

Implications of Sea Level Rise for NJ's back bay and salt marsh habitats

& What can we do about it?

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Photo credit: N. Psuty



Coastal Community Resiliency Progression



Understand
the Issues



Assess Risk
and
Vulnerability



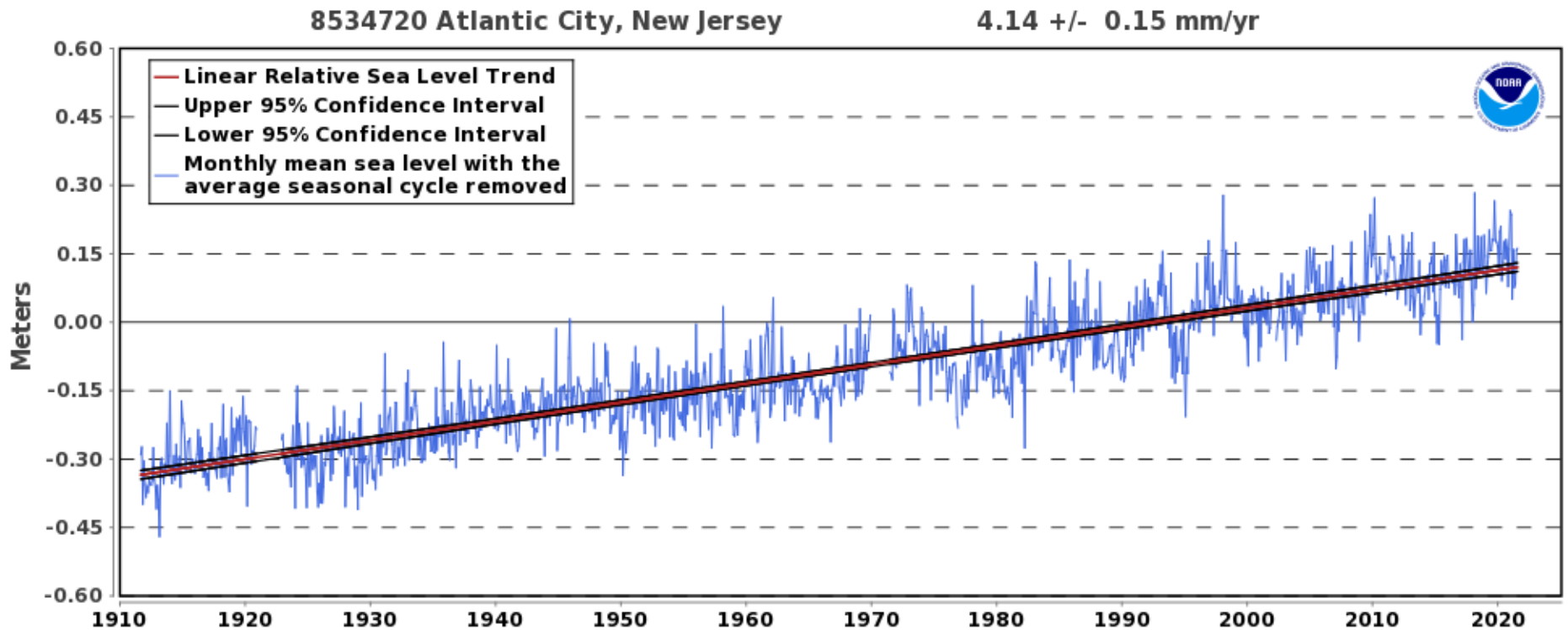
Plan for the
Future



Implement
and Adapt



Rising sea level is a physical reality that is impacting the New Jersey and the entire Mid-Atlantic coastline.



The mean sea level trend over the past century is 4.1 millimeters/year (0.16 in/yr) which is equivalent to a change of 1.33 feet in 100 years. Graphic Credit: NOAA
https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?id=8534720

How Much Will Sea-Level Rise in New Jersey?

Table 3. New Jersey Sea-Level Rise above the year 2000 (1991-2009 average) baseline (ft)*

		2030	2050	2070			2100			2150		
				Emissions								
Chance SLR Exceeds				Low	Mod.	High	Low	Mod.	High	Low	Mod.	High
Low End	> 95% chance	0.3	0.7	0.9	1	1.1	1.0	1.3	1.5	1.3	2.1	2.9
Likely Range	> 83% chance	0.5	0.9	1.3	1.4	1.5	1.7	2.0	2.3	2.4	3.1	3.8
	~50 % chance	0.8	1.4	1.9	2.2	2.4	2.8	3.3	3.9	4.2	5.2	6.2
	<17% chance	1.1	2.1	2.7	3.1	3.5	3.9	5.1	6.3	6.3	8.3	10.3
High End	< 5% chance	1.3	2.6	3.2	3.8	4.4	5.0	6.9	8.8	8.0	13.8	19.6

*2010 (2001-2019 average) Observed = 0.2 ft



Nove

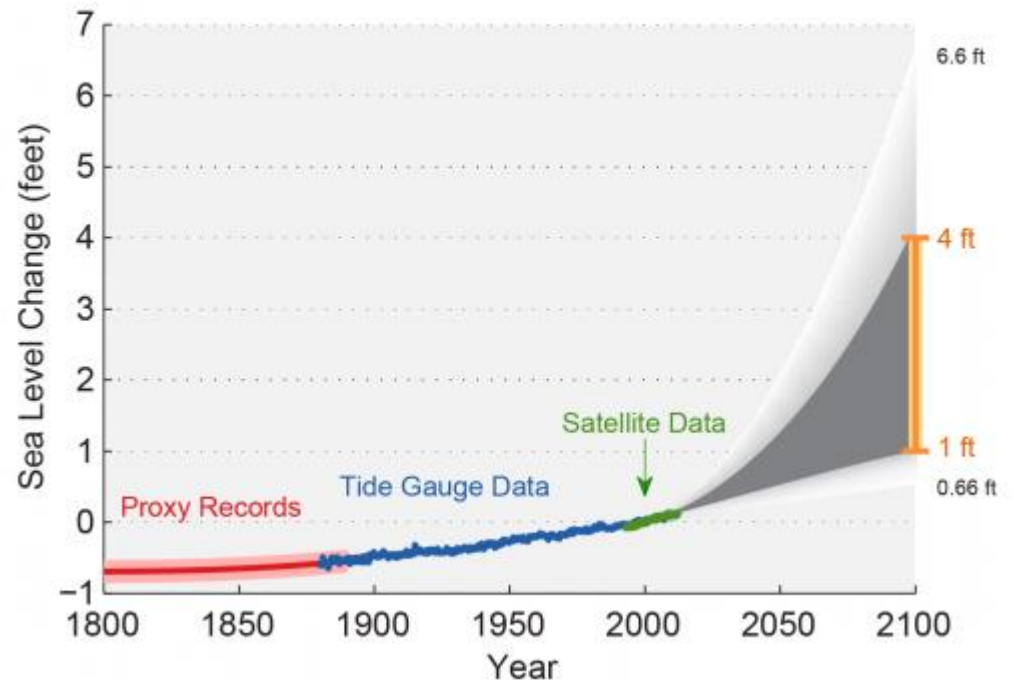
RUTG
THE STATE
OF NEW JERSEY

Projection of sea level rise from 1990 to 2100, based on temperature projections for different Green House Gas emissions scenarios

SOURCE:

<https://www.globalchange.gov/browse/multimedia/past-and-projected-changes-global-sea-level-rise>

Past and Projected Changes in Global Sea Level



April 1, 2010

Sea Oaks Golf Course

Little Egg Harbor, NJ

08087

Co-Sponsored
by:



Background

Global climate change is one of the most pressing challenges facing coastal communities today.

The Intergovernmental Panel on Climate Change concluded in February 2007 that it is "unequivocal" that Earth's climate is warming, and that it is "very likely" (a greater than 90 percent certainty) that the heat-trapping emissions from the burning of fossil fuels and other human activities have caused "most of the observed increase in globally averaged temperatures since the mid-twentieth century".

According to the Union for Concerned Scientists, "the Northeast and the rest of the world face continued warming and more extensive climate-related changes to come—changes that could dramatically alter the region's economy, landscape, character, and quality of life." They go on to state, "By the end of this century, global sea level is projected to rise 7 to 14



inches under a lower emissions scenario and 10 to 23 inches under a higher-emissions scenario. Several lines of evidence indicate that these projections may be quite conservative. Even under these projections, many areas of the densely populated Northeast coast face substantial increases in the extent and frequency of coastal flooding and are at increased risk of severe storm-related damage.

This conference provided an opportunity for municipal leaders, scientists, resource managers, engineers, and others interested in the consequences of climate change to meet and discuss the latest science-based information, highest priority needs, and next steps.

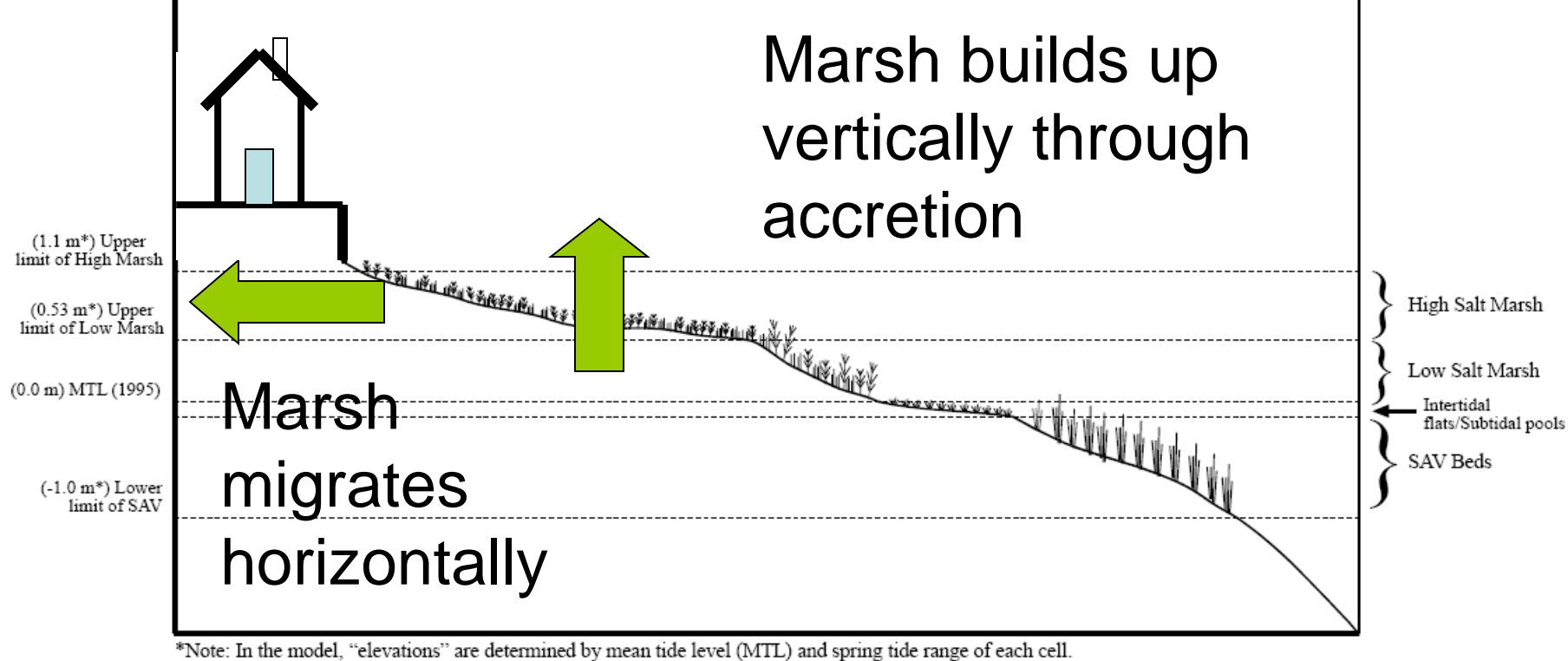
Conference Goals

- To facilitate a dialogue on key issues facing New Jersey's coastal estuaries related to climate change and sea level rise.
- To present sample adaptation tools and strategies.
- To share information amongst local stakeholders.

Workshop Survey Results:

The audience of coastal decision makers highlighted their perceived need for place-based information and decision support tools to inform land use planning, floodplain management and emergency management in the face of accelerating sea level rise.

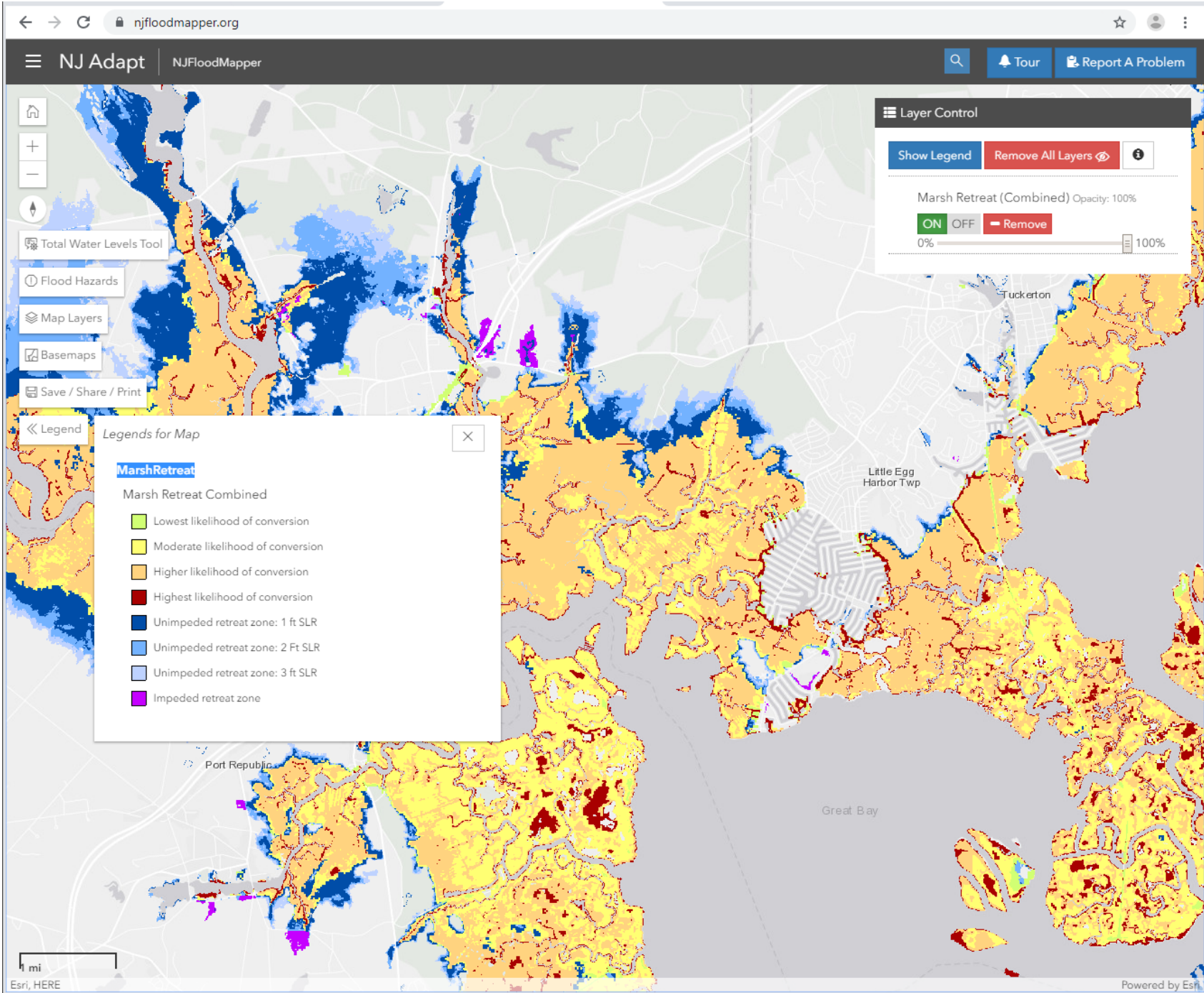
Tidal Marsh Retreat



Hypothetical shoreline profile

Combining estimates of marsh platform conversion and shoreline edge erosion to estimate likelihood of marsh conversion out to Year 2050

Likelihood of Conversion	Marsh Platform Criteria (derived from SLAMM)	Marsh Edge Criteria
Highest Likelihood	Converts to open water or tidal flat under 1' SLR scenario	Within 80% threshold distance of 2050 projection - along exposed high wave energy coast
High Likelihood	Converts to open water or tidal flat under 2' SLR scenario	Within 80% threshold distance of 2050 projection
Moderate Likelihood	Converts to open water or tidal flat under 3' SLR scenario	Between 80% and 120% threshold distance of 2050 projection
Low Likelihood	All other existing marsh	Beyond 120% threshold distance of 2050 projection



Area by Vulnerability Class

Class_Names	Area(ac)	Area(ha)
Lowest likelihood of conversion	56400.9	22824.6
Moderate likelihood of conversion	66084.6	26743.5
High Likelihood of conversion	50213.1	20320.5
Highest likelihood of conversion	23899	9671.57
Unimpeded retreat 1' SLR	41677.1	16866.1
Unimpeded retreat 2' SLR	18142.4	7341.98
Unimpeded retreat 3' SLR	10699.3	4329.84
Impeded retreat zone	4656.67	1884.49

Conclusions:

At 1' of SLR by 2050, the loss of existing salt marshes may be compensated by “new” marsh due to marsh migration into the uplands.

If SLR accelerates to 2' and 3' of SLR by 2050, we predict a net loss coastal salt marshes.

Coastal Ecological Restoration and Adaptation Planning (CERAP)



RUTGERS New Jersey Agricultural Experiment Station

Office of Research Analytics

Climate and Environmental Change Initiative



MONMOUTH
UNIVERSITY
URBAN COAST INSTITUTE

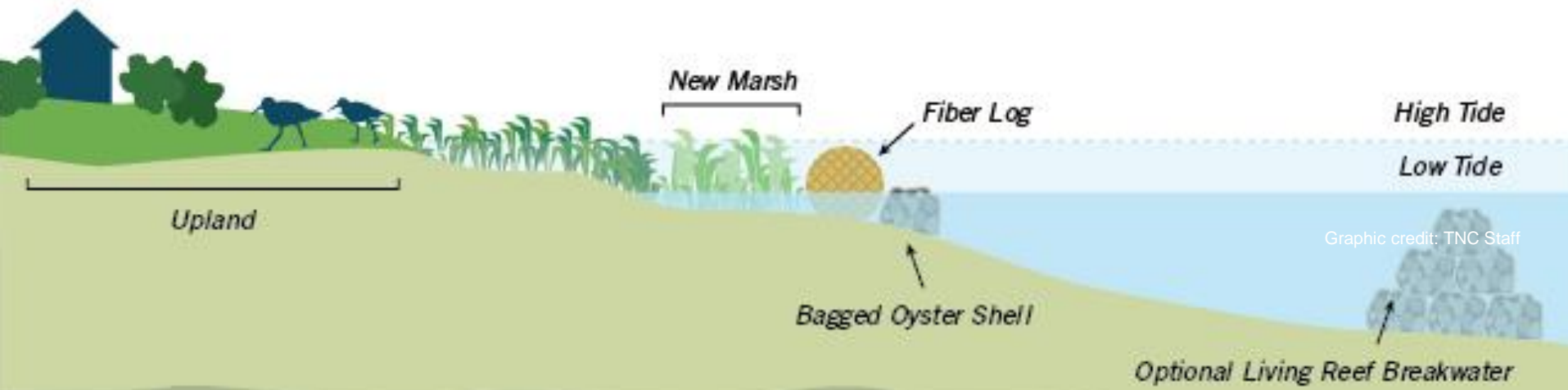


Coastal Ecological Restoration and Adaptation Plan (CERAP)

- A key component of the CERAP will be to identify areas of New Jersey (NJ)'s coastal zone most appropriate for future restoration, enhancement, or preservation projects that will produce significant
 - net carbon sequestration,
 - ecosystem health
 - community resilience value.
- Working with regional collaborators we have identified prospective areas through a Public Participation GIS (PPGIS) approach based on their determination of the ecological, economic and social function of the location and stakeholder interests.

Nature-Based Living Shoreline

Nature-based living shorelines are best in low-energy areas. “Biological enhancements,” like biodegradable fiber logs (which also provide habitat for ribbed mussels) or Christmas trees, are placed along the tidal marsh edge to provide a contained area for sediment to accumulate and marsh vegetation to grow. In more moderate energy areas, it might be possible to use a hybrid approach that pairs nature-based living shorelines with living reef breakwaters.





Site Location Map

Earle Naval Weapons Station
Living Shoreline Expansion
Leonardo, NJ

Nominated Area



Project site



0 490 980
Feet



 **Biohabitats**

May 2019



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

CERAP Project Nominations

Project Information

Please Read

This section is all about the individual projects you have planned or in process within the area of concern you just told us about.



Here is an example of an area of concern (boundary in yellow) with 3 project locations identified within the area with points (dotted circles).

Your answers will provide a deeper understanding of your vision for the future of the area of concern. Thank you for taking the time to provide information on your project.

Area of Concern Name*

Please use the same name you gave on the previous page.
(The name we mentioned you should remember on the last page)

Project Name*

Please give the project a unique identifier, to differentiate potentially more than one project at the same area of concern

Lead Organization for Project*

Lead Contact for Project*

(First and Last name)

Project Contact Email*

Type of Lead Organization*

CERAP Nomination Survey

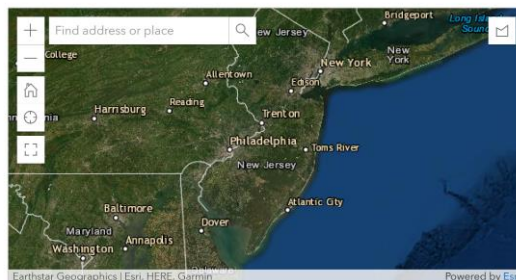
Draw a boundary around your area of concern

To create a boundary around area of concern:

1. Navigate to your area on the map by searching for nearby towns or landmarks in the search box within the map, and/or by using the zoom buttons at the top left of the map and your mouse to click and drag the map to the correct location.
2. Click on the icon at the top right of the map (a 5 sided shape)
3. Once that icon turns green, click on the map to place the first vertex of your area boundary.
4. Continue clicking the screen until the shape has surrounded your area of concern.
5. When you place your last vertex, double click (instead of single clicking) to place the final vertex and save the boundary.
6. Once you have a boundary, a pencil icon and a garbage can icon will appear under the shape icon in the top right of the map.
7. To edit your boundary, click the pencil icon. this will highlight your polygon and allow you to move existing vertices (the blue points) or add additional vertices (the grey points). **Be sure to click the check mark when you are done editing**
8. To delete the polygon and try again, just click the garbage can icon.

The boundaries created are automatically saved.

For a video tutorial, click [here](#)



CERAP Area of Concern Nominations

Area of Concern Information

Thank you for taking the time to provide this information.

Please Read

Section 1 of this survey is asking you to provide details about the area in which you are concerned (referred to as "Area of Concern"). This area should be a location that you deem needs protection/restoration/enhancement and that will promote ecosystem health, community resilience value and carbon sequestration. This Area of Concern may consist of a vulnerable tidal area as well as adjacent ecosystems.



Here is an example of an area of concern (boundary in yellow) with 3 project locations identified within the area with points (dotted circles).

Your answers will provide a deeper understanding of the area of concern.

Your First and Last Name*

(person filling out this form)

Your Email Address*

Primary Contact*

The person that should be contacted about this area of concern.
(First and Last name)

Primary Contact Affiliation*

Primary Contact Email*

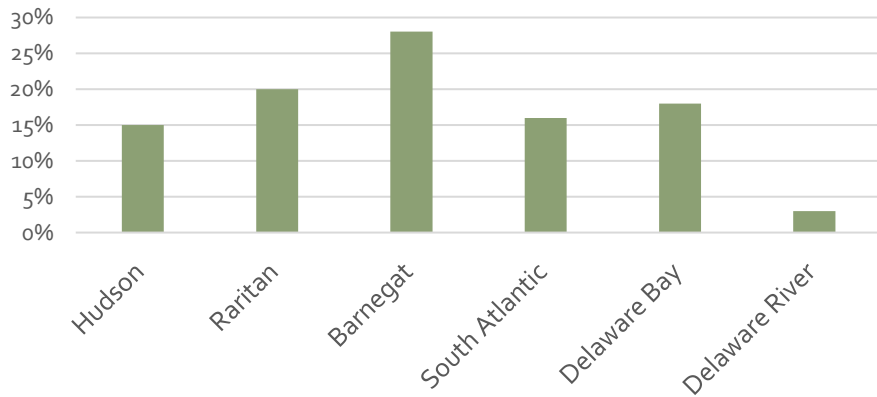
Other Partners?

Please list any other organization that are or will be involved with current or future work in this area of concern.

Survey Results

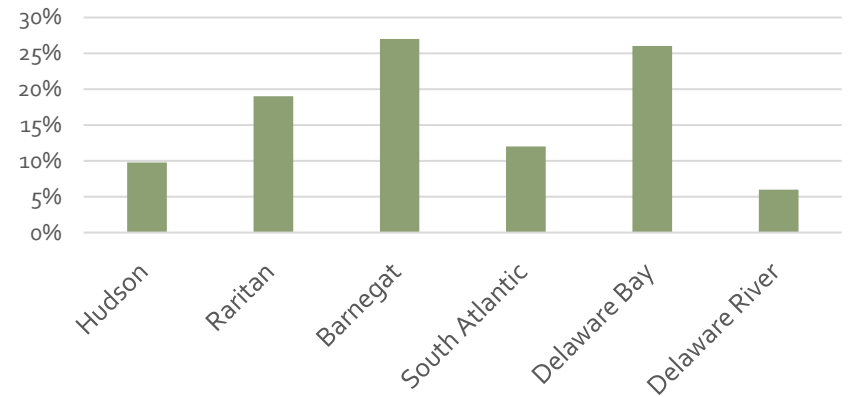
Total Nominated Areas of Interest: 177

Percentage of Nominated Areas of Interest
by Region



Total Projects Nominated: 173

Percentage of Nominated Projects
by Region



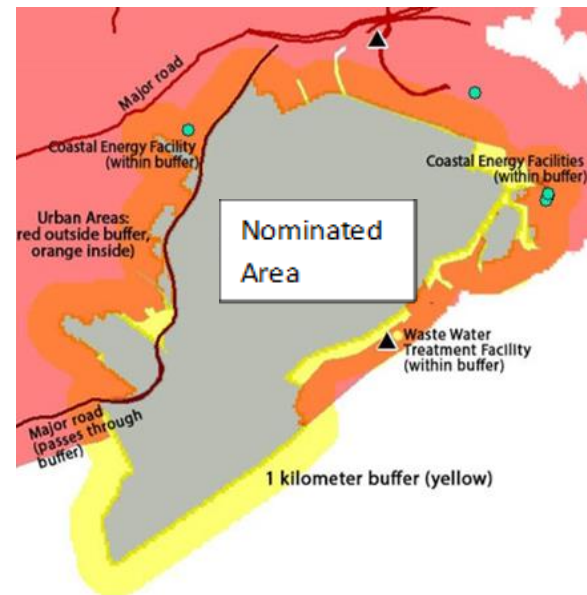
The Nominated Sites will be characterized based on their vulnerability to one or more Issues of Concern (IOC)

- Coastal Ecosystem Degradation and Habitat Loss
- Shoreline Erosion
- Coastal Flood Damage
- Nuisance Flooding
- Coastal Storm Damage
- Water Quality Degradation
- Loss of CO₂ Sequestration
- Social Vulnerability

We have developed a quantifiable, mappable metric for each IOC to provide a statewide view of the geographic distribution of individual IOCs and in composite.

CERAP Area/Project Profile

- Attribute information supplied through the Online Survey
- Area/Project Area information (based on GIS data provided by nominator)
- Individual and Composite IOC Scores (generated through GIS analysis for the footprint of the nominated Area/Project polygon)
- Local Context - Zone of Influence (i.e., the region adjacent to the Nominated Area that might be affected the proposed resiliency/adaptation project).
A GIS model will summarize the IOC scores (individually and in composite)





Site Location Map

Earle Naval Weapons Station
Living Shoreline Expansion
Leonardo, NJ

Geospatial Context

Determine

- % Urbanized
- Other Infrastructure
- Population
- Socially Vulnerable Population
- Conservation Land ownership



Collaborative Platform: ArcGIS Online

- You can view each of the IOCs as well as additional environmental and administrative data that might assist you in your project nomination considerations.
- Access an ArcGIS Online portal through your web browser at the following URL address

Link <https://arcg.is/1CPL4H>

