Sea Grant
NEW YORK

Understanding Perceptions and Needs around Flooding and Erosion Risk for Shoreline Communities in Long Island and the Hudson River Estuary, New York

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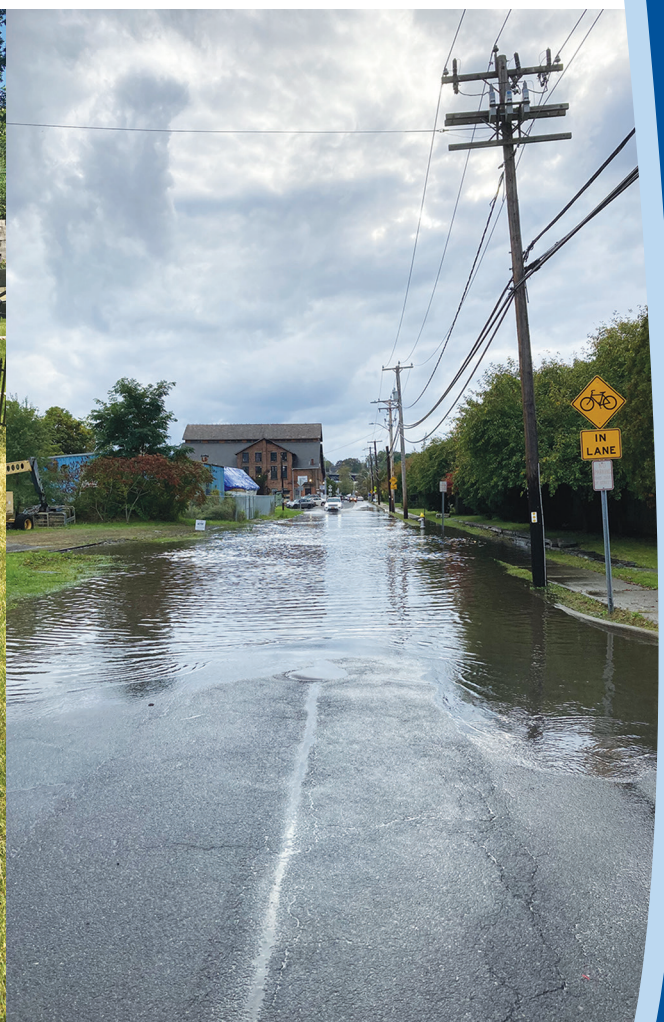

Needs Assessment Report

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Caption for cover photos. *(left)* Eroding bluff on Long Island's north shore. I*mage credit: Kathleen Fallon, New York Sea Grant.*
(right) A flooded street in Kingston, NY. *Image credit: Jess Kuonen, New York Sea Grant.*

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Executive Summary

New York Sea Grant (NYSG), acting as a Cooperating Technical Partner (CTP) of the Federal Emergency Management Agency (FEMA), is developing educational resources for stakeholders who are living on and managing New York State's (NYS) tidally-influenced shorelines, this includes Long Island and the Hudson River up to the federal dam at Troy. To create the most relevant end products, NYSG Specialists on Long Island and in the Hudson River Estuary conducted a needs assessment consisting of focus groups and interviews with the target audience defined below for insight on how to frame key messages. The focus groups and interviews aimed to characterize the stakeholders' perceptions of flood and erosion risk, decision-making, and information needs.

Focus groups targeted 'critical' and 'important' shoreline decision-makers based on FEMA's Communication Toolkit (2019). Critical target audience members were identified as shoreline decision-makers because their knowledge and actions directly impact shoreline and floodplain management. This group includes current and future shoreline residents, businesses, marinas, and local officials. Important target audience members were identified as shoreline influencers because their knowledge and actions directly impact the shoreline decision-makers. This group includes, but is not limited to engineers and consultants. Focus groups and interviews with the critical and important target audiences were completed in December 2020 and January 2021, respectively.

Perceived risk is the subjective judgment that people make about the characteristics and severity of a risk. We use perceived risk since there was no formal risk analysis completed for this needs assessment. Use of the term perceived risk when reporting focus group findings does not imply that those risks are not legitimate.

Key findings

Collection of educational resources. Educational resources and programming related to risk communication and best practices for managing the shoreline and floodplain exist, but they are not always easily accessible and/or in one place in the context of flooding and erosion risk. Work can be done to collect this information, raise awareness for decision-makers, and provide training on how to best utilize the resources.

More clarity needed around regulations. One of the most common themes were challenges with the current regulatory practices and policies around shoreline work. Challenges include the lack of coordination between multiple agencies with jurisdiction, different interpretations of shoreline resilience and regulations by individuals, the length of time it takes to issue permits, and regulatory barriers to innovative solutions. There were requests for more leadership from the state on standardization and more clarity of regulations and the permit application process.

Uncertainty around the effectiveness of natural and nature-based features (NNBF) prevents implementation. There is broad interest in NNBF solutions for the shoreline but uncertainty around how well they will protect community assets, and the continued investment in long-term monitoring, maintenance, and adaptive management continue to be barriers. Currently, there is a lack of local data and a few projects that have been constructed.

Preservation and revitalization of public recreational access to the shoreline is important. The risk of losing public access to the shoreline from sea level rise, land loss, and shoreline armoring (i.e., the construction of hard immoval engineered structures) was frequently mentioned. This suggests that public access to shorelines is a strong community value and worthwhile investment along NYS's tidally-influenced shoreline.

There is concern about the risks to water quality from flooding and erosion hazards. The risk of degraded water quality from stormwater, wastewater management, and other nonpoint sources was frequently mentioned. This suggests that water quality is a strong community value and can be emphasized as a co-benefit when communicating about flood and shoreline resilience.

Shoreline decision-makers and influencers play an important role in shoreline resilience. Each group had different perspectives based on their motivations and responsibilities that; when taken together, gave a fuller picture of the risks, challenges, and needs. Both groups should be considered in ongoing education, training, and conversations around flood and shoreline resilience; however, the messaging would need to be adapted for each group based on their needs.

Next Steps

Based on the findings of these focus groups, NYSG has developed a number of educational resources responding to needs that include:

The Hudson and Long Island Dynamic Shorelines Story Map Collections

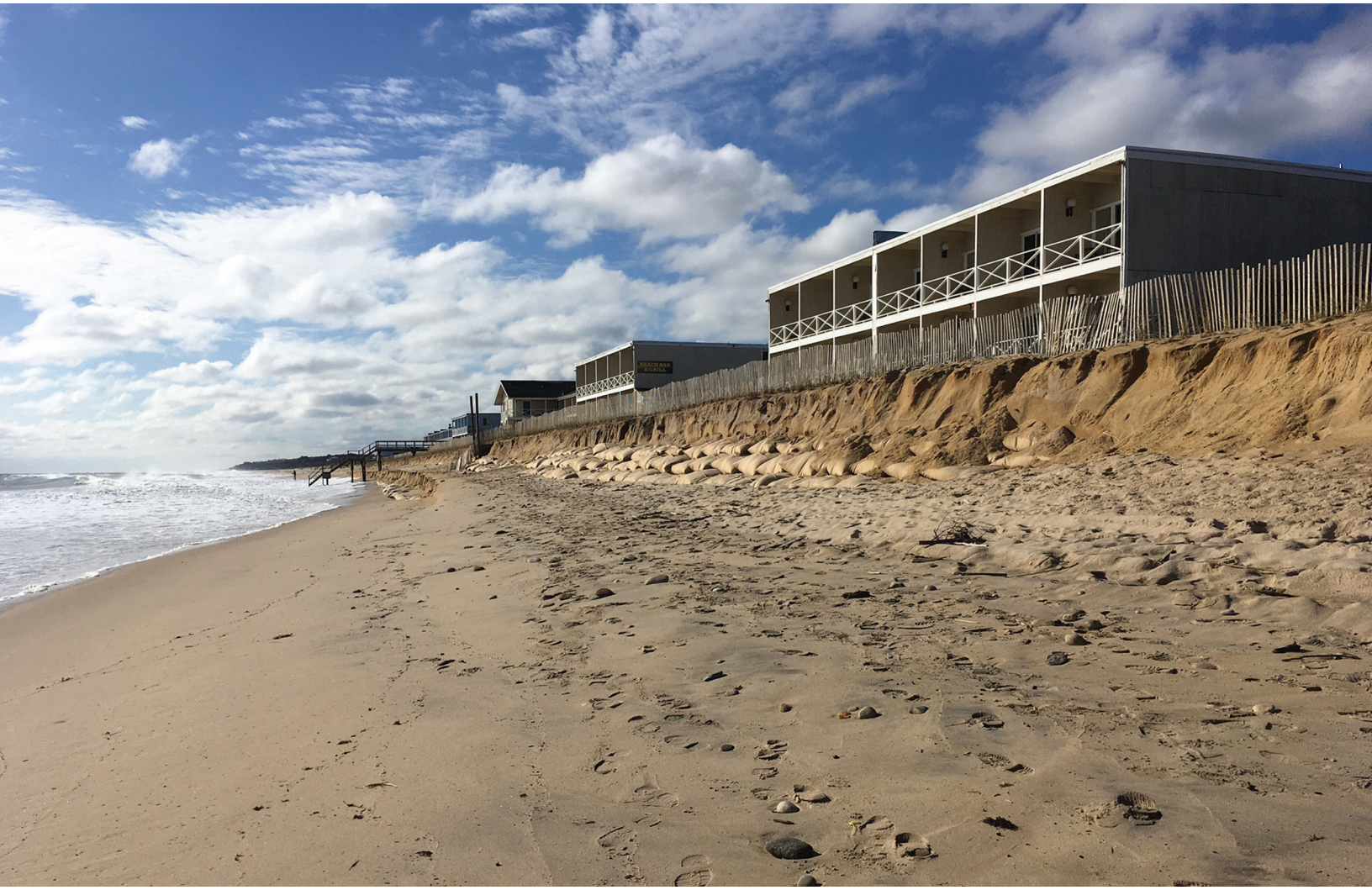
Hudson: https://bit.ly/HudsonCollection

Long Island: https://bit.ly/LICollection

A Guide to Permitting Shoreline Modification Projects in New York's Tidal Waters, *expected completion July 2023*

The Dynamic Shorelines Toolkit, *expected completion September 2023*

More work is needed to promote these resources, increasing their use in decision making, and keeping them up to date. These key findings continue to inform related projects and work throughout these regions.



Exposed sand bags due to beach erosion. *Image credit: Kathleen Fallon, New York Sea Grant.*

Methods

Participant selection

The goal was to interview 5-10 participants in each region through focus groups. However, if there was a scheduling conflict, an individual interview was offered. Recruitment of participants occurred through known contacts of the NYSG Extension Specialists and recommendations from partners. An attempt was made to get variation in terms of geography and the types of shoreline decision-makers and influencers. The majority of shoreline decision-makers included shoreline residents, local officials (e.g., municipal board members and planners), and water-based businesses (e.g., marinas and boat clubs). The influencer groups consisted of engineers and consultants.

Focus groups and interviews

Due to Covid-19 protocols and restrictions, the focus groups were held via the remote online platform, Zoom. The focus groups were scheduled for two-hour time slots during the evenings of the second and third weeks of December 2020 and in January 2021; in the invitation the participants were given the option of choosing between two times and dates for their region. Focus groups and interviews followed a modified mental models protocol developed by Morgan et al. (2002)[1] specific to risk communication that provides a systematic and repeatable procedure to elicit an individuals' mental model of risk. This method begins with open-ended questions that allow participants to freely express their views about a risk, followed by more specific, semi-structured questions that target the typical risk assessment topics of exposure, effect, and mitigation[1, 2]. We added an introductory question that asked each participant to state their name, location, and relationship to the shoreline. Interview questions can be found in Appendix A. The focus groups were recorded using Zoom after obtaining verbal permission from the participants.

Transcription, coding and analysis

After the focus groups, the recordings were transcribed in order to conduct the analysis using the software Atlas.ti. The transcriptions were uploaded and coded. A code library was developed to assist with the coding and to have some form of standardization for both regions (Appendix B). The code library includes both deductive codes that directly related to the focus group questions, and inductive codes that emerged throughout the discussion and were identified through the analysis. NYSG Extension Specialists for the Hudson and Long Island shared passages and developed the code library together as a form of triangulation. Deductive codes, which related directly to the focus group questions, were used to create the themes. Inductive codes emerged from discussion and analysis and were described within the themes. Each theme was summarized and quotations that showed interesting or common examples of the main themes were reported.

Limitations and biases

The NYSG Extension Specialists facilitated the focus groups. They had previous professional relationships with most of the interview and focus group participants which may have influenced their responses. The goal was to remain neutral; however, confirmation bias based on the facilitator's past experience and area of expertise is always a risk. The scope was limited to those whose decisions have a direct impact on the shoreline. Several important voices were missing from the focus groups such as emergency managers, department of public works staff, and community-based organizations, to name a few. Results of this study are not generalizable due to the small sample size and saturation was not reached. However, these results are useful for informing educational materials, fostering discussion, and informing future efforts at understanding risk perception, challenges, and needs throughout the regions.

Cone, J., & Winters, K. (2011). Mental models interviewing for more-effective communication. Corvallis, OR: Oregon State University, 12.

Morgan, M. G., Fischhoff, B., Bostrom, A., & Atman, C. J. (2002). Risk communication: A mental models approach. Cambridge University Press.

Results: Hudson River Estuary

Results are reported in narrative and bulleted format depending on the richness of the discussion around each question. Key quotes are included to further support the themes.

Participants

For the Hudson region, out of the 17 invitations sent to decision makers, 10 participated in two focus groups and one interview. There were four residents, four local officials, and two water-based businesses representing Albany, Greene, Columbia, Ulster, Dutchess, Rockland, and Westchester counties. Rensselaer, Orange, and Putnam counties were not represented. Some participants were both shoreline residents and local officials.

Ten influencers were invited to the focus group, and two participated. Though this was a low number of participants, it allowed for rich conversation. The participants were consultants that had worked on shoreline projects along the Hudson River Estuary.

Theme 1: Hazards

There was not an interview question specifically about hazards, but the following hazards were cited during focus groups:

Natural hazards	Hazards
Natural forces that impact the shoreline or watershed	Natural hazards that interact with the human system
• Bigger storms (e.g. Nor'easter)	• Recurring, regular flooding in low lying areas
• Ice	• Debris
• Strong forces of Hudson (e.g. tidal current, river current)	• Boat wake
• Unpredictable weather	• Erosion at parks and undercutting infrastructure
• Storm surge	
• Fetch	• Sewer overflows

"You have years that ice really builds up, those rocks will be kind of disrupted and dragged away and you know you just have to start over. That's where the challenge is of being in an estuary and the tides going back and forth with the ice in the wintertime."

-— Marina owner

Theme 2: Perceived risks

Decision-makers

Interview question: Tell me about some of the risks you experience living along or managing the shoreline?

- Perceived uncertainty in likelihood of hazardous events occurring
- Financial risks & consequences on investment
- Degraded water quality & drinking water supply
- Marsh loss

A common theme throughout the interviews was the uncertainty of when hazards would get "bad enough" to where people would "know when to quit." This can be interpreted as a tipping point that decision-makers feel they have not reached, despite climate projections of increasing hazards and risk to their communities. Uncertainty is also related to the financial risk of investing in infrastructure versus relocating or investing in nature-based shorelines versus hardening shorelines.

"I mean what do we do? Do we keep fighting it or at some point do you just say 'okay this is nature.' That's my biggest (question). At what point do I say 'okay that's it.'" — Private landowner.

Natural systems are at risk with potential water quality and impacts to drinking water supplies due to runoff, sewage overflows, placement of hazardous materials and fuel tanks, and salt water intrusion from sea level rise. Loss of intertidal marshes that protect shoreline areas from storms by absorbing flood waters.

The Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management practices that exceed the minimum requirements of the National Flood Insurance Program (NFIP). CRS generally has low participation in New York largely due to administrative burden on municipalities that have low capacity. Decision-makers in one community perceived there was a risk from joining the CRS without buy-in from elected officials and the broader community because CRS member communities need to execute comprehensive floodplain management which often conflicts with local economic interests and development goals. If a community cannot meet the obligations of CRS, then they will not reap the benefits of the program in the form of reduced flood insurance rates. This example shows how buy-in, and perhaps a broader understanding of floodplain management, is needed by elected officials, those reviewing permits, and making development decisions.

Influencers

Interview question: Tell me about some of the risks and challenges that your shoreline clients are facing?

Since the influencers interviewed focused on shoreline work, the main perceived risk observed was the risk of failure of natural and nature-based shorelines, particularly when work was tied to grant funding. They also perceived a risk of communities not committing, or having the capacity to commit to, long-term maintenance of natural shorelines. Because shoreline work often requires public engagement, influencers observed a risk of bringing up emotional or politically divisive conversations during meetings - such as restricting development along the shoreline, converting parcels to parks, buyouts, and managed retreat.

> *"There's always going to be a chance that a project–no matter how well it is designed and how well it's built–is going to fail. I think the challenge is getting the stakeholders who may not have a technical background and may not read all of the academic literature on the (nature-based) approach to understand how to adaptively manage these projects." — Consultant*

Theme 3: Impacts

Decision-makers

Interview question: How do these hazards or challenges impact you or members of your community?

Impacts were defined as the result of the force of natural hazards and hazards on something. Participants tended to describe impacts to individuals, to the community, and to natural resources, or ecology. Financial and emotional impacts were most prevalent to individuals and entire communities.

- Individual
  - Emotional - Angst of living on the river every day (uncertainty and risk)
  - Property damage
  - Financial impacts: Loss of personal wealth and investment from homes at risk

> *"They have no idea what the cost of living on the river is and what the maintenance is and it's a liability now as far as I'm concerned. If I was buying, I'd much rather buy on the other side of (Road) than be on the water… I think you have to weigh the angst of living on the river day to day." — Private landowner*

- Community-wide
  - Financial impacts: lack of recovery, abandoned houses, loss of tax base
  - Changes the "feel" of community, people leave, new people enter without knowing the risks
  - Loss of recreational river access

> *"A lot of places along the waterfront have still not rebounded and you know it's just a shame. I mean, such beautiful property that should be utilized more. People just can't recover and they can't sell the property. They're just kind of stuck with it." — Private landowner*

- Ecological
  - Floodplains transitioning to wetlands, and buildup of new land
  - Loss of shoreline vegetation: Trees falling down & being undercut

Influencers

Interview question: How do these risks and challenges impact the work you do on the shoreline?

- Willingness to be flexible with design and accommodate community values.
- Being transparent and selling/framing ideas in a positive light.
- Support converting lots to floodable parkland and clearly communicating that to the public, though this is often politically charged.
- Designing monitoring programs and protocols that include reference sites (when funding is available).
- Developing partnerships for long-term maintenance of shorelines.

> *"It's expressing that you're going to have to give back to the environment and that that's not a negative. That there is a chance of failure and that that's not a negative. That we're constantly readapting and that these projects are not over the day they're done. I like to always give the clients very simple solutions like you know if you plant 2 bushes in your front yard there's a decent chance that one of them is probably going to die in the next 5 years and you'll have to replant it. It's just part of you know of the maintenance of the living space. And to start thinking of their shoreline and the adjacent upland areas that are going to be shoreline soon as living areas that are not to be tamed but to be embraced and celebrated as they change." — Consultant*

Theme 4: Mitigation and coping

Decision-makers

Interview question: How do you cope with the risks and challenges of flooding and erosion along the shoreline?

All participants were coping with the impacts of flooding and erosion and were also taking action in various ways to mitigate future losses along the shoreline and inland through a range of methods, listed below. A major challenge is finding the right balance between protecting assets by investing in shoreline hardening and stabilization versus retreating, or relocating, from high risk areas. Because the perceived risk is still in the future, it's a difficult and emotional topic, and there are few suitable locations within several waterfront communities to retreat to, communities are still largely avoiding serious discussions about retreat. Interestingly, and related to the avoidance of discussions around retreat, another challenge often-cited was the increasing frequency of short-term "band-aid" solutions that are becoming expensive over time.

- Shoreline mitigation actions
  - Beach nourishment
  - Rebuilding rock jetties and rip rap (i.e., rock or other material placed to protect shoreline structures against erosion)
  - Planting for shoreline stabilization, replacing invasives with natives that control erosion, valuing trees
  - Wave fence/attenuators
  - Cement wall/bulkheads for stabilization

> *"So on a yearly basis we have to add to our rock jetties but you know it just seems like it's just a band-aid every year and it's not really taking care of the real issues that we have." — Marina owner*

- Inland mitigation actions
  - Mapping and right-sizing culverts
  - Conservation easement
  - Invasive species management
- Adaptation
  - Planning processes: vulnerability assessments, comprehensive plans, LWRP
  - Elevating homes (house vs surrounding land)
  - Happening in other places: Buyouts, converting lots to park land

"Erosion in our parks is an issue. We are undertaking engineering for one of the bulkheads and we're trying to go for a natural shoreline as opposed to a hard fast wall in one park." — Local official

Influencers

Interview question: For your projects that are related to shoreline stabilization or restoration, what are common questions from your clients?

The questions that influencers often hear are: What is the cost of maintenance? What's the chance of failure? Will this project limit recreational access to the shoreline?

"So there's always a lot of questions about what are you taking away? What are you preventing us from accessing? You may not realize that initially, especially if you're not from the community. It's kind of a hard lesson to learn which always goes back to the mantra: make sure you engage early with the stakeholders. Find out what those issues are before you get too far in the design." — Consultant

Theme 5: Challenges

Decision-makers

Interview question: Tell me about challenges you or others from your community face from flooding or erosion along the shoreline?

There are many challenges faced by communities when addressing flooding or erosion. NYS is a Home Rule state which can make it difficult to work across jurisdictional and property boundaries for more holistic solutions (i.e. every community and person for themselves). Funding mechanisms also create challenges because projects are expensive (i.e. several million dollars), it's difficult for smaller communities to access funding due to a lack of capacity (i.e. staff time) to apply, and it can be difficult for smaller communities to score well on the cost benefit analyses used by funders.

"There's a lot to be said for Home Rule in the State of New York but that could also be a challenge in terms of not looking at things comprehensively or regionally. The more communities can work together on watershed basis, sub watershed, or shoreline basis, beyond municipal boundaries, the better." — Marina owner/environmental practitioner

Regulations are also seen as a challenge due to conflicting information and priorities around community resilience versus protecting habitat. Different permitters may interpret the regulations or a project differently, which can lead to frustration, loss of trust, and negative perceptions from the applicants. There was confusion over the policy of replacing "like with like" when it came to building higher bulkheads that account for sea level rise. It was noted that the Community Risk and Resiliency Act (CRRA) may be a way to push back against regulators that were not cooperating with shoreline designs that considered sea level rise. There was also confusion around the concept of placing fill and whether it was allowed and encouraged or if it would worsen flooding to surrounding areas. The amount of time it takes to get a permit approved was also described as a barrier, with 2.5 years being a common timeframe.

"I think on the regulatory side, there's a lot of challenges. There's a lot of over-complexity and there's a lot of apathy for supporting businesses and individuals and the municipalities wanting to preserve their shoreline. It has not been easy to work with them. There are very intelligent individuals in the regulatory sector but they are in no rush to serve or support and they make it very, very difficult and challenging no matter if you're a private resident or a municipality. I wish there was more support and enthusiasm and leveraging their knowledge and abilities to ascertain expertise and techniques to help." — Local official

Shoreline work in navigable waterways is particularly challenging due to additional levels of review by the US Army Corps of Engineers (USACE) and NYS Department of State (DOS) in addition to NYS Department of Environmental Conservation (DEC) and local jurisdiction. One community leader spoke of not seeing a need to enact stricter standards along navigable waterways because the agencies would supersede their decision. Another spoke to the general frustration of having to "give up 15-20 feet of land" to accommodate slopes for natural shorelines when land is limited. In regards to FEMA, it was noted that there was no current mandate from Congress to account for sea level rise and that FEMA Flood Insurance Rate Maps (FIRMS) have serious limitations.

"The crux of the problem in my mind is trying to kind of throw darts in the dark at some of this. For example, if you're talking to some regulatory agency in charge it might just be environmental issues vs. purely flooding issues but it becomes a very difficult regulatory space to try to navigate. They're saying on one side 'we want resilient things' dealing with sea level rise and on the other side, it doesn't fit within their current regulatory framework to address that." — Local official

"We have to differentiate between the insurance part which is FEMA and what the state or local governments decide for their building codes or state-related codes. It was a big mistake in the past to use FEMA flood maps for planning purposes." — Landowner

Another challenge is the lack of specialized skills, training, and experience of staff related to water and shorelines. There are other competing priorities, especially in smaller communities where budgets to maintain municipal services are already tight and current work is carried out by volunteers. Both individual property owners and municipal leaders are concerned with the cost of annual maintenance of shorelines. When it comes to stabilizing the shoreline, low maintenance options are usually preferred.

There were also anecdotes of property owners making flooding worse for surrounding neighbors through their actions and that people continue to build in floodplains, despite local laws.

- Lack of resources (financial/educational) for individual property owners
- Lack of capacity to enforce/implement local laws
- Home Rule
- Funding challenges & lack of capacity in communities
- Confusion over regulations/regulators
- Competing priorities
- Individual decisions impacting neighbors
- Other
  - No place to retreat to
  - Emergency management response is insufficient on river in some places
  - Risk communication
  - Wetlands regulations
  - FEMA FIRMs not modernized/digitized in Columbia county

Influencers
Interview question: Tell me about some of the risks and challenges that your shoreline clients are facing?

- Smaller communities are understaffed when it comes to managing large grants and shoreline projects
- Meeting match requirements and fundraising
- Keeping the community engaged
- Committing to long-term maintenance of natural shorelines
- No common definition of resilience.

"Being able to supply grant money or financing for infrastructure projects, green infrastructure projects, to smaller municipalities without (match) and actually beyond without (match) would actually be a component to finance the local participation in those projects. Maybe what we need is like a sliding scale system that if your municipality is X big, you don't have to have (match)." — Consultant

"We want to build these projects to be as self-sustaining and low maintenance as possible but…there's always going to be someone that has to go out there after a storm and clean up what gets washed in. (Communities) get a little nervous with their DPW, it's a small town not a big budget and they're very nervous about seeing structural components to that design that potentially was going to lead to a long-term commitment to maintenance…There's going to have to be a commitment to working with research institutions, consulting firms, or whomever to make sure that that monitoring is done and that the results of that monitoring can be interpreted in such a way to support the adaptive management approach" — Consultant

Theme 6: Needs from stakeholders

Decision-makers

Interview question: What information or assistance would be most helpful to you?

When asked about needs, both decision-makers and influencers spoke about a need for more creative solutions with NNBF shoreline work. Decision-makers viewed the need as stemming from a lack of expertise and options on the supply side with few consultants, engineers, developers, and even nurseries supplying shoreline plantings in the region, while influencers cited communities fear of failure and committing to long-term monitoring (More on this in Theme 2: Perceived risk).

> *"I think we lack general expertise in shoreline preservation and the techniques and best practices for bulkhead building, natural shoreline and other types of mechanisms that countries in Europe like The Netherlands have long perfected in this area. You go to rebuild or do any development whatsoever, there is only 1 or 2 people, they're overbooked and even they you know don't necessarily have the most innovative ideas." — Local official*

- Incentives or payment for ecosystem services
- Support from state and federal regulators related to permitting, acknowledgment of complexities
- Capacity
  - MS4 compliance
  - Grant writing
  - Risk communication
  - Including sea level rise, flood risk and erosion risk in comprehensive plans and other planning documents.
- Training and incentives for consultants, engineers, and developers on best practices in shoreline management and NNBF (currently a lack of expertise)
- Research
  - Changing Hudson salt front
  - Pilot study on oyster bed feasibility at southern end of Estuary. (Note that these studies have been conducted, which indicates a gap in education or translation to policy)
  - Economic studies on the value of preserved and restored floodplains and wetlands
- Funding
  - Reducing match requirements on grants for smaller communities
  - Annual and innovative funding mechanisms for adaptation.
- Inter-municipal and regional planning

> *"Best practices and materials. I think I can see the need for that in preserving the shoreline. Maybe not for a homeowner but just for town, town use." — Local official*

Influencers

Interview question: Is there information that you wish you could pass on to your clients so that they could make better informed decisions? What resources do you currently use and/or provide?

- Creativity with adaptive management of shorelines
- Best practices for long term monitoring and maintenance of shorelines
- A common definition of resilience
- Economic studies on the value of preserved floodplains
- A bibliography of shoreline resources to share with clients and consultants would be helpful, including resources in the Mid-Atlantic and Northeast.
- Including sea level rise, flood risk and erosion risk in comprehensive plans

> *"A lot of folks in the community have different ideas of what resiliency really means. Some people think resiliency means build a seawall to protect my home and property, not realizing that resiliency means building a system that can and will be flooded and will bounce back. Without being condescending there has to be somebody early on, that can put forth some definitions that we would all like to agree on." — Consultant*

> *"There's a lot of technical guidance already out there in the form of monitoring reports, designs or just protocols and they're not just in New York State. If you only limited yourself to technical guidance documents related to coastal ecosystem restoration in New York State (and New York State does have some very good guidance on those lines) you're still missing quite a lot." — Consultant*

Results: Long Island

Results are reported in narrative and bulleted format depending on the richness of the discussion around each question. Key quotes are included to further support the themes.

Participants

For Long Island out of the 23 invitations sent, 16 shoreline decision-makers accepted and participated in two focus groups and three one-on-one interviews; this includes three contacts who were not directly invited but recommended from other invitees. The population was composed of six residents, nine officials, and one water-based business representing both Nassau and Suffolk counties and all of Long Island's shorelines (e.g., Atlantic Ocean, Great South Bay, Peconic Bay, and Long Island Sound). Ten influencers were invited to the focus group, and eight participated, not including one Steering Committee Member who is a shoreline consultant. The participants mainly consisted of consultants, with one engineer, and one real estate agent also included.

Theme 1: Hazards

The following is a list of the natural hazards and hazards that both decision-makers and influencers discussed during the focus groups:

Natural hazards	Hazards
Natural forces that impact the shoreline or watershed	Natural hazards that interact with the human system
• Storm events including: Superstorm Sandy, the next 100-year storm, Nor'easters • Damaging wave forces • Marsh erosion • Wind • Climate change effects including saltwater intrusion	• Storms • Flooding including: sunny-day high tide, storm surge • Erosion including: bluffs, sediment transport • Loss of habitat • Sea level rise

"The waves coming through, off the Long Island Sound, are really due to a fetch and can really be quite damaging." — Local official

"We've got the ocean on one side and two blocks to the other side we've got Reynold's Channel, and during the storm the Channel came up and it met the ocean and the entire community was pretty much wiped out." — Private landowner

"Erosion is a constant problem but I will tell people erosion is a natural process. It will occur day and night in response to wave energy, wind, and even human disturbance." — Local official

Theme 2: Perceived risks

Decision-makers

Interview question: Tell me about some of the risks you experience living along or managing the shoreline?

The conversation among decision-makers about their perceptions of risks surrounded the topic of coastal storms. Many in attendance were heavily impacted by Superstorm Sandy in 2012 which resulted in major flooding, erosion, and infrastructure damage on Long Island. Even almost 10 years later this group spoke mostly on their experiences during, immediately after, and still how they are dealing with the storm's aftermath. A central focus around the topic of storms remained specifically regarding preparedness, both in the sense of how little they were prepared for the impact of Sandy and also how they are now preparing for the next storm. In addition to coastal storm impacts, decision-makers also spoke about the age of multiple infrastructure types and how this plays a role in how successful they are in the face of coastal risks such as flooding and strong wave attack. Lastly, this group discussed not only the need for innovative shoreline management techniques but the fact that these applications really need to be monitored to determine their effectiveness and appropriate usage.

"One of the risks I found was that there is no monitoring or accountability in monitoring the features that were put in, for instance, most of what you see on Long Island was put in back in the 1950's. Most of the bulkheads on public land were never maintained."
— Private landowner

Influencers

Interview question: Tell me about some of the risks and challenges that your shoreline clients are facing?

While the decision-makers focused their conversation about how the risk of coastal storms impacted their lives and well-being, the influencers spoke more about how coastal storms impact the shoreline, such as by erosion. They also spoke about the risks of natural hazards like sea level rise and how aging and/or insufficient infrastructure can pose a risk. The influencers discussed the risks they perceive for their clients, such as not having room or ability to retreat from the shoreline and the risk of an investment losing value. Lastly, the influencers saw the complex regulatory system and its shortcomings as a risk since it often leads to poor shoreline management decisions.

> *"Some of the biggest risks I see with my clients have to do with sea level rise and with shoreline erosion and being kind of caught in-between various regulatory requirements. We've not only had issues with the NYS DEC but also the Army Corps. Not wanting anything going seaward of the spring high water, which is a problem when you're dealing with erosion and trying to reclaim some land, whether it is a wetland, or marsh, or bluff." — Consultant*

Theme 3: Impacts

Decision-makers

Interview question: How do these hazards or challenges impact you or members of your community?

Similar to the conversations around risk, when asked about how coastal hazards impact the decision-makers, they focused on the direct impacts to themselves, their livelihood, and to their community. Coastal storms remained a central topic, particularly in regards to flooding, but also the issue of lack of utilities and how evacuations can lead to home looting. They also discussed how infrastructure and standards are outdated and insufficient when faced with increased storm event frequency and intensity, and how this is leading to home elevations, concerns with losing value in their investments, and increased insurance costs. Decision-makers have noticed an increase in the frequency of climate change impacts to their communities, such as flooding and how this can lead to a lack of access during emergencies. They also discussed some of the impacts they are seeing to the shoreline and natural areas, like erosion of dune systems, undercutting of coastal bluffs, and a general loss of recreational areas along the water. While the decision-makers discussed the need for shore protection, they also acknowledged how armoring can cut off sediment supply leading to increased erosion to adjacent shorelines. Lastly, they spoke about their concerns of the loss of marshes and wetlands around Long Island; how these natural features are being impacted by sea level rise by either flooding or massive dead spots occurring.

> *"There were only 2 or 3 nights that I left my house during the entire thing, we didn't lose gas but I didn't have any heat, I didn't have any electricity; I was heating the house with a generator and my stove; we were afraid of looting." — Private landowner*

> *"The damages of flooding and erosion are impacting the home values so people are losing, they are getting more concerned about losing home value or whether they can get insurance when they buy a house." — Local official*

> *"Access in the event of emergencies over bridges, as well as roads, is a real issue and the safety of first responders going out and trying to rescue people." — Local official*

> *"We have a lot of recreational areas along the shoreline and we've been having constant flooding when we get high, high tides and those recreational areas are lost." — Local official*

> *"The state came out with an analysis where they compare the 1974 marsh maps with the 2005 and 2008 maps and they noticed that there was almost 24% loss of coastal marshes across the Island." — Local official*

Influencers

Interview question: How do these risks and challenges impact the work you do on the shoreline?

Influencers focused their discussion on how the complete lack or inflexibility of shoreline regulations impacted the options for mitigation that they could present to their clients. They also spoke about how they have noticed an increase in the amount of concern

people are having about living on or near the shoreline. The influencers also briefly touched upon the current instability of the waterfront and the impact of coastal processes, such as sea level rise, wetland loss, and shoreline erosion.

> *"There's an increasing level of trepidation regarding buying on the waterfront or near water in a floodplain; certainly heightened since Sandy." — Realtor*

Theme 4: Mitigation and coping

Decision-makers

Interview question: How do you cope with the risks and challenges of flooding and erosion along the shoreline?

The decision-makers felt strongly about utilizing various natural and nature-based management solutions, such as vegetation and other sediment trapping techniques, when coping with the coastal risks affecting the coast and how beneficial it would be to return built infrastructure to nature. Other natural methods discussed included the need for more gently sloped shorelines, and techniques to reduce wave action. However, they also understood that sometimes hard structures, like rock revetments, and drastic measures, such as raising infrastructure, need to be taken in order to deal with the changing conditions along the coast. Decision-makers discussed the need to build infrastructure better and use bulkheading to prevent the erosion of shorelines. Ultimately, they are looking for innovative solutions to deal with their current challenges, acknowledging that what is in place now is no longer working, and that it is necessary to take into account sea level rise projections when making decisions about shoreline management. Lastly, the decision-makers spoke a great deal about the human capacity to take it upon themselves to do the necessary work and how there is a need to invest in and gain buy-in for community-improvement.

> *"I know there were certain communities subsequent to Sandy, like Howard Beach, where they've been wiped out on a regular basis, and we're very prehistoric in taking the buyouts, so you had a solid block that subscribed to it and it was turned back into wetland or still in the process of being." — Local official*

> *"From my perspective, I would much rather lose $50-60,000 worth of revenue from a few boat slips being lost to allow something like an embankment to occur because that just does a better job of dealing with runoff; it does a better job of dealing with erosion then any bulkhead is going to do in the long term." — Marina owner*

> *"The erosion along the North Shore is worse during Nor'easter storms and a lot of property owners want to protect their properties and bulkheading compounds the beach width problem because it loses, while they're protecting their own property, the source of sand to replenish the beaches gets lost; so we're always concerned with public access and the balance there." — Local official*

> *"We've been putting a lot of effort, time, and funding into restoring those areas." — Local official*

Influencers

Interview question: For your projects that are related to shoreline stabilization or restoration, what are common questions from your clients?

When asked about mitigation and coping, the influencer group again discussed the struggles they are having with agencies regulating the shoreline activities. They talked about the need for inter-agency cooperation in order to ensure or create regulations that will lead to increased shoreline resilience. Influencers also presented an interest in preserving the natural shorelines rather than developing and/or hardening them and how existing resources, such as plant guides, have been helpful in allowing them to achieve these goals.

> *"People are willing to invest a lot of money and they have the bandwidth to take on big projects and see them through, but if it becomes back and forth it seems like it's just going to get them hooked into some plan for 10 years to come, or not be viable for another three years, they find other projects to take on." — Realtor*

Theme 5: Challenges

Decision-makers

Interview question: Tell me about challenges you or others from your community face from flooding or erosion along the shoreline?

The majority of the challenges that the decision-makers discussed centered on a lack of education or understanding of shoreline processes and taking responsible actions in response to risk prevention. Much conversation also occurred regarding the challenge of shoreline decision-makers choosing short-sighted solutions when attempting to increase resilience and creating a false sense of security. Other challenges mentioned included issues with hardened shorelines, lack of consistency among regulatory agencies, restrictions on grant money, impacts on the shoreline from storms, and a general lack of preparedness.

> *"A very big challenge to me is that I can speak to one group and I don't get the same answer from the other and these are regulatory bodies." — Private landowner*

> *"In some of these communities it almost results in a false sense of security because you can elevate the house but you can't elevate the road and you can't bury all the infrastructure, and I think people forget about that element of it. It's great when you see storm damage photos wherever you are in the country, it's nice to see a house that wasn't destroyed. It's always sad when you see stuff is destroyed but when you look around it and you see that the house is now inaccessible, it may be for weeks or months, those are the educational challenges that we have." — Local official*

> *"Getting people to know their own backyard and trying to realize that investing in coastal resiliency projects is investing in the local community and investing in the preservation of your house." — Local official*

Influencers

Interview question: How do these risks and challenges impact the work you do on the shoreline?

The influencers focused the vast majority of their discussion on the challenges presented to them working with regulatory agencies and moving a project through the permitting process. Things mentioned included navigating the different requirements of the various agencies and not being able to design the project that the client wants or is the best solution due to outdated regulations. Influencers also pointed out the issue of the permitting process taking too long and being too costly, which may result in decision-makers choosing other options that may not be the most appropriate or best for their situation. An additional challenge identified was education and an apparent lack of knowledge of either themselves, their clients, and/or permitters. Lastly, other challenges included use of consistent shoreline management techniques, loss of property value, and changing environmental conditions.

> *"The permitting process is way too long so that when you assess a site it's one thing but by the time you get through the permitting process it may be two years later and the problems are even more severe that it doesn't encourage homeowners to consider living shorelines because the process takes too long." — Consultant*

> *"It's very difficult and frustrating when you're trying to manage client expectations and doing a thoughtful design that you've done the calculations, the due diligence, to come up with something that you feel will work and is a good solution for the project and the considerations involved and then you get some feedback that's not necessarily reflective of the effort and the diligence that's gone into the design at that point and it's not necessarily at that point an engineering or scientific based conversation as much as it is a you know if you want to move forward you have to do this." — Engineer*

> *"Some of the difficulties that we and challenges that the homeowners have faced are ignorance. They don't understand coastal processes, they don't understand that you don't put sprinklers up on the edge of the bluff. They don't understand that they need to maintain, if there's something starting to erode that it's like the little leak in the dam, they need to deal with it as soon as possible." — Consultant*

Theme 6: Needs from stakeholders

Interview question: What information or assistance would be most helpful to you?

When discussing needs with both focus group types, a common theme arose, the need for more information and education to get to those who are making the decisions along the shorelines. This included, but was not limited to, the need for best practices and other guidance documents, as well as the desire for educational programs, perhaps aimed specifically towards the youth in the communities who will become the next generation of shoreline regulators and/or owners. The second most commonly discussed need was for more coordination and collaborations within and across the various shoreline regulatory agencies, including federal, state, and local jurisdictions in order to achieve more consistent messaging and decisions about shoreline management techniques and abilities.

- Decision-makers
  - Increased collaborations
    - With institutions and agencies
    - Among adjoining properties
  - More assistance
  - Getting information and education out to the public
    - Being able to diffuse false information
    - Development of best practices and guidelines
  - Local student involvement in order to develop the workforce
  - The need for the regulatory community being open-minded to what works best, leading to being able to find common ground as often as possible
  - Grant money
  - List of endorsed, reputable, and/or certified contractors
- Influencers
  - Information about living shorelines, particularly their design
  - Education, training, and/or guidance
    - For homeowners and potential buyers
    - For students
    - For those with regulatory jurisdictions
  - The need to conduct additional research
  - Tools including, but not limited to checklists, visualization, resources, and/or databases
  - Coordination between agencies regarding regulations
  - Planning, specifically identifying the lack of comprehensive planning and the need for more holistic approaches
  - Streamlining and standardizing the regulatory process

"I think we've had so many discussions on Long Island about our shoreline and so many great people have so much knowledge that it's time to take the next step. If we need to make revisions to our laws." — Local official

"I've been noticing that something that is missing is that link between community and environment; education (high school and college) and environment. We need to get people involved and the information that the state, federal, and local government have has to be available for the people in a user-friendly way." — Local official

"It's better if the agencies that are involved in reviewing permit applications can find common ground as often as possible, it's better for us, it's better for the NYS DEC, and it's better for the applicant who's trying to satisfy the requirements." — Local official

Appendix A: Interview Questions

Critical Focus Group Questions

1. Tell me about some of the risks you experience living along or managing the shoreline.
2. EXPOSURE: Tell me about challenges you or others from your community face from flooding or erosion along the shoreline?
3. EFFECT: How do these hazards or challenges impact you or members of your community?
4. MITIGATION: How do you cope with the risks and challenges of flooding and erosion along the shoreline?
5. FINAL: What information or assistance would be most helpful to you?

Important Focus Group Questions

1. Tell me about some of the risks and challenges that your shoreline clients are facing.
2. EFFECT: How do these risks and challenges impact the work you do on the shoreline?
3. MITIGATION: For your projects that are related to shoreline stabilization or restoration, what are common questions from your clients?
4. FINAL: Is there information that you wish you could pass on to your clients so that they could make better informed decisions? What resources do you currently use and/or provide?

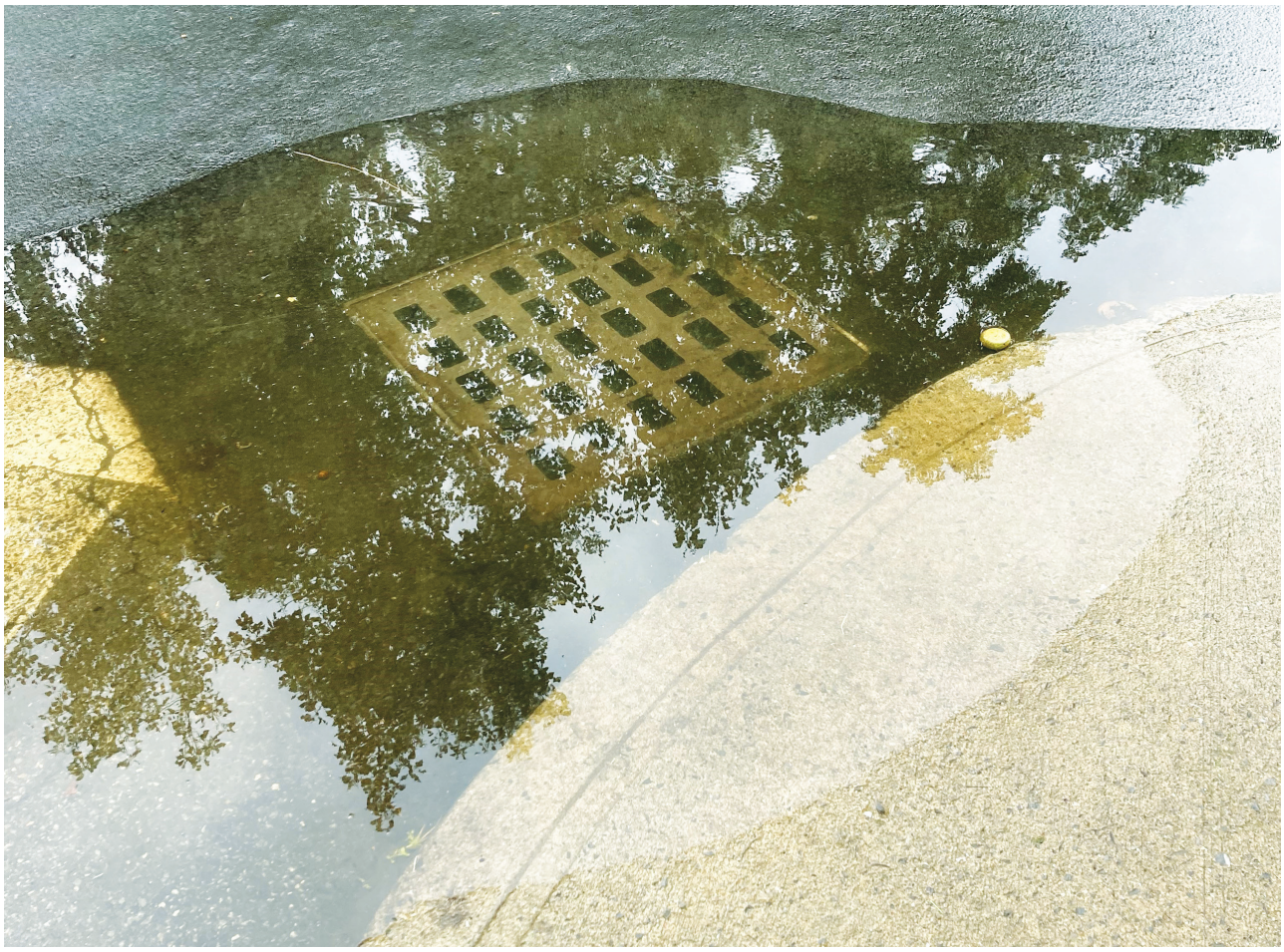
Appendix B: Code Library

Deductive Codes - relate directly to focus group questions

- Coping - general/nonspecific strategies (i.e. yearly maintenance)
- Mitigation - methods specific to shoreline erosion or flooding (i.e. beach nourishment)
- Needs from stakeholders - resources, assistance, policy, etc. that would be useful to stakeholders (i.e. expert advice)
- Challenge - a difficult task or problem (i.e. cost of maintenance)
- Natural hazards - natural forces that impact the shoreline/watershed (i.e. storms)
- Hazards - when natural hazards interact with the human system (i.e. flooding)
- Impact - the result of the force of natural hazards and hazards on something (i.e. loss of dunes)
- Risk - the likelihood of a hazardous event occurring and the consequence of the event (i.e. not being prepared)

Inductive Codes - emerged from discussion and analysis

- Complicating Factors - something that adds a layer of complexity to a main issue (i.e. beavers, jet skis)
- Competing priorities - aside from flooding/erosion (i.e new garbage plant)
- Government - mention of government related actions
- Regulations - mention of policies, permitting, or assistance programs (i.e. permitting)
- Planning - mention of planning processes (i.e. LWRP, Comp plan, Parks)
- Recreation - parks, boating, fishing
- Motivation - specifically, continuing to living in risky areas (i.e. beautiful sunsets)
- Flood Insurance - mention of flood insurance
- Design - mention of how shoreline structures are designed
- Local knowledge - something that is mentioned that is learned over experiences of living on the shoreline over time
- Time - Recurring things, past, present
- Landscape feature - description of land or waterbody that is relevant to hazards and impacts
- FEMA - related to FEMA products (i.e. flood maps)



Storm draim back up due to an extreme high tide. *Image credit: Jessica Kuonen, New York Sea Grant.*

This needs assessment is a product resulting from Fiscal Years 2020-2021 Cooperative Technical Partners Progam – Region 2 funded under awards EMN-2020-CA-00009 and EMN-2021-CA-00012-S01 from the Federal Emergency Management Agency of the U.S. Department of Homeland Security to Cornell University on behalf of New York Sea Grant.

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May 2023