



Measuring Success

*Monitoring Natural and Nature-Based
Shoreline Features (NNBF)
in New York State
Webinar: Jan. 17 2020*

Core Project Team



SCAPE



New York State
Water Resources Institute
Cornell University



NYC Parks



Consensus Building Institute

NY/NJ
HARBOR
& ESTUARY
PROGRAM



NEW YORK
STATE OF
OPPORTUNITY.

Department of
Environmental
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Sponsorship



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Agenda

- I. Ground Rules (*Facilitator: Bennett Brooks, Consensus Building Institute*)
- II. Welcome and Introductions (*Dr. Brett Branco, Science and Resilience Institute at Jamaica Bay (SRIJB); Carolyn Fraioli, NYDOS; Amanda Stevens, NYSERDA*)
- III. Monitoring Framework Background (*Pippa Brashear, SCAPE*)
- IV. Process and Feedback (*Helen Cheng, NY Sea Grant / SRIJB*)
- V. Selecting Parameters, Indicators and Protocols (*Dr. Peter Groffman, Brooklyn College*)
- VI. Pilot Data Collection (*Chris Haight, NYC Parks*)
- VII. Discussion (*Bennett Brooks, CBI*)
- VIII. Next Steps and Concluding Thoughts (*NYSERDA, NYDOS, SRIJB*)

Monitoring Framework Background

Pippa Brashear, SCAPE

Why do we need a monitoring Framework?

- Despite a growing number of pilot projects, widespread adoption of NNBFs remains limited.
- This is in part due to a lack of data on how such shorelines perform relative to goals such as providing risk reduction benefits, ecosystem services, socio-economic benefits or other services that decision-makers are interested in.
- There is no state-wide system to evaluate the relative performance of different shoreline features.
- As a result, there is currently limited data available on their actual (versus modeled) performance, and any existing data is difficult to compare because it has not been collected through consistent protocols.
- *So how do we decide what type of shoreline is best for our goals? Or how we should design or manage our shorelines?*

Project Goal & Objectives

Develop a coherent framework for shoreline monitoring that will guide data collection to inform more consistent and effective shoreline management decisions in New York State, particularly as it relates to NNBF.

- Identify key performance and resiliency benefits of NNBF through a stakeholder-driven process.
- Develop standardized protocols to generate better comparative data across the diverse shorelines of New York State.
- Help decision makers determine which benefits are realized at shoreline sites.



What are we monitoring? (shoreline types)



beach dune



riprap and shorelines



bio-enhanced concrete unit



submerged



salt marsh/emergent wetland



constructed dune



rock balls



revetment



shellfish reef/reef



living shoreline



bio-enhanced concrete unit



groynes

Natural
Feature

Nature-Based
Features

Ecologically-Enhanced
Hard Structural

Hard
Structural

Who are we monitoring for?

Shoreline managers across NYS

...who can be property owners, property managers, engineers, contractors and agencies ... they are individuals or organizations who make decisions about how we plan, build, and maintain our shorelines.

Shoreline managers need comparative data collected through consistent protocols. So, the framework will first be used by...

Partners collecting data...

...who may be scientists, stewardship groups, citizens, or shoreline managers themselves.

What is a monitoring framework? (parameters & indicators)

MONITORING FRAMEWORK

EVALUATION ROADMAP

establishes an agreed-upon set of performance goals for shoreline features against which the performance these features can be comparatively evaluated and a framework for relating these goals with specific metrics or indices by which achievement of or progress towards such goals might be evaluated. This framework allows for the selection, development and prioritization of relevant monitoring protocols.

MONITORING PROTOCOLS

agreed-upon methods for gathering comparable data about various shoreline features relevant to identified goals and indicators/metrics.



Evaluation Roadmap

Resilience Service Area	Performance Parameter	Indicators	Associated Protocols	
			field protocols	desktop protocols
Ecological Function	Biological Health & Biodiversity	Plant species cover, abundance, species richness and composition (including native versus exotic)	Plant species cover, abundance, species richness and composition (including native versus exotic) Establishing Sampling Scheme (including transect locations, etc.)	n/a
		Sessile organisms presence, abundance, (percent) cover, species richness, and composition	Sessile organisms presence, abundance, (percent) cover, species richness, and composition Establishing Sampling Scheme (including transect locations, etc.)	n/a
		Distribution and abundance of substrates including wrack, debris, concrete, etc.	Distribution and abundance of substrates including wrack, debris, concrete, etc. Establishing Sampling Scheme (including transect locations, etc.)	n/a
	Habitat Connectivity	Habitat connectivity to adjacent areas, habitats, land uses in all directions	Site and feature characterization (Site Questionnaire)	Site and feature characterization (Site Questionnaire)
	Hydrology	Visual evidence of hydrologic alteration	Site and feature characterization (Site Questionnaire) Site photolog (to be developed in future)	Site and feature characterization (Site Questionnaire)
Hazard mitigation and Structural Integrity	Shoreline and topographic change	Change in Feature Position and Elevation	Feature Elevation - Field Feature Aerial Dimension - Field Erosion Measurements and Asset Displacement	Feature definition, location and aerial dimension - Desktop
		Change in Shoreline Position and/or Updrift / Downdrift (at Feature)	Feature Aerial Dimension - Field	Shoreline location, intertidal zone definition, and shoreline change
	Coastal Flooding	Change in Wave Conditions	Water Levels and Coastal Flooding Data - Simplified Detailed Wave Measurement	n/a
		Water Levels	Water Levels and Coastal Flooding Data - Simplified	n/a
	Structural Integrity	Change in Feature Position and Elevation	Feature Elevation - Field Feature Aerial Dimension - Field Erosion Measurements and Asset Displacement Establishing Sampling Scheme (including transect locations, etc.)	Feature definition, location and aerial dimension - Desktop Shoreline location, intertidal zone definition, and shoreline change
		Visible Scour, Erosion, Escarpments, and/or Material Degradation	Erosion Measurements and Asset Displacement Site photolog (to be developed in future)	n/a
Change in Vegetation, Shellfish, or Other Biomass of Structure		see biological health and biodiversity protocols	n/a	
Socio Economic Indicators	Quality of Life	Household Perception of Risk, Neighborhood Satisfaction (general & as it relates to shoreline condition), and Quality of Life	Household Survey	n/a
	Recreation and Cultural Use	Observation and Telling of Recreation and Cultural Shoreline Use	Shoreline Social and Site Assessment Protocol	n/a
	Economic Development	Change in Real Estate Value	n/a	Real Estate Value Impacts
		Business Activity Index	Business Activity Impacts Shoreline Social and Site Assessment Protocol	Business Activity Impacts
		Property Damage & Cost of Recovery	Household Survey	Damages to Households & Public Infrastructure (to be developed in future)
	Environmental Justice	Presence/Absence of Potential Environmental Justice Area	n/a	Environmental Justice Index
Civic Engagement	Rate of participation in stewardship related to shoreline	Shoreline Social and Site Assessment Protocol	n/a	

Monitoring Protocols

Found in the Final Report Appendix A

Measuring Success: Monitoring Natural and Nature Based Features in NYS

Annotated Protocols and Worksheets for Data Collection

January, 2020

EXAMPLE

Protocol 5: Establishing a Monitoring Scheme

Measuring Success

PROTOCOL 5: ESTABLISHING A MONITORING SCHEME

SUMMARY INFORMATION

Related resilience service categories: Ecological Function and Hazard Mitigation/Structural Integrity
Associated indicators: Plant species cover, abundance, species richness and composition (including native versus exotic), Benthic organisms presence, abundance, (percent) cover, species richness, and composition, Distribution and abundance of substrates including rocks, debris, concrete, etc., Change in Feature Position and Elevation, Change in Shoreline Position
Field/Desktop Field: (with desktop preparation prior to field visit)

Quantitative/qualitative: both

Data output / data format: Text and numeric spreadsheet; scaled drawing (Worksheet 5A (Segment Description), Worksheet 5B (Control Points and Assessment Points), Worksheet 5C (Points of Interest)).

Protocol type (easy, medium, hard): Medium
 Number of people required: 1-2
 Approximate time(s) complete: 1-2 hours
 Special equipment required (Y/N): Y (see below for specifics)

OVERVIEW OF PROTOCOL

This protocol establishes the sampling scheme layout, including transect locations and "assessment points" for all field protocols utilizing field indicators (structure) on the site for monitoring. This protocol must be completed prior to undertaking any of the other Ecological Function (EF) or Hazard Mitigation & Structural Integrity (HMSI) protocols as monitoring locations rely on the transects and assessment points set up by this protocol.³⁸

FREQUENCY

This protocol only needs to be undertaken once (the first time monitoring is performed at the site), if this is not the first monitoring effort at a given site/feature, the sampling scheme set-up from the initial monitoring should be used for subsequent monitoring. The only exception to this is in instances of significant alteration of movement in the site or shoreline features.

REQUIREMENTS (EQUIPMENT, TRAINING, ETC.)

Prerequisite protocols:

- Protocol 1: Site and Feature Characterization
- Protocol 2: Feature Definition, Location, and Areal Dimension
- Protocol 3: Feature Areal Dimension

³⁸ If the above desktop protocols can be fully completed prior to site visit using desktop imagery and standstill knowledge, the sampling scheme can be sketch on the desktop. However, there is a chance that a field visit will prompt a change to the sampling scheme. So, it is generally more efficient to establish the sampling scheme in the field when the team has complete information about the area.

EXAMPLE

Site Name	Surveyor(s)
Feature Name	Date:

Worksheet 5A: Segment Descriptions

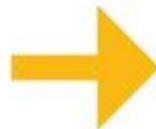
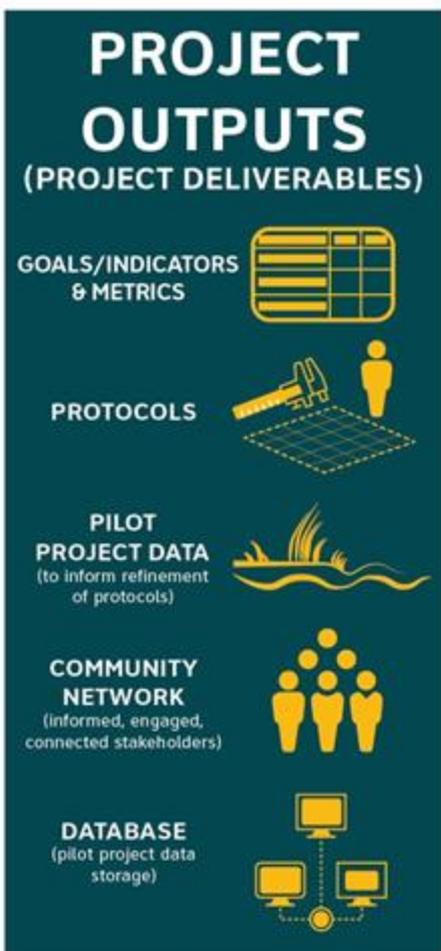
- Units of measurement
 - horizontal datum & units:**
 - vertical datum & units:** NAVD83, feet; unless otherwise indicated.
- Shoreline length
 - Total Length of shoreline feature in ft _____ [measured in a straight line, beginning point to end point].
 - If shoreline feature consists of multiple "types", length of feature by "type" in feet:
- Segments
 - Number of different segments _____
 - Length of each segment - record the length in the table below in feet, Same measurement instructions as for total length
 - Sinuosity** - place the letter that is most applicable based on bird's eye view for each segment in the table below
 - nearly straight
 - concave (i.e. embayment, cove)
 - convex (i.e. shore bends into water)
 - wavy (3-5 undulations per 100 ft segment)
- Transects - these should span "representative" zones of the shore area
 - Total number of transects _____
 - Number of transects in each segment - record the number of transect lines per each segment in the table below

Segment Number	Length (ft)	Sinuosity (a, b, c, d)	# of Transects

5. sketch or annotated aerial photo³⁹

[Attach]

³⁹ See Worksheet 1C



Process and Feedback

*Helen Cheng, NY Sea Grant /
Science and Resilience Institute at Jamaica Bay*

NNBF Engagement

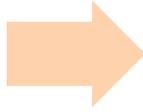
- Developing and revising framework
 - Gathering feedback on the project, framework, resilience service areas, and feasibility
 - Ecological Function
 - Haz. Mitigation and Structural Integrity
 - Socio-economic Outcomes



Timeline

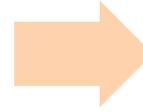
Technical Working Groups (TWG)

- Winter/ Spring 2018
- Developed draft framework
 - Lit Review and previous projects/ programs



Regional Working Groups (RWG)

- Summer 2018
- Introduced draft framework
- Gathered feedback
 - Hudson (June)
 - NYC (July)
 - Long Island (August)
 - Great Lakes (Sept)



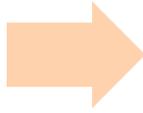
Permit Reviewers Webinars

- Winter 2019
- Introduced draft framework
- Shared what we heard from the RWG
- Gathered their feedback

Timeline

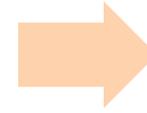
Revisiting the TWG

- Spring 2019
- Revised draft framework



Project Advisory Committee (PAC) Update

- Spring/ Summer 2019
- Updated PAC on activities
- Gathering their feedback



Finished revised draft framework/ Pilot monitoring in regions

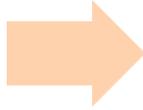
- Summer 2019
- Pilot monitoring in regions



Timeline

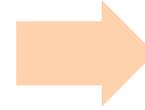
“Getting the word out”

- Fall 2019
- Presentation at the NY-NJ Annual Harbor Estuary Conference



Last round of framework revisions and develop database

- Fall 2019 / Winter 2020
- Finalized monitoring framework*
 - Though this is a living document
- Database development



NNBF Final Webinar

- Winter 2020
- **HERE WE ARE TODAY!**

Regional Workshops

Data

- How do we ensure consistency and use?
 - What is baseline?
 - How do we standardize?
 - How do we use, distribute?
Who owns it?
 - What about specific site goals?

People

- Roles
 - Who is the audience?
 - Who does this?
 - Who funds this?



Regional Workshops cont.

- Other common themes
 - Don't reinvent the wheel (ie: use existing data)
 - Provide training and instruction, keep it simple
 - Is monitoring 'forward-based'? Or 'keeping track of things'?

Permit Reviewers

- Site-specific projects and regional differences
 - Each project: different characteristics, different purpose
 - Take into account projects nearby and their differences and/or intra-regional
- Compliance/ Enforcement
 - Can't enforce something if it is not required out of the jurisdiction
 - le: private land owners aren't going to be doing this type of monitoring
 - Lack of enforcement
 - Nobody wants to do more than they are required
 - Will not issue permits with voluntary conditions
 - --This was apparent for Socio-economic Outcomes Resilience Service

Permit Reviewers cont.

- Funders vs. Permit Reviewers Roles
 - There is support for state-funded monitoring programs
 - Fund demonstration projects
 - Funders require monitoring, not the permittees
 - Permittees don't have an opening for this
 - Funding partners also monitor

PAC Feedback

- Establishing baseline
- A lot of the indicators having a timing component
 - Ie: Census data happens every 10 years; how often are we collecting data, especially before and after installation of a project?

Selecting Parameters, Indicators, and Protocols

*Dr. Peter Groffman
Brooklyn College*

NNBF and the Knights who say Ni . . . :

- HEAD KNIGHT: You must return here with a shrubbery or else you will never pass through this wood alive!
- ARTHUR: O Knights of Ni, you are just and fair, and we will return with a shrubbery.
- HEAD KNIGHT: One that looks nice.
- ARTHUR: Of course.
- HEAD KNIGHT: And not too expensive.
- ARTHUR: Yes.
- HEAD KNIGHT: Now... go!

FINAL MONITORING FRAMEWORK MATRIX

Resilience Service Area	Performance Parameter	Indicators	Associated Protocols	
			field protocols	desktop protocols
Ecological Function	Biological Health & Biodiversity	Plant species cover, abundance, species richness and composition (including native versus exotic)	Plant species cover, abundance, species richness and composition (including native versus exotic) Establishing Sampling Scheme (including transect locations, etc.)	n/a
		Sessile organisms presence, abundance, (percent) cover, species richness, and composition	Sessile organisms presence, abundance, (percent) cover, species richness, and composition Establishing Sampling Scheme (including transect locations, etc.)	n/a
		Distribution and abundance of substrates including wrack, debris, concrete, etc.	Distribution and abundance of substrates including wrack, debris, concrete, etc. Establishing Sampling Scheme (including transect locations, etc.)	n/a
	Habitat Connectivity	Habitat connectivity to adjacent areas, habitats, land uses in all directions	Site and feature characterization (Site Questionnaire)	Site and feature characterization (Site Questionnaire)
	Hydrology	Visual evidence of hydrologic alteration	Site and feature characterization (Site Questionnaire) Site photolog (to be developed in future)	Site and feature characterization (Site Questionnaire)
Hazard mitigation and Structural Integrity	Shoreline and topographic change	Change in Feature Position and Elevation	Feature Elevation - Field Feature Aerial Dimension - Field Erosion Measurements and Asset Displacement	Feature definition, location and aerial dimension - Desktop
		Change in Shoreline Position and/or Updrift / Downdrift (at Feature)	Feature Aerial Dimension - Field	Shoreline location, intertidal zone definition, and shoreline change
	Coastal Flooding	Change in Wave Conditions	Water Levels and Coastal Flooding Data - Simplified Detailed Wave Measurement	n/a
		Water Levels	Water Levels and Coastal Flooding Data - Simplified	n/a
	Structural Integrity	Change in Feature Position and Elevation	Feature Elevation - Field Feature Aerial Dimension - Field Erosion Measurements and Asset Displacement Establishing Sampling Scheme (including transect locations, etc.)	Feature definition, location and aerial dimension - Desktop Shoreline location, intertidal zone definition, and shoreline change
		Visible Scour, Erosion, Escarpments, and/or Material Degradation	Erosion Measurements and Asset Displacement Site photolog (to be developed in future)	n/a
Change in Vegetation, Shellfish, or Other Biomass of Structure		see biological health and biodiversity protocols	n/a	
Socio Economic Indicators	Quality of Life	Household Perception of Risk, Neighborhood Satisfaction (general & as it relates to shoreline condition), and Quality of Life	Household Survey	n/a
	Recreation and Cultural Use	Observation and Telling of Recreation and Cultural Shoreline Use	Shoreline Social and Site Assessment Protocol	n/a
	Economic Development	Change in Real Estate Value	n/a	Real Estate Value Impacts
		Business Activity Index	Business Activity Impacts Shoreline Social and Site Assessment Protocol	Business Activity Impacts
		Property Damage & Cost of Recovery	Household Survey	Damages to Households & Public Infrastructure (to be developed in future)
	Environmental Justice	Presence/Absence of Potential Environmental Justice Area	n/a	Environmental Justice Index
	Civic Engagement	Rate of participation in stewardship related to shoreline	Shoreline Social and Site Assessment Protocol	n/a

SUMMARY OF PROTOCOLS

#	RESILIENCE SERVICE	PROTOCOL	TYPE	DESCRIPTION OF PROTOCOL	RELATED INDICATOR(S)
1	EF / HM5SI	Site and feature characterization (Site Questionnaire)	desktop and field	A protocol for determining the type of shoreline feature and describing its physical and biological context and adjacent land uses, including: adjacent land uses, evidence of erosion, presence water intake or discharge pipes, vulnerable infrastructure, existing human uses, and fill/construction activity. The protocol draws on existing site information such as aerial imagery, prior surveys, as-built documents, or input from people with local knowledge of the site as well as field observations.	All
2	EF / HM5SI	Feature definition, location and aerial dimension (desktop)	desktop	A protocol describing desktop analysis that uses existing remote sensed data (aerial imagery, LIDAR, etc.) to identify the "type" of site/feature for monitoring and establish the approximate location and extents of the monitoring site/feature prior to field monitoring.	All
3	EF / HM5SI	Feature Aerial Dimension (field)	field	A simple field assessment to map the aerial dimension of the feature, and track changes from the documented baseline conditions.	Change in Feature Position and Elevation
4	EF / HM5SI	Shoreline location, intertidal zone definition, and shoreline change	desktop	Desktop analysis that evaluates the shoreline position using LIDAR or aerial imagery. If a time series of LIDAR or aerial imagery is available allows for the development of shoreline change over time.	Change in Shoreline Position
5	EF / HM5SI	Establishing Sampling Scheme (including transect locations, etc.)	field with desktop pre-visit prep	The protocol for planning and specifying the spatial layout of the sampling design for each site that will be used for multiple EF and HM5SI protocols. This includes determining the number of segments to be monitored, identifying the number and location of potential profile lines within each segment and individual assessment points where measurements are made.	Most EF and HM5SI
6	HM5SI	Feature Elevation (field)	field	A field data collection protocol for identifying the feature elevation and evaluating feature elevation change by mapping elevational profiles along permanent transects associated with the feature as well as adjacent reference location(s).	Change in Feature Position and Elevation
7	HM5SI	Erosion Measurements and Feature Displacement	field	A simple field measurement to evaluate the overall structural stability of the feature, and the degree to which the feature is abating shoreline erosion.	Visible Scour, Erosion, Escarpments, and/or Material Degradation
8	HM5SI	Detailed Wave Measurement	field	An intensive protocol for making detailed wave measurements using acoustic or pressure-based wave measuring equipment. Requires significant monitoring budget and technical expertise.	Change in Wave Conditions
9	HM5SI	Coastal Flooding Data - Simplified	field + desktop	A simple field assessment of water levels, waves, and wave runup at / around shoreline features. Complemented with the collection of desktop data intended to validate or support the field data.	Water Levels; Change in Wave Conditions
10	EF	Distribution and abundance of substrates including wrack, debris, concrete, etc. (in Combined Ecological Function Protocol)	field	A protocol for investigate the distribution, abundance of different substrates on the transect (site) and assessment area (AP) including wrack, debris, concrete, etc. Substrate refers to the ground surface and any non-living material on the ground, such as bedrock (boulders, seawalls, concrete > 13 ft in size), boulders (between 1 and 13 ft - basketball to car size), gravel/cobble (between 0.1 and 12 in - pea to basketball size) and sand/mud (<0.1 in), wrack, large woody debris.	Distribution and abundance of substrates including wrack, debris, concrete, etc.
11	EF	Plant species cover, abundance, species richness and composition (including native versus exotic) (in Combined Ecological Function Protocol)	field	A field protocol to record the cover, abundance, species richness and composition (including native versus invasive/exotic plant species). It requires plant identification skills.	Plant species cover, abundance, species richness and composition (including native versus exotic)
12	EF	Sessile organisms presence, abundance, (percent) cover, species richness, and composition (in Combined Ecological Function Protocol)	field	A field protocol to assess the presence, abundance, richness and composition of sessile organisms/benthic fauna. Requires identification skills.	Sessile organisms presence, abundance, (percent) cover, species richness, and composition
13	SEO	Business Activity Impacts	desktop	The protocol is designed to gather data on business activity surrounding a shoreline area and evaluate what, if any, impacts shoreline type, including investments in nature-based infrastructure projects, will have had on surrounding businesses.	Business Index
14	SEO	Real Estate Value Impacts	desktop	The protocol is designed to gather data on real estate value in neighborhoods adjacent to a shoreline and evaluate what, if any, impacts shoreline feature type, including investments in nature-based infrastructure projects, have had on surrounding real estate values.	Real Estate Value
15	SEO	Environmental Justice Index	desktop	We will determine whether the neighborhood around the shoreline intervention can be considered a potential environmental justice area (yes/no), and why (because of income / race / or both).	Environmental Justice
16	SEO	Household Survey Protocol	field	The household survey protocol is a survey that addresses the following indicators for socio-economic outcomes: Neighborhood Satisfaction (Quantitative), Risk Perception (Quantitative), Quality of Life (Quantitative & Qualitative), Households Impacted by Flooding (Quantitative & Qualitative), Attitudes toward NBNF (Quantitative & Qualitative).	Neighborhood Satisfaction (Quantitative), Risk Perception (Quantitative), Quality of Life (Quantitative & Qualitative), Households Impacted by Flooding (Quantitative & Qualitative), Attitudes toward NBNF (Quantitative & Qualitative).
17	SEO	Shoreline social and site assessment protocol	field	The social and site assessment is a rapid overview that includes human observation counts, signs of human use and randomized interviews with site users. This data is collected by using two worksheets (supplemental material, attached): (1) Interviews and (2) Direct Human Observation/Signs of Human Use.	Neighborhood perceptions; Recreation and Cultural Shoreline Use
TO BE DEVELOPED IN FUTURE					
	Shared Monitoring Setup	Site Photolog / photos from fixed locations	field	Photo point monitoring consists of repeat photography of an area of interest over a period of time and is effective for documenting visual changes occurring at a fixed point through time.	Multiple
	SEO / HM5SI	Damages to Households & Public Infrastructure	desktop	An analysis of the potential economic damages to property inland of the shoreline were a particular storm event(s) to occur.	Property Damage & Cost of Recovery

Ecological Function

Performance Parameter	Indicators	Associated Protocols	
		Field Protocols	Desktop Protocols
Biological Health & Biodiversity	Plant species cover, abundance, species richness and composition (including native versus exotic)	Cover, abundance, richness, composition Establishing Monitoring Scheme (including transect locations, etc.)	n/a
	Sessile organisms presence, abundance, percent cover, species richness, composition	Presence, abundance, percent cover, richness, composition.	n/a
	Distribution and abundance of substrates including wrack, debris, concrete, etc.	Distribution and abundance of substrates including wrack, debris, concrete, etc.	n/a
Habitat Connectivity	Habitat connectivity to adjacent areas, habitats, land uses in all directions	Site and feature characterization	GIS and maps
Hydrology	Visual evidence of hydrologic alteration	Site and feature characterization Site photolog	GIS and maps

Hazard Mitigation

Performance Parameter	Indicators	Associated Protocols	
		Field Protocols	Desktop Protocols
Shoreline and topographic change	Change in Feature Position and Elevation	Feature Elevation	Maps and GIS
	Change in Shoreline Position	Feature Areal Dimension Erosion Measurements Feature Displacement	
Coastal Flooding	Change in Wave Conditions	Wave Height and Period Measurement	n/a
	Water Levels	Water Levels	Tide data
Structural Integrity	Change in Feature Position and Elevation	As above	
	Visible Scour, Erosion, Escarpments, and/or Material Degredation	Erosion Measurements Asset Displacement Site photolog	n/a
	Change in Vegetation, Shellfish, or Other Biomass of Structure	<i>see biological health and biodiversity protocols</i>	n/a

Socio-Economic

Performance Parameter	Indicators	Associated Protocols	
		Field Protocols	Desktop Protocols
Quality of Life	Household Perception of Risk Neighborhood Satisfaction Quality of Life	Household Survey	n/a
Recreation and Cultural Use	Recreation and Cultural Shoreline Use	Shoreline Social and Site Assessment	n/a
Economic Development	Change in Real Estate Value	n/a	Real Estate Values
	Business Activity Index	Business Activity Impacts Shoreline Social and Site Assessment	Business Activity Impacts
	# Households and public facilities exposed to flooding or erosion	Household Survey	Damages to Households & Public Facilities
Environmental Justice	Presence/Absence	n/a	Environmental Justice Index
Civic Engagement	# People Participating in Shoreline Stewardship	Shoreline Social and Site Assessment	n/a

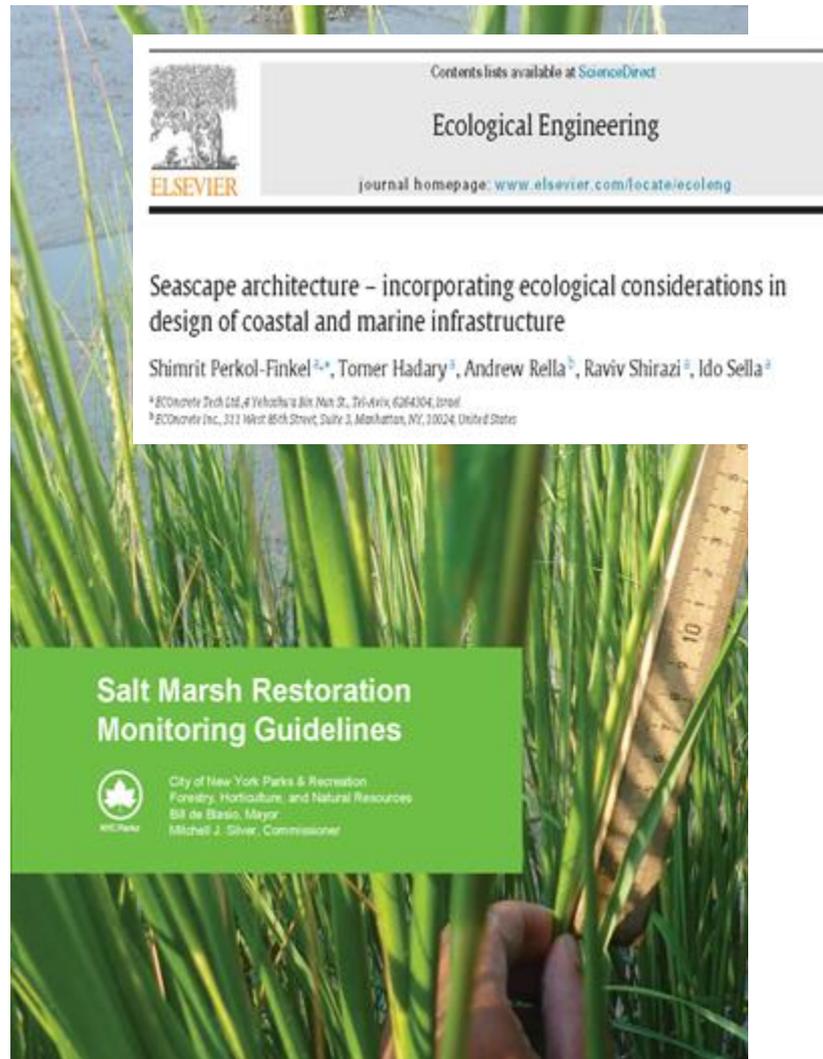
Building on previous efforts:



HUDSON RIVER SUSTAINABLE SHORELINES RAPID ASSESSMENT PROTOCOL MANUAL

Stuart Findlay, Jon Miller,
Amy Williams, Emilie Hauser

September 2018



Two questions going forward:

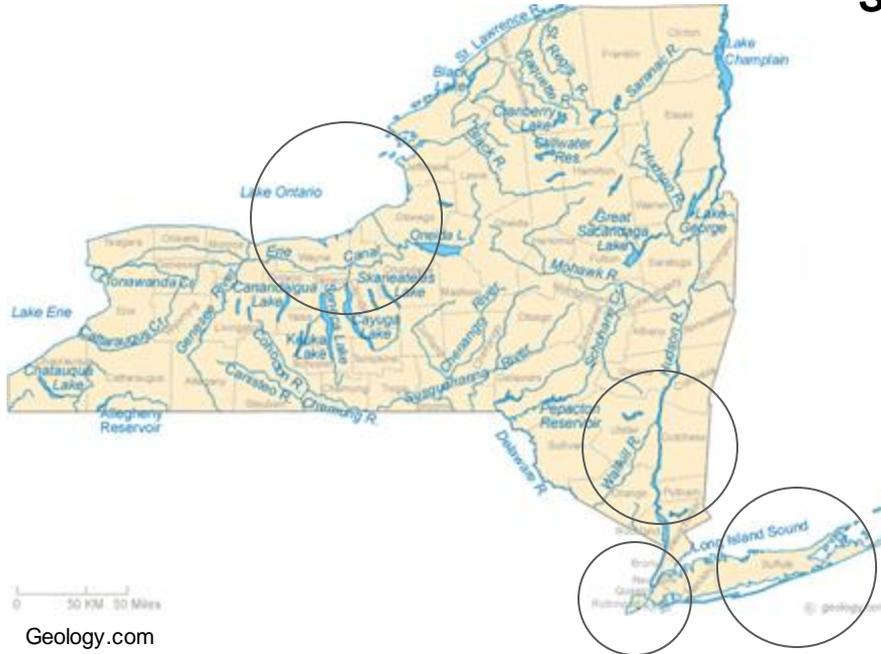
1. Are these NNBF “worth a damn”, i.e., are these features providing ecological function, hazard mitigation and socio-economic value?
2. Can our framework assess this value?
3. Can our framework assess changes in this value over time?

ARTHUR: Knights of Ni, we have brought you your shrubbery. May we go now?

HEAD KNIGHT: It is a good shrubbery. I like the laurels particularly . . .

Pilot Monitoring: Summer 2019

- 4 sites per region (16 sites total)
- NYC Parks will lead NYC/NY Harbor
- Group of graduate Fellows (led by SRIJB)
- Feedback on pilot monitoring will inform the Final Framework



Pilot Data Collection

Chris Haight, NYC Parks

Monitoring Questions

- Are the metrics and protocols feasible to implement?
 - Can different groups with different resources collect data successfully?
 - Can we collaborate with local partners?
 - Can the metrics and/or protocols be improved?
- Are the NNBF providing ecological function, hazard mitigation/structural stability, and socio-economic value?
- Does the framework assess NNBF value?
- Does the framework assess change in value over time?



Pilot Monitoring: Hudson Valley



Coxsackie Boat Launch



Coxsackie Wetland & Living Shoreline



Peekskill Municipal Park



Cold Spring Foundry Park

Pilot Monitoring: Long Island



Widow's Hole, Greenport - Restoration



Widow's Hole, Greenport – Existing Wetland



Cedar Creek Beach, Southold



Patchogue Shorefront Park

Pilot Monitoring: NYC



Randall's Island - Bronx Kill



Randall's Island - Living Shoreline

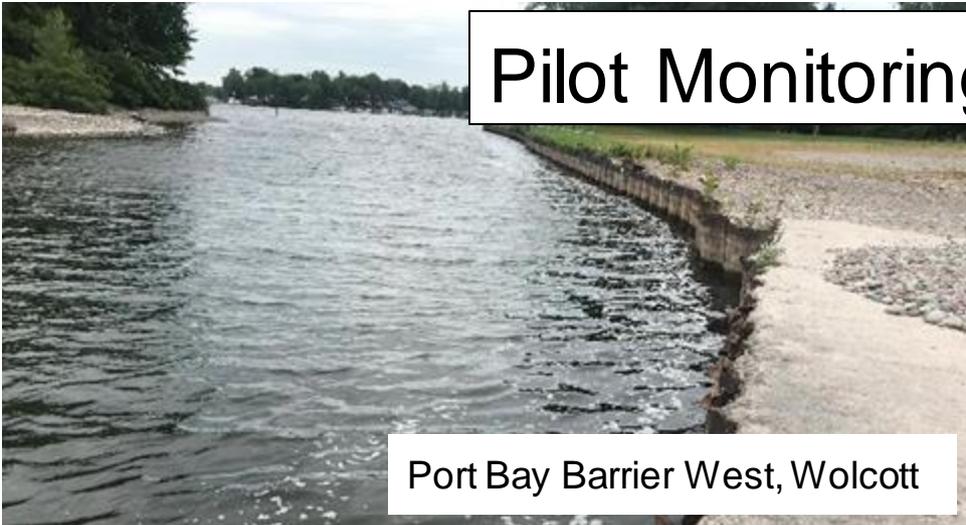


Harlem River Park, Manhattan



Bayswater Park, Queens

Pilot Monitoring: Great Lakes



Port Bay Barrier West, Wolcott



Port Bay Barrier East, Wolcott



Sodus Bay

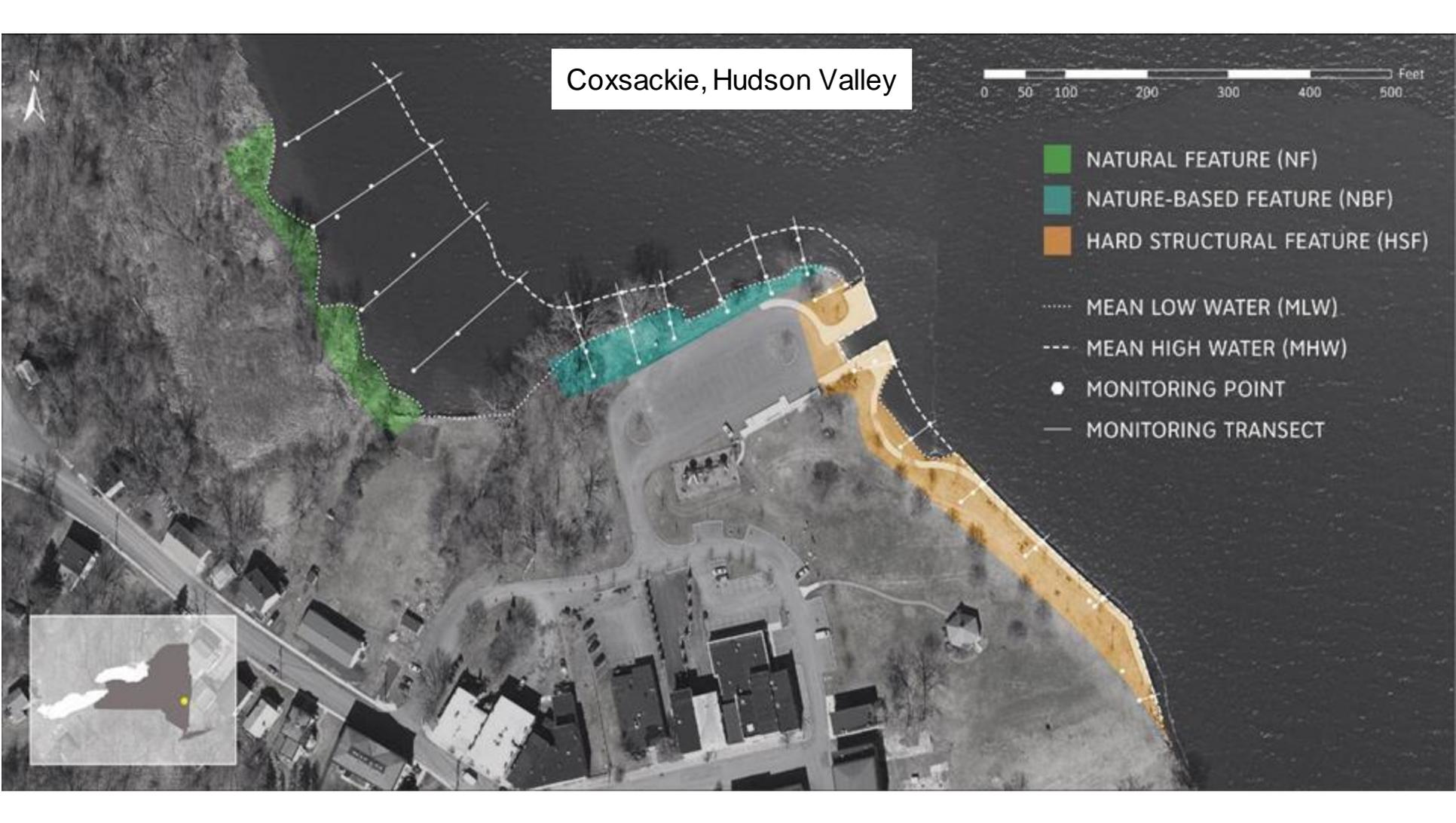


Sterling Nature Center

Coxsackie, Hudson Valley



- NATURAL FEATURE (NF)
- NATURE-BASED FEATURE (NBF)
- HARD STRUCTURAL FEATURE (HSF)
- MEAN LOW WATER (MLW)
- MEAN HIGH WATER (MHW)
- MONITORING POINT
- MONITORING TRANSECT



Ecological Function



Structural Integrity and Hazard Mitigation



Socio-Economic



Lessons Learned

- Protocols can be implemented in the field and desktop
- Delineating the project boundary is challenging
- Streamline datasheets/protocols for the field
- Collaborating with local groups is highly valuable
 - Local knowledge of the site
 - Extra hands/equipment
 - Can be trained in protocol use
 - Potential longer-term monitoring
- Field logistics – weather and tide coordination
- Smart phones are a useful tool
- Timing per site
 - One to three days in field
 - One to three days in office



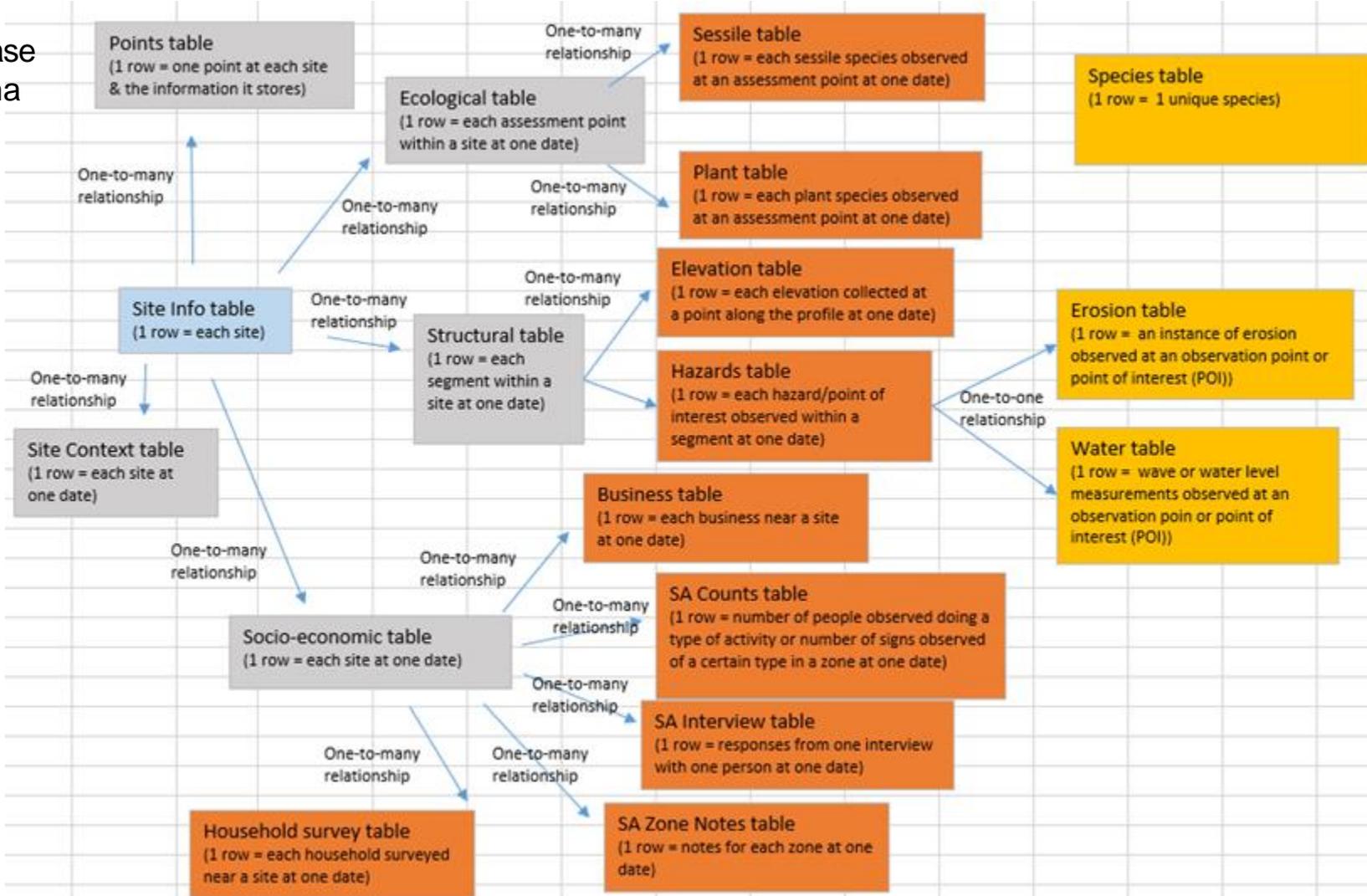
Monitoring Questions

- Are the metrics and protocols feasible to implement?
 - Can different groups with different resources collect data successfully?
 - Can we collaborate with local partners?
 - Can the metrics and/or protocols be improved?
- Are the NNBF providing ecological function, hazard mitigation/structural stability, and socio-economic value?
- Does the framework assess NNBF value?
- Does the framework assess change in value over time?



Database Development

Database Schema



Lessons Learned

- Communication between field monitoring team and data manager
- Documentation of data gaps
- Database can improve protocols and field data collection

Future of the Database

- Collect and add more data
- Database improvements
 - Data entry form/interface
 - Analytics, graphics/visuals
 - Data Queries
- Public-facing database

Site	Profile	Assessment Point	Percent Cover			
			Bedrock/Manmade	Boulder	Gravel/Cobble	Sand/Mud
			Shorefront park, Patcho	1	3	25
Shorefront park, Patcho	2	1	10	0	0	0
Shorefront park, Patcho	2	2	0	0	70	30
Shorefront park, Patcho	2	3	30	0	40	30
Shorefront park, Patcho	3	1	0	0	30	5
Shorefront park, Patcho	3	2	0	0	80	20
Shorefront park, Patcho	3	3	50	0	25	25
Shorefront park, Patcho	4	1	0	0	5	95
Shorefront park, Patcho	4	2	0	0	45	55
Shorefront park, Patcho	4	3	50	0	25	25
Shorefront park, Patcho	5	1	-	-	-	-
Shorefront park, Patcho	5	2	-	-	50	50
Shorefront park, Patcho	5	3	50	0	50	5
Shorefront park, Patcho	6	1	-	-	-	100
Shorefront park, Patcho	6	2	Yes	-	Yes	Yes
Shorefront park, Patcho	6	3	50	-	-	5
Shorefront park, Patcho	7	1	-	-	5	95
Shorefront park, Patcho	7	2	-	-	90	10
Shorefront park, Patcho	7	3	50	0	10	40
Municipal Park, Peekskil	1	1	0	0	30	0
Municipal Park, Peekskil	1	2	0	0	100	0
Municipal Park, Peekskil	1	3	100		100	
Municipal Park, Peekskil	2	1	0	0	90	10
Municipal Park, Peekskil	2	2	100	10	90	0
Municipal Park, Peekskil	2	3	100	50	50	
Municipal Park, Peekskil	3	1	0	0	0	0
Municipal Park, Peekskil	3	2	100	90	10	0
Municipal Park, Peekskil	3	3	100	90	10	0
Municipal Park, Peekskil	4	1	0	0	0	30
Municipal Park, Peekskil	4	2	20	0	25	0
Municipal Park, Peekskil	4	3	100	100	5	0
Municipal Park, Peekskil	5	1	0	0	0	30
Municipal Park, Peekskil	5	2	100	0	100	0

Discussion

- (1) Open new window or use your smartphone*
- (2) Go to www.menti.com*
- (3) Enter code on screen : 66 02 36*

Next Steps

*Amanda Stevens, NYSERDA
Carolyn Fraioli, NYDOS
Dr. Brett Branco, SRIJB*

For more information, contact:

*Carolyn Fraioli, Carolyn.Fraioli@dos.ny.gov
or
Katie Graziano, KGraziano@srijb.org*