review of Karl Nordstrom's work
- How to deal with ACOE plans for pumping sand into the bayside shoreline
- USGS modeling of shoreline response to SLR with & without NNBF Jamaica Bay could serve as an example

Day Two Summary: categories of combined comments from all four breakout groups: Carrington Tract, Talisman, Sailors Haven, and Point O'Woods.
The four sites had similar concerns/issues:

- 1) What are the primary project design considerations for addressing erosion at each of the sites?**
 - Gaps in understanding system sediment budget/sediment transport
 - To what extent are waves impacting sediment budget
 - The marina interrupting sediment transport
 - Saltwater intrusion at Sunken Forest
 - Need a structural way to keep sand on the shoreline
 - Nature-based Solutions on either side of the marina to improve sediment deposition and promote biological and mineral accretion/overwash
 - Fetch–wave energy/direction
 - Need a breakwater from ferry wakes/oysters
 - Choosing the right type of vegetation
 - Hard structures to stabilize sediment against existing bulkheads
 - Restoration potential of offshore SAV
 - Layers of jurisdiction—Hard structures could be incompatible with the overlay of regulatory requirements
 - Current shoreline habitat types
 - Identify the stakeholders and interested parties—may identify additional funding opportunities
- 2) Which design elements have the best track record at effectively addressing shore line erosion?**
 - Big projects with high uncertainty often benefit from a “phased” approach as a way of maximizing effectiveness and reducing risk
- 3) Novel/innovative approaches**
 - Partner with US Geologic Survey (USGS) and US Army Corps of Engineers for future modeling
 - Alternatives analysis—SLR and what this area will become in fifty years with and without action
- 4) What are the concerns about current conditions at this location?**
 - There is no hydrodynamic sediment model for the system to inform management decisions
 - Need bathymetry data to know where sediment is settling
 - Need a system-wide model for Great South Bay. Will cost roughly \$100–\$300k
 - How do we get native vegetation/native material—Create nurseries for FI native vegetation from Fire Island seeds
 - Ground water movement. During superstorms groundwater heads to the bay on the Cherry Grove side (maybe referring to runoff?).

5) Other notes during discussion

- Strong NPS—communities partnership exists; Fire Island Association has brought together a forum for collaborating among stakeholders; extreme concern about bayside erosion; lots of positive community value on-island
- Large boating community and travelers via ferry—options should take into account impact this community
- NY State Dept.of State (DOS) has Seagrass Change Map—2002–2018
- Local communities—funding mechanism for beach nourishment that can be tapped?

Recommendations

The Fire Island National Seashore Bay Shoreline Management Workshop provided an important opportunity for National Seashore staff, subject matter experts, and engaged stakeholders to: review available data on the impacts of erosional hot spots on the bayside of Fire Island, identify key information gaps, and explore the application of nature-based approaches to address those impacts.

The topical presentations, in conjunction with the five breakout groups actively engaged workshop participants over the two-day event. Participants provided a significant amount of feedback in response to each of the discussion questions (See Breakout Groups Summary in Appendix 3). In addition, there was considerable alignment across participant feedback, with common themes emerging from each of the breakout groups. Synthesizing the themes that emerged from those discussions resulted in a discrete set of recommendations and priority concepts.

- Given the extent of a shared bio-geophysical setting, the breadth of similar impacts, and a long history demonstrating that the activities conducted at one site have implications at other sites, there was broad recognition that proposed management activities should be explored within a whole-systems context.
- If a determination is made that additional data is required to inform management approaches at a specific site, every effort should be made to provide that data for the whole system (e.g., Great South Bay hydrodynamic sediment transport model).
- Detailed site assessments, in conjunction with pre- and post-implementation monitoring, are fundamental to evaluating project effectiveness and impacts within a whole-systems context.
- The Carrington Track, Talisman, Sailors Haven and Point O'Woods were the four highest priority erosional hotspots identified for the workshop. With a number of the erosional hotspots occurring on federal property, Fire Island National Seashore managers should engage in an internal review effort to determine which locations should be addressed, and to prioritize those in need of intervention.

Next Steps

Recognizing that it might be very difficult to fund projects in all four of the areas discussed at the workshop, the Seashore will need to determine priority project areas. The Seashore (along with a designated subject matter experts) will utilize the information from the workshop to determine which types of shoreline projects would best fit the prioritized portions of the bay shoreline. Once the project types have been decided upon, the Seashore will complete a National Environmental Policy Act (NEPA) impact analysis to determine which alternative(s) would have the best outcome with the least environmental impact. With completion of the NEPA analysis, the Seashore would then move forward with determining project funding for implementation.

APPENDIX 1: Workshop Agenda

Fire Island National Seashore Bay Shoreline Management Workshop Thursday, May 13, 2021		
8:15 am	Day-1—Welcome/Orientation	Alexcy Romero—Superintendent, Fire Island National Seashore
8:20 am	The Flood Adaptation Hierarchy: A hierarchical decision-making framework for shoreline management	Alison Branco, Ph.D.—Director of Coastal Programs, The Nature Conservancy
8:40 am	Overview of Fire Island National Seashore	Kaetlyn Jackson—Park Planner, Fire Island National Seashore
9:00 am	Fire Island Climate Change Vulnerability Assessment and NPS climate adaptation related to shoreline management including natural and nature-based features	Amanda Babson—Coastal Landscape Adaptation Coordinator, Interior Region 1, National Park Service
9:20 am	Historic shorelines and conditions on the bayside at the four potential project locations	Jordan Raphael—Park Biologist, Fire Island National Seashore
9:40 am	Geomorphological Evolution of the Fire Island Barrier Island and Drivers Affecting Bayside Coastal Development	Dr. Norbert Psuty—Professor Emeritus, Sandy Hook Cooperative Research Programs, New Jersey Agricultural Experiment Station, Rutgers University
10:00 am	BREAK	
10:10 am	Break-out Groups	Five groups with facilitators and note-takers
10:55 am	BREAK	
11:05 am	Break-out Groups Report Out	Group Facilitators
11:30 am	Closing Discussions and Wrap up	Bilecki/Jackson

Fire Island National Seashore Bay Shoreline Management Workshop
Friday, May 14, 2021

8:15 am	Day 2—Re-cap Day 1	Bilecki/Jackson
8:25 am	Back-Barrier Restoration: A Focus on Building Resiliency and Ecosystem Function	Bartholomew Wilson, P.G., Ph.D.—Geologist/Project Manager, Coastal Delaware National Wildlife Refuge Complex, USFWS
8:45 am	Learning from past Projects: Step in the Right Direction	Bhaskar Subramian—Chief, Shoreline Conservation Service, Maryland Department of Natural Resources
9:05 am	Living Shoreline Design Principles for Long Island: Theory and Practice	Chris Pickerell—Marine Program Director and Steve Schott—Marine Botany/Habitat Restoration Specialist, Marine Program, Cornell Cooperative Extension, Riverhead, New York
9:25 am	Living Shorelines in High Energy Environments	Jon Miller—Stevens Institute of Technology
9:45 am	BREAK	
9:55 am	Engineering With Nature®—Overview and Approach	Dr.Safra Altman—Research Ecologist, ERDC's Coastal Ecology Team Lead, US Army Corps of Engineers
10:15 am	Permitting a Living Shoreline—DEC Requirements	Alexa Fournier—Coastal Resiliency Program Manager, NYSDEC Division of Marine Resources
10:35 am	Break-out Groups	Four Groups with facilitators and note-takers
11:20 am	BREAK	
11:25 am	Break out Groups Report Out	Group Facilitators
11:45 am	Closing Discussion and Next Steps	Bilecki/Jackson

APPENDIX 2: Presenter Abstracts

Title: The Flood Adaptation Hierarchy: A hierarchical decision-making framework for shoreline management

Presenter: Alison Branco, PhD, Director of Coastal Programs, The Nature Conservancy in New York

Abstract: Past land use patterns and modern development pressures have led to the risky situation on our shorelines today: communities are in danger from flooding. And these flood risks are ever-increasing in our changing climate. Coastal managers want to, and must, balance the needs of people and nature, but struggle to do so in the current decision-making structure where goals are too often narrowly defined based on short term goals, like the protection of property. Here we will discuss a hierarchical decision-making framework that will assist landowners, public officials, and project planners alike to select flood risk reduction options that best balance the needs of people and nature for the long-term. This framework prioritizes the preservation of natural processes, the needs of nature to naturally adapt to climate change, and the need for communities to truly reduce risk, rather than defer it. It is also a flexible framework, recognizing there is no optimal solution that can be applied everywhere. Rather, it allows the particular constraints of every situation to be evaluated and incorporated into stepwise decision-making. The Flood Adaptation Hierarchy is equally applicable to coastal areas battling storm surge and sea level rise as it is to inland riverine, lake, or stormwater flooding. This framework could be implemented in many contexts, including public and private grant programs, state and/or municipal regulations and permitting, comprehensive planning, funding allocations, and even decisions by individual property owners.

Title: Overview of Fire Island National Seashore

Presenter: Kaetlyn Jackson, Park Planner, Fire Island National Seashore

Abstract: Did you know Fire Island welcomes 2.2 million visitors a year and many do not know they are in a national park? The complexity of land ownership, transportation to Fire Island sites, and various local authorities makes Fire Island a challenging place to protect and manage. This presentation will provide an introduction to Fire Island and the layers of stakeholders that require Fire Island to be managed collaboratively to ensure future generations can enjoy Fire Island's unique resources.

Title: Fire Island Climate Change Vulnerability Assessment and NPS climate adaptation related to shoreline management including natural and nature-based features

Presenter: Amanda Babson, Coastal Landscape Adaptation Coordinator, Interior Region

1, National Park Service

Abstract: We'll share results and recommendations from the Integrated Coastal Climate Change Vulnerability Assessment for Fire Island National Seashore. One of the assessment's focal areas was Island Change on the Bayside. The discussion of the interacting vulnerability and adaptation options of different resources highlighted the need to evaluate nature-based solutions.

We'll set the context of NPS direction and policy relevant to shoreline management and climate adaptation. Natural and Nature-based Features (NNBF) are a category of adaptation option that is often considered but benefits and disadvantages are location dependent and must be appropriately designed for the local conditions. Examples from parks that have implemented NNBF will be shared.

Title: Historic shorelines and conditions on the bayside at the four potential project locations

Presenter: Jordan Raphael, Park Biologist, Fire Island National Seashore

Abstract: There has been extensive bayside erosion occurring within many of the federal tracts on Fire Island National Seashore. Most notably in the Sunken Forest, Carrington tract and Talisman. This erosion has caused loss of habitat, such as, saltmarshes and rare maritime forests. Sea level rise and erosion along the bayside has not only created "ghost forest" in areas adjacent to the bay, but it has also driven tree mortality in many sections of the forest within the interior of the island, at low elevations. Along with vadose zone thinning many of these trees are dying from saltwater intrusion, which is exacerbated by the bayside erosion. There are many different factors that are causing habitats to change on Fire Island, but bayside erosion is arguably the most influential of them all.

Title: Geomorphological Evolution of the Fire Island Barrier Island and Drivers Affecting Bayside Coastal Development

Presenter: Dr. Norbert Psuty - Professor Emeritus, Sandy Hook Cooperative Research Programs, New Jersey Agricultural Experiment Station, Rutgers University

Abstract: The Fire Island barrier island system is part of the East Coast response to the geomorphological drivers of sediment supply, coastal wave and current energetics, and sea level rise of recent geologic time. The bayside conditions are part of the evolution of the barrier island system and are the products associated with sediment mobilization and transport on restricted fetch situations characteristic of estuarine shorelines. Interaction of the localized sediment transport and anthropogenic impacts have caused spatially-focused sediment accumulations and sediment deficits along the bay shores. The unique alongshore transport system localizes impacts of sediment transport interference and accumulation resulting in site specific responses.

Title: Back-Barrier Restoration: A focus on Building Resiliency and Ecosystem Function

Presenter: Bartholomew Wilson, P.G., Ph.D., Geologist/Project Manager, Coastal Delaware National Wildlife Refuge Complex, USFWS

Abstract: There are many perspectives and routes projects have taken to tackle the restoration of the back-barrier ecosystems in the North and Mid-Atlantic, with a focus on the changing environment. The USFWS and its partners have focused on re-creating resilient ecosystems that functions in a natural equilibrium with coastal dynamics, with an eye toward addressing the impacts that anthropogenic activities have had upon the condition and response to sea-level.

Projects discussed will include topics such as: enhancing natural over-wash and transgression, innovative planting designs, wave attenuation, elevation enhancement through sediments application, re-evaluating how to design dune and back-barrier projects, and building elevation capital for the marshes to enhance transgression of habitats. Study sites include locations in Rhode Island, New Jersey, Delaware, and Virginia.

Title: Learning from Past Projects: Step in the Right Direction

Presenter: Bhaskar Subramian, Chief, Shoreline Conservation Service, Maryland Department of Natural Resources

Abstract: Since 1985, Maryland DNR has implemented numerous living shoreline projects in diverse site conditions and with a multitude of project goals. Project maintenance or the lack of, have affected the success of these projects. This presentation will address some of these lessons learned over time and how adaptive management has tilted the balance and resulted in better project performance, enhancement of overall knowledge and in the design/implementation of smarter projects over time. Lessons learned from these efforts are helping Maryland get ready for the future.

Title: Overview of Living Shorelines in New York and Potential Methods for Fire Island

Presenters: Chris Pickerell and Stephen Schott

Abstract: Cornell Cooperative Extension has been involved with planning and installing living shorelines for habitat restoration, erosion control and water quality improvement for a number of years. As part of this work, we look to integrate coastal plants, native shellfish and natural materials such as stone and wood to achieve desired goals. Although this approach has been utilized in other parts of the US, these methods are fairly new to New York.

Our talk will provide an overview of our work to date including lessons learned, future directions and opportunities for innovation. Throughout the talk, special emphasis will be placed on how various methods might be applied to the Fire Island barrier beach ecosystem.

Title: Living Shorelines in High Energy Environments

Presenter: Jon K. Miller, Stevens Institute of Technology

Abstract: As living shorelines have increased in popularity in the northeast over the past decade, a question that is frequently asked is, can living shorelines be used in high-energy environments? The answer is unequivocally yes, however, these projects differ from those constructed in more traditional low-energy settings. In low-energy settings, shoreline stabilization can often be achieved with strategically placed, low-impact structures such as coir rolls, and vegetative plantings. In moderate energy settings, it often becomes necessary to introduce additional structural elements to either absorb or dissipate the ambient energy. Frequently, these projects include rock, concrete or wood in addition to sediment and/or vegetation and are commonly referred to as hybrid living shoreline projects. At even higher energy levels, the size of the structural elements generally increases and the structures begin to resemble more traditional gray coastal infrastructure, often with modifications or enhancements added to improve their ecological function. This talk will review the challenges of implementing living shoreline projects in high-energy environments, and some of the techniques used to extend the application of the methodology.

Title: Engineering With Nature®—Overview and Approach

Presenter: Safra Altman, Research Ecologist, ERDC's Coastal Ecology Team Lead

Abstract: Over the last 11 years, the U.S. Army Corps of Engineers has been working through an initiative called Engineering With Nature® (EWN) that uses natural processes and systems to deliver a broad range of economic, environmental, and social benefits. Sustainable development of water resources infrastructure is supported by solutions that beneficially integrate engineering and natural systems. With recent advances in the fields of engineering and ecology, there are opportunities to combine these fields of practice into a single collaborative and cost-effective approach for infrastructure development and environmental management. EWN brings together a growing international community of practitioners, scientists, engineers, and researchers, from all kinds of disciplines to collaborate on how best to harness the power of nature to innovate, solve problems, and create sustainable solutions. This presentation will provide an overview of the EWN initiative focused on the approach, guiding principles, and highlights of EWN projects.

Title: Permitting a Living Shoreline—DEC Requirements and Strategies for Success

Presenter: Alexa Fournier, Coastal Resiliency Program Manager, New York State Department of Environmental Conservation, Division of Marine Resources

Abstract: The protection and restoration of coastal habitats, such as salt marshes, is a key priority in New York’s coastal resiliency strategy. Living shorelines and other natural and nature-based shoreline features can lessen the impacts of flooding and storm surge events to coastal developments while providing critical habitat resources. In recent years, staff within DEC’s Division of Marine Resources have worked closely with municipalities, estuary programs, nonprofit groups and private homeowners to promote, design, and implement a variety of shoreline restoration projects. In this presentation, I will give an overview of how living shoreline projects are permitted by the DEC and offer strategies to successfully navigate this process. I will provide resources to a variety of guidance documents available for developing living shoreline designs, and will discuss the importance of determining the right design to meet the project goals and the need for maintenance and monitoring post-construction.

APPENDIX 3: Summary of Breakout Groups

Summary Group 1

Day 1—Discussion Summary

Facilitator: Amanda Babson

Notetaker: Dennis Skidds

JamBoard Link:

https://jamboard.google.com/d/1WgiWtDAYIAHasDURVNHMxhCWFB_F6GEoZ7_tx1GsBp8/viewer?f=1

Day 2—Group Pines/Talisman Breakout

Day 1—Discussion Topics

1) What are the priority issues/variables inherent to addressing rapid shoreline erosion in higher-energy back bay systems?

- Tide Range
- Fetch
- Knowledge of historical habitats in the area
- Storm surge
- Understanding of the physical setting-what is the problem, what are the contributors, what happens if the problem is not addressed (consequences—both local and regionals)
- Does high energy mean hard structure component? Not always a good option due to wave refraction and reflection
- Wave Attenuation should be looked at (not sills but true refraction through WADs)
- How to encourage storm overwash as a means of transgression and back barrier ecosystem enhancement
- We have tried feeder beaches, what would it take to get softer shoreline management
- Need to track erosion rates, wave climate
- Loss of bay seagrass beds has had a large impact
- FIIS has tried using feeder beaches. There needs to be some measures to slow erosion rate, slow sediment transport; for infrastructure, properties in peril
- Wave attenuation devices that can be moved (pyramids, oyster castles, logs/rootballs) instead of harder measures can be more cost effective. Often attractive from regulatory standpoint—non-permanent, provides habitat
- Given multiple jurisdictions, how feasible is implementation
- One purpose of the workshop is to determine what is in our tool box
- FIMP, multiple solutions being implemented LI-wide (including wave attenuation structures), but also sand-only solutions. Trying to demonstrate success with the least-impactful method first, then if it doesn't work, we'll document why another approach is needed
- Where is sediment coming from
- FIMP trying to take into account reduced overwash sediment into bays from FIMP ocean beach activities. Offshore borrow areas inlets, (ebb shoals)
- Need to take into account effect of what is implemented on FIIS with mainland

- One concern of FIMP to restore bay shorelines to in part widen island and reduce breach frequency
- NPS units in NYC, Boston also concerned with the use of NNBF to protect larger areas

2) What are we missing (from presentations)/what are the data gaps?

- Improved understanding of the sediment budget—where is the sand moving
- What are the constraints from regulatory and land owner perspective, are there things that cannot be done i.e. non-starters
- Hydrodynamic model is necessary (including sediment transport) to evaluate changes and actions. LSU Coastal Resiliency Group has done some great work in other areas to help inform management and effects of SLR, storms
- Eelgrass/bottom habitat mapping (some coverage but incomplete and ideally could map change
- Reconciling the imminent demise of the Sunken Forest from fresh ground water rise coupled with increased erosion rate and that affects what holds the island together in these forested areas
- Improved understanding of sediment budget, general east-west transport along ocean shoreline well understood, but better understanding of inter-tidal / offshore sinks, channels, effects of/on marinas needed
- Bayside shoreline monitoring
- Recognize that other processes like groundwater monitoring important (e.g. sunken forest)

Day 2—Pines/Talisman

JamBoard Link: Not available for this session

1) What are the primary project design considerations for addressing erosion at this site? What design components are NOT applicable as a result of NY permitting, site-specific characteristics, funding limitations? Which design elements have the best track record at effectively addressing shoreline erosion, Novel/Innovative approaches?

- Bulk headed shoreline to east
- Restoration potential of offshore SAV
- BU/Dredge material availability and make up
- Wave energy direction
- Understanding sediment movement/budget
- Layers of jurisdiction
- Is the park currently dredging to maintain ferry access to the dock
- Designing for SLR re: height of exposed structures/features influences effectiveness
- Potential for overwash as a sediment source
- Current shoreline habitat types
- Existing vegetation and habitat variability
- Opportunities for recurring strategic placement

- Current limits of Intertidal or High marsh within project area
- Sediment budget, hydrodynamics
- Changing heights of hardened structures/changing bulkheads to sills
- Identify the stakeholders and interested parties - may ID additional funding opportunities
- Consider where you want the seaward toe of your shoreline—keep at current location? Go seaward to reclaim historic shoreline limits? Will impact cost and feasibility
- Presence/absence of hardened shoreline

Additional Notes during Breakout

- Bulkhead to east, hardened shoreline—design options for dealing w/ this
- Staggered approaches v. continuous hardened structures
- Elements/designs w/ best track records for similar areas
- Offshore breakwaters to prevent sediment loss to deeper waters
- Dredge material availability
- Consider opportunities for dredge material near shore. Also sediment placement (“permanent” versus available for transport)
- Ferry service channel dredging will be important to know
- Don’t believe dredging still being done; 5–8yr replenishment on ocean side w/ FIMP—is there possibility to acquire some for bay
- Replenishment stockpiles exist in 2 areas on the island
- FIMP planned ongoing bayside placement to mimic overwash that would be lost
- Will fill from inlet dredging in Moriches be available
- Long-distance sediment pumping from dredging is feasible from past projects
- Horseshoe crab spawning needs to be taken into account here—is a hotspot. Animals will need connectivity to the beach
- Pilot project in Lito Beach horseshoe crab observed trapped in larger stones in front of sand
- Important to create exit routes
- Pines Community very engaged and interested in volunteering labor, fundraising

Additional Notes

- Need to determine how far into the bay shoreline should be; attempting to reproduce full historical shoreline may not be feasible
- Need to consider this area in relation to other projects (including FIMPS)
- Infrastructure protection (e.g. substation)
- This is a good point for permitting
- Stakeholder buy-in—Cooperation, coordination needs to be built into a project early on
- Enhance ecosystem services, vegetation habitats; focus on soft side of solutions

- What does the community value at this location?
 - a) Power substation
 - b) New seagrass (2002-2018 DOS Seagrass Change report/map) New York OPD

Geographic Information Gateway (ny.gov) Link:

<http://opdgig.dos.ny.gov/#/map/0/%7BF3E2E11F-BDA6-4E98-9D97F120CE455E53%7D>

Additional Notes

- Strong NPS—community partnerships exist—FI Association has brought together a forum for collaborating among stakeholders—extreme concern about bayside erosion—lots of positive community value on-island
- Large boating community and travelers via ferry—options should take into account impact this community
- Orange on map = eelgrass—this habitat needs to be taken into account
- This is 2011 mapping
- Has the eelgrass loss been noticable in this area of late? Bulkhead could have prevented sediment accumulation.
- Probably correlated
- Could use 1930's aerial imagery to help model seagrass loss, movement. Brad Peterson's lab
- Bayside water quality has improved, communities looking to improve waste water management to enhance this; allow for seagrass recovery
- Seagrass restoration is a soft off-shore structure option
- SLR will affect feasibility
- As will increasing water temps
- Can be flexible; seagrass beds can be temporary
- Infrastructure protection
- Local communities have funding mechanism for beach nourishment that can be tapped

Summary of Group 2

Day 1—Discussion Summary

Facilitator: Chris Hilke

Notetaker: Chris Olijnyk

JamBoard Link:

<https://jamboard.google.com/d/18Ttuoo1vmYUBuKrntKSKCne5Ms0hOEaU2mPSeD1GrAo/viewer?f=0>

Day 2—Sailors Haven/Sunken Forest

Day 1—Discussion Topics

- 1) What are the priority issues/variables inherent to addressing rapid shoreline

erosion in higher-energy back bay systems?

Most of the conversation around this question was focused on the issues below.

- Understanding current and projected storm frequency and strength, particularly nor'easters, are key data
 - Understanding system sediment budget
 - Length of fetch is an important consideration
 - How energetic is the system?
 - a) **What additional variables are missing from list (pre-drafted list of primary variables)?**
 - SAV distribution
 - b) **What variables are often overlooked when designing projects to address back bay shoreline erosion?**
 - Distribution and proximity of built infrastructure as an accelerant of erosion
- 2) **What are we missing? What are the primary data gaps?**
- Missing a system-wide hydrodynamic sediment model
 - a) **Which climate projections/scenarios are most appropriate?**
 - Regionally downscaled data is most appropriate for site-specific planning
 - SLR, storm surge & coastal storm projections

Not Answered:

- 3) **what other scenario might be more useful?**
- 4) **How have projects in other geographies acquired these data?**
- 5) **Which variables are the most important to consider in developing projects to address shoreline erosion in back bay systems?**
- 6) **Other prompting questions?**

Day 2—Sailors Haven

Facilitator: Chris Hilke

Notetaker: Chris Olijnyk

JamBoard Link:

<https://jamboard.google.com/d/18Ttuoo1vmYUBuKrntKSKCne5Ms0hOEaU2mPSeD1GrAo/viewer?f=0>

1) What are the primary project design considerations for addressing erosion at this site?

- Primary discussion topic for this question was gaps in understanding system sediment budget

- We know we are losing sediment, but we don't know definitively where it is going
- To what extent are waves impacting sediment budget
- The marina interrupting sediment transport
- Saltwater intrusion at Sunken Forest
- Alternative pier designs
- Need a structural way to keep sand on the shoreline. Consider dredging and possibility to add sand regularly to the shoreline design
- Living shorelines on either side of the marina to improve sediment deposition and promote biological and mineral accretion
- A structure could be used to help slow the movement of a "feeder" beach (like the one previously constructed) to prolong effectiveness

a) Which design elements have the best track record at effectively addressing shoreline erosion?

- Big projects with high uncertainty often benefit from a "phased" approach as a way of maximizing effectiveness and reducing risk

b) What design components are NOT applicable as a result of NY permitting, site-specific characteristics, funding limitations?

c) Novel/innovative approaches

- Partner with USGS and USACOE for future modeling
- Alternatives analysis—SLR and what this area will become in fifty years with and without action

2) What are the concerns about current conditions at this location?

- There is no hydrodynamic sediment model for the system to inform management decisions
- Need bathymetry data to know where sediment is settling
- Need a system-wide model for Great South Bay. Will cost roughly \$100-\$300k.
- DELF 3D may be an appropriate model among others

3) Is it appropriate/can there be changes to the current conditions at this location? Why?

4) If yes, what will the goals be of a project on this shoreline?

5) What does the community value at this location?

- Hiking Sunken Forest
- Beach use
- Tailgating in the Marina

Summary of Group 3

Day 1—Discussion Summary

Day 2—Point O'Woods

JamBoard Link: for Kaety and Cathy

https://jamboard.google.com/d/1bnEaQ9etKG247oN3fDWZ_J86m2jpwa3t-HZBsd5i8QI/viewer?f=9

Day 1—Discussion Topics

1) What are the priority issues/variables inherent to addressing rapid shoreline erosion in higher-energy back bay systems?

- Improving longevity expectations of a project requires restoring an area aiming for sustainability of the area and its environmental functions (biological, hydrological, etc.)
- Expected lifespan of a project
- Lifespan might be a tough one!
- Is there a phased strategy (increasing longevity to explore)
- What are the park's priorities regarding longevity of features vs preservation of resources?
- 25–30 year example of lifetime
- Maintenance and ability built in to adjust = monitoring
- Permitting and meeting requirements of regulatory agencies is key for the success of any project success
- Existing shoreline structures and specifically how each is affecting specific park areas
- I would add: desired project goals, bathymetry, presence of natural resources
- In addition to depth offshore, etc. the quality of bottom is very critical. Having a soft muddy bottom offshore could drive the cost of the project up.
- YES models

a) System Parameters

- Erosion History
- SLR
- Tidal Range
- Fetch/energy

b) Hydrodynamic Variables

- Wind
- Waves
- Wakes
- Current/drift
- Ice scour
- Storm surge

c) Ecological parameters

- Water quality

- Soil type
- Sunlight exposure

d) Terrestrial parameters

- Upland slope
- Shoreline slope
- Width
- Nearshore slope
- Offshore depth
- Soil bearing capacity

e) Additional Characteristics

- Length of project effectiveness
- Permits/regulatory
- Constructability
- Native/invasive species
- Debris impact
- Project monitoring

Additional Notes

- If sediment is still mobile, pulled off shore in winter, may ride along the ridges and head out to deeper water
- Examples of how you got to a decision about the longevity of a project
- Hopefully nature will take over and keep things going long-term post project
- Need to have things to compare to—think in terms of phasing; what's the near-term effort and as we enter phases of future change
- Important to build flexibility into a project—e.g. if necessary, add another layer on top of a sill; need to consider permitting needs for that type of flexibility also
- But, to (e.g.) increase height of the sill, you need to increase the bottom as well to maintain trapezoidal structure. At the design phase you need to think about what may be needed in the future to design with that in mind.
- County-need to protect the area into perpetuity; if using federal funds, etc. they need to be able to ensure it stays into perpetuity. Average term is 25-30 years for a project
- Restoration—not meant to go back in time, but rather to re-establish the functioning of the system
- How to deal with the areas that have those bulkheads/hard shorelines? Do we try to add outward from structures to soften and reestablish more natural shoreline. Or shifting and adapting structures (e.g. Sailor's Haven Marina)
- Bhasker—many examples of dealing with structures and restoration or maintaining shoreline at properties adjacent to existing hard structures
- Replacing/modifying hardened shoreline? And how is the interaction with regulatory agencies in doing that/project goals
- People reviewing living shorelines (even if state has general permit)—no consistent

Day 2—Point O'Woods

JamBoard Link: (Starts on page 5):

https://jamboard.google.com/d/1bnEaQ9etKG247oN3fDWZ_J86m2jpwa3t-HZBsd5i8QI/viewer?f=4

1) What are the project design considerations for addressing erosion at this site

- Sediment budget, size, etc.
- Modeling (sediment transport)
- Modeling wave climate based on local bathy, with seasonal effects of fetch, water levels, etc.
- Fetch dominant sediment transport direction
- Biggest fetch—10 miles from NE; 8 miles from NW. The effect of the bulkhead and revetment is very pronounced. A combination of Crab Claw (copy right) tying with the revetment
- What habitats historically existed in this area
- Meshing the feature with adjacent land use
- Adjacent structure/features (e.g. bulkheads, marinas, channels)
- Based upon the presentations it sounds like some hard features would be required to address erosion rates-breakwaters
- Hard structures could be incompatible with the overlay of regulatory requirements-what is required to provide this information-improved modeling?
- Need for sills to allow any restoration to be successful at shoreline given the sed. Movement to both sides? Stabilization of shoreline, followed by sediment augmentation and restoration. . .
- Existing use type and level of access, as well as anticipated or desired future use of the site should help determine the design. What type of access will be allowed at the site

a) Which design elements have the best track record at effectively addressing shoreline erosion

b) What design components are NOT applicable as a result of NY permitting, site-specific characteristics, funding limitations

c) Novel/innovative approaches

Not answered:

2) What are the concerns about current conditions at this location?

3) Is it appropriate/can there be changes to the current conditions at this location? Why?

4) If yes, what will be the goals of a project on this shoreline?

5) What does the community value at this location?

Additional Notes

- The presentation didn't talk to the down drift effect of sediment supply
- Is the breach sediment supply going to move around and get, for example, down to POW?
- May have some localized reversal of sediment plume
- Winds from the NW and NE—you can see shoals responding to both orientations. A lot of the north shore stuff is not moving much A lot of the movement (sediment displacement-sediment longshore in plumes) is happening right at shoreline
- At the end of the bulkhead is a plume, for ex.— erosion both east and west of structures
- Plume from the breach appears to extend maybe 1000 ft. offshore is where the plume is
- If FIIS builds a project adjacent to bulkhead will it have an amount of material added to structure
- Need to put a structure west of shoreline to help with NW exposure as well as movement from erosion
- From Sailors Haven, protrusion into bay to push sand past bulkhead
- Plume coming of east bulkhead—seasonal; may well change as events change But seems to persist across years/ It's at the boundary of a dredged hole, so may be anthropogenic
- Big hole offshore was created by ACOE moving sand onto beach
- Erosion has to be addressed as well as sediment transport away from the shoreline. Stabilization of shore—bringing in sediment in front to restore—vegetate—have sills or something offshore to maintain placed sediment
- There is a marsh just past the bulkhead that could be expanded upon from a restoration perspective. Waves from nor'easter will break pretty far out, but they are significant (2–3) that just roll in; tidal range is about 3'
- Transport is right along the shore and being carried off to one side or the other
- Ownership—a little of everything
- Goals—restoring marshes, reducing frequency of flooding (community concerns)—so breaking up energy is needed, back road flooding kept folks from getting to heart attach victim for example, restore functioning of upland watershed (e.g. fresh water wetlands, drainage, etc.)

Additional Notes

- Things to consider moving forward—What are the localized sediment transport—can we model it
- Would sills work at different angles to deflect wave energy, and sand placement
- Bhaskar not concerned about the marina too much, more focused on the bulkhead
- Sediment spit out into the bay east of the bulkhead is persistent and should be built into the design—make sure you don't mess with it.
- ~1300 linear feet in the eroded section
- Go off of bulkhead to the east about 50 ft where the rock revetment is 1:1.65 ratio
- Crab claw/whale tale in area

- Suspicion is that nor'easters impacting this area a lot.
- 8-10 mile fetch, ~3 tidal range
- What is the composition of the sediment here- fine vs courser
- Need communicate goals and expectations with stakeholder input
- Design should be built up and designed in phases to test effectiveness in this area
- What are the goals—stabilization, habitat creation—restoring marshes that have been loss, infrastructure protection, nuisance flooding—low lying area and engineering proper flow of inland marshes, maybe consider retreat in here

Summary of Group 4

Day 1—Discussion Summary

Day 2—N/A only needed 4 groups for 4 Priority Areas

Facilitator: Monique LaFrance

Notetaker: Greg Ferenbach

JamBoard Link:

https://jamboard.google.com/d/1P6GcPxKybj_eXrw22t79XDzco-3nDQrLEljbUtYFuP0/viewer

Day 1—Discussion Topics

1) What are the priority issues/variables inherent to addressing rapid shoreline erosion in higher-energy back bay systems?

- Modelling SLR
- Waves/fetch
- Boat wakes
- Currents/drift
- Ice
- Storm flooding/surges
- Man-made impacts—structures
- Geology/historic erosion patterns (natural or man-made)
- “Sediment budget” and impacts of dredging
- Feasibility—need to assess both scientifically and politically
- Importance of vegetation; use in sand entrapment
- Importance of rationale: what is the overall purpose of the project? (For example: island protects the mainland)

2) What are we missing (from presentations)/what are the data gaps?

- Models of SLR rise are imprecise: what are the predictions of future conditions
- What is range of choices and vulnerabilities of building materials at these locations?
- Modelling for sites must be more holistic, taking into account more variables (present and future conditions, sediment transport, impacts of existing man-made structures and removing them etc.)
- On Fire Island, what do we know about effects of the new inlet? What explains

- increase in nuisance flooding
- Consider time scale around a project—how long should it last?
- Agreeing on time scale is an important consideration both in terms of funding and permitting/compliance
- Need to know more about ice impact at this location (ice scour)
- SAV-could impact permitting, sand placement etc.
- Wave effects at these location, particularly from ferry wakes, storm events
- Effects of sea grass and other vegetation on flooding

Additional Notes

- Need to carefully balance the goals of the projects to optimize results (e.g. protect property, protect nature)
- Continued erosion at Carrington Tract, is it driving water levels higher
- What can we learn from other local projects (e.g. Patchogue)

Summary of Group 5

Day 1—Discussion Summary

Facilitator: Michael Bilecki

Note Taker: Scott Rasmussen

JamBoard Link:

<https://jamboard.google.com/d/10hGYaP468topLfwY2HWO-rBIJKfKAG4Xx0jrgVTvgvQ/viewer>

Day 2—Carrington Tract

Day 1—Discussion Topics

1) What are the priority issues/variables inherent to addressing rapid shoreline erosion in higher-energy back bay systems?

- NPS has policies in place that need to be considered
- Complexity of jurisdictions
- What permits are required? Cost? Lifespan
- What sites should be considered? How will the sites be chosen? What is the time frame for implementing a project
- Sediment Supply is a key variable
- Needs to be compatible/function with existing habitats
- Need to look at the appropriate SLR scenario
- Fetch, wind, and wave climate need to be taken in to consideration—High energy environment
- How to maintain navigable Channels at odds with sediment supply? Channels are sinks for sediment transport
- How do we address existing structures/infrastructure
- Need to have community engagement and support

a) What additional variables are missing from list (pre-drafted list of primary variables)?

- Hydrodynamic Variables—Fetch, wind, waves, energy
- Ecological Variables—compatible with habitats
- Terrestrial Parameter

b) What variables are often overlooked when designing projects to address back bay shoreline erosion?

c) Other prompting questions?

2) What are we missing? What are the primary data gaps?

- Community interactions/needs both mainland LI and FI communities
- Will FI be allowed to rollover
- What is the sediment budget
- Modeling different scenarios of fetch and SLR and how it is tied to island geomorphology
- Capacity for modeling on a small scale
- Review of Karl Nordstrom's work
- How to deal with ACOE plans for pumping sand into the bayside shoreline
- USGS modeling of shoreline response to SLR with & without NNBF? in Jamaica Bay could serve as an example

3) Which climate projections/scenarios are most appropriate?

4) What other scenario might be more useful?

5) How have projects in other geographies acquired these data? Jamaica Bay?

6) Which variables are the most important to consider in developing projects to address shoreline erosion in back bay systems?

7) Other prompting questions?

Day 2—Carrington Tract

JamBoard Link:

https://jamboard.google.com/d/1dAFu6p-8AkWocARlyjzfcBRU_kUTetyxlowAKJVb6w/viewer

1) What are the primary project design considerations for addressing erosion at this site?

- Fetch
- Need a breakwater from ferry wakes
- Choosing the right type of vegetation

- Oysters
 - May need harder structures to stabilize sediment against existing bulkheads
 - What is the dominant direction of sediment transport in each tract area
 - Bay bottom ownership is going to be a major consideration
- 2) What design components are NOT applicable as a result of NY permitting, site-specific characteristics, funding limitations?**
- Looking into public/federal partnering for funding
 - Partner with orgs (CCE/NY Sea Grant/TNC) for pilot project
- 3) What are the concerns about current conditions at this location?**
- Need more data...fetch sand transport, ground water, dominant wind direction, average wave height
 - How do we get native vegetation/native material
 - Create nurseries for FI native vegetation from FI seeds
 - Ground water movement. During superstorms groundwater heads to the bay on the Cherry Grove side. (maybe referring to runoff?)
 - Need a Cherry Grove-Pines connect to maintain and protect the site...shell fishing and making paths need to be regulated
 - Need Do we keep the “ghost trees” that fall into the bay
 - A breakwater from the fetch also
 - Absolutely no sediment coming in and bulkheads on both sides need sediment and it may keep it
 - Need a definition of high/low energy in these areas
 - SLR scenario needs to use the higher SLR range from NOAA/NYS

Not Answered:

- 4) Is it appropriate to change current conditions at this location? Why?**
- 5) If yes, what will the goals be of a project on this shoreline?**
- 6) What does the community value at this location?**
- 7) Which design elements have the best track record at effectively addressing shoreline erosion?**
- 8) Novel/innovative approaches**