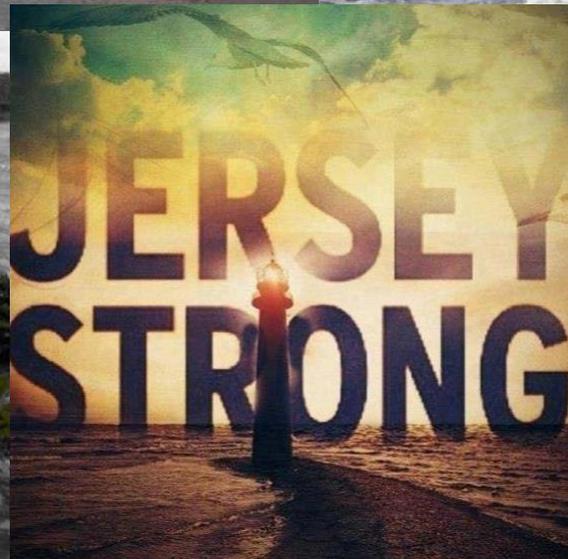




Lisa Auermuller and  
Martha Maxwell-Doyle



# “Jersey Strong” Coastal Communities: Tools for Risk Awareness and Adaptation Planning





# Coastal Community Resiliency Progression



Understand  
the Issues



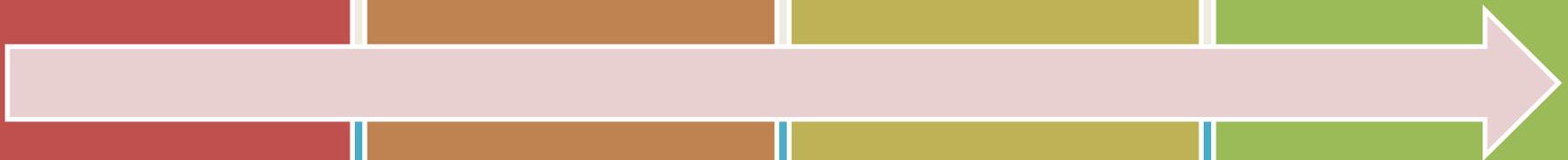
Assess Risk  
and  
Vulnerability



Plan for the  
Future



Implement  
and Adapt





## Understand the Issues

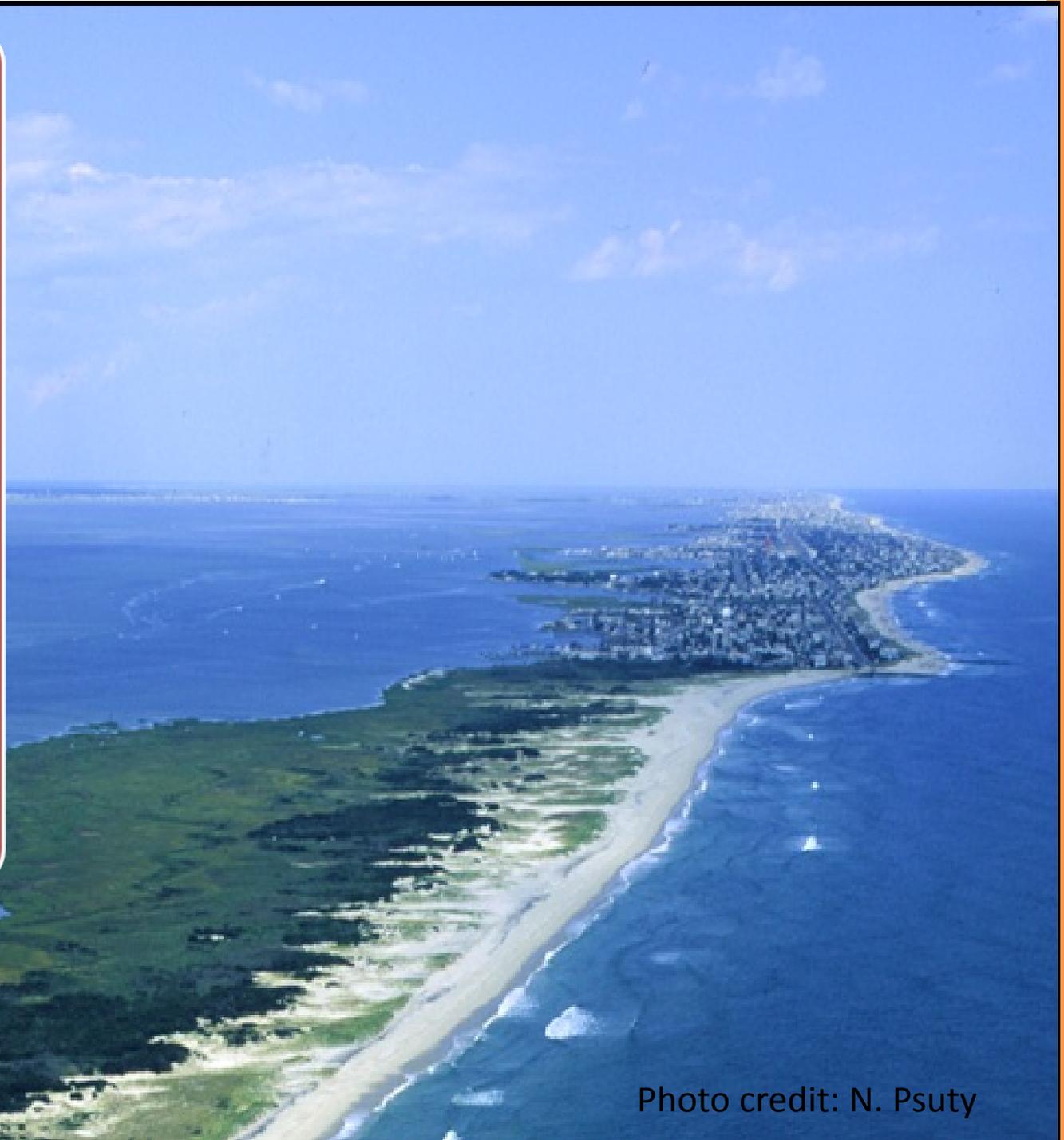


Photo credit: N. Psuty

Sea Level Rise Confidence Marsh  
 Vulnerability Flooding Facilities

Sea Level Rise

6 ft SLR

Legend

- Water Depth
- Low-lying Areas
- Visualization Location

**Overview**

Use the slider bar above to see how various levels of sea level rise will impact this area.

Levels represent inundation at high tide. Areas that are hydrologically connected are shown in shades of blue (darker blue = greater depth).

Low-lying areas, displayed in green, are hydrologically "unconnected" areas that may flood. They are determined solely by how well the elevation data captures the area's hydraulics. A more detailed analysis of these areas is required to determine the susceptibility to flooding.

**Understanding the Map**

**Additional Information**



# Assess Risk and Vulnerability



# How did we doing this?

- Website Usability Testing
- Needs Assessment
- Beta Version
- “Final” version



# FloodMapper Website

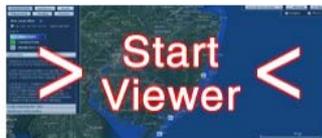
RUTGERS



Funding provided by NOAA's Cooperative Institute for Coastal and Estuarine Environmental Technologies (CICEET), and Sustainable New Jersey

Produced in collaboration with the NOAA Coastal Services Center (CSC) through a partnership with the Jacques Cousteau National Estuarine Research Reserve (JCNEER) and the Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University

About

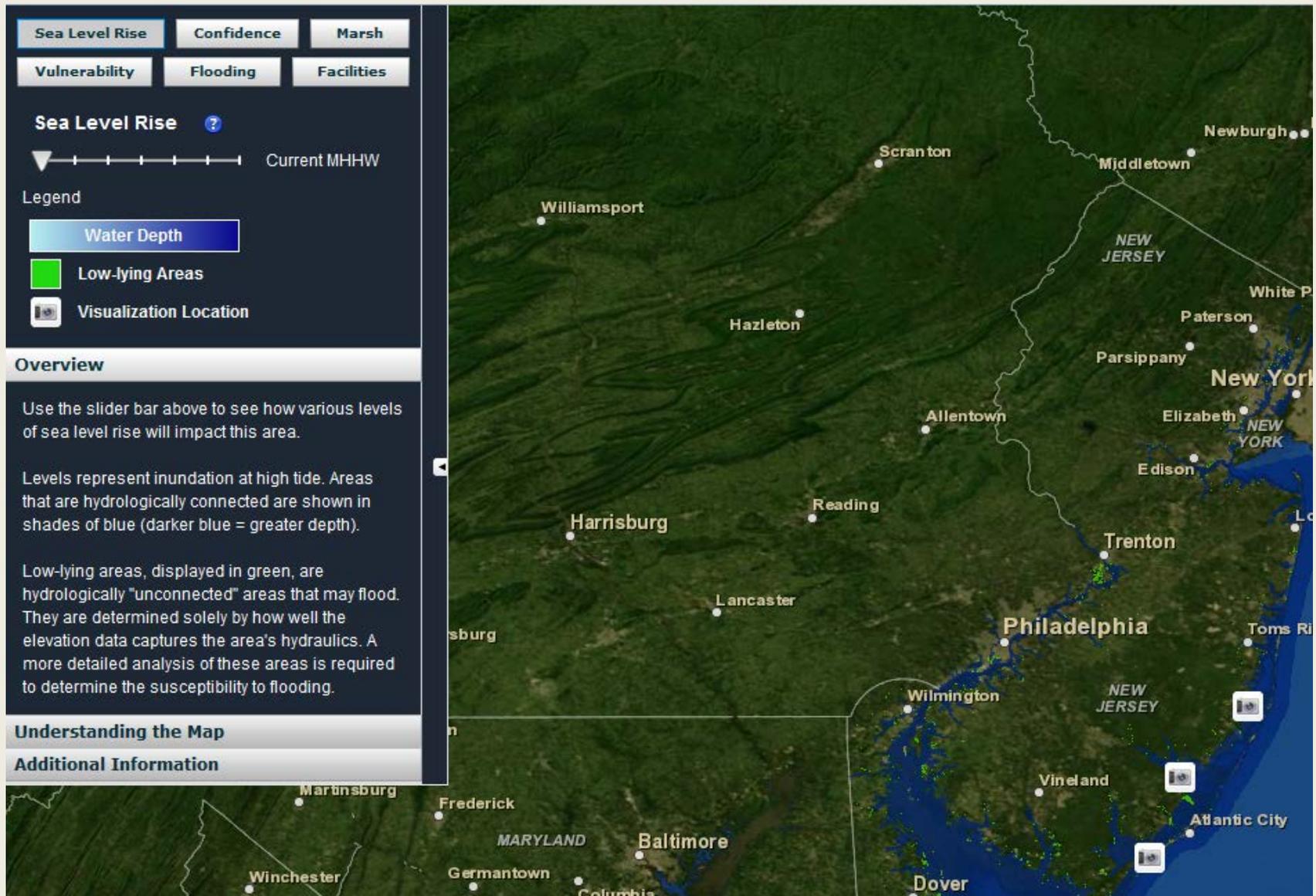


Resources

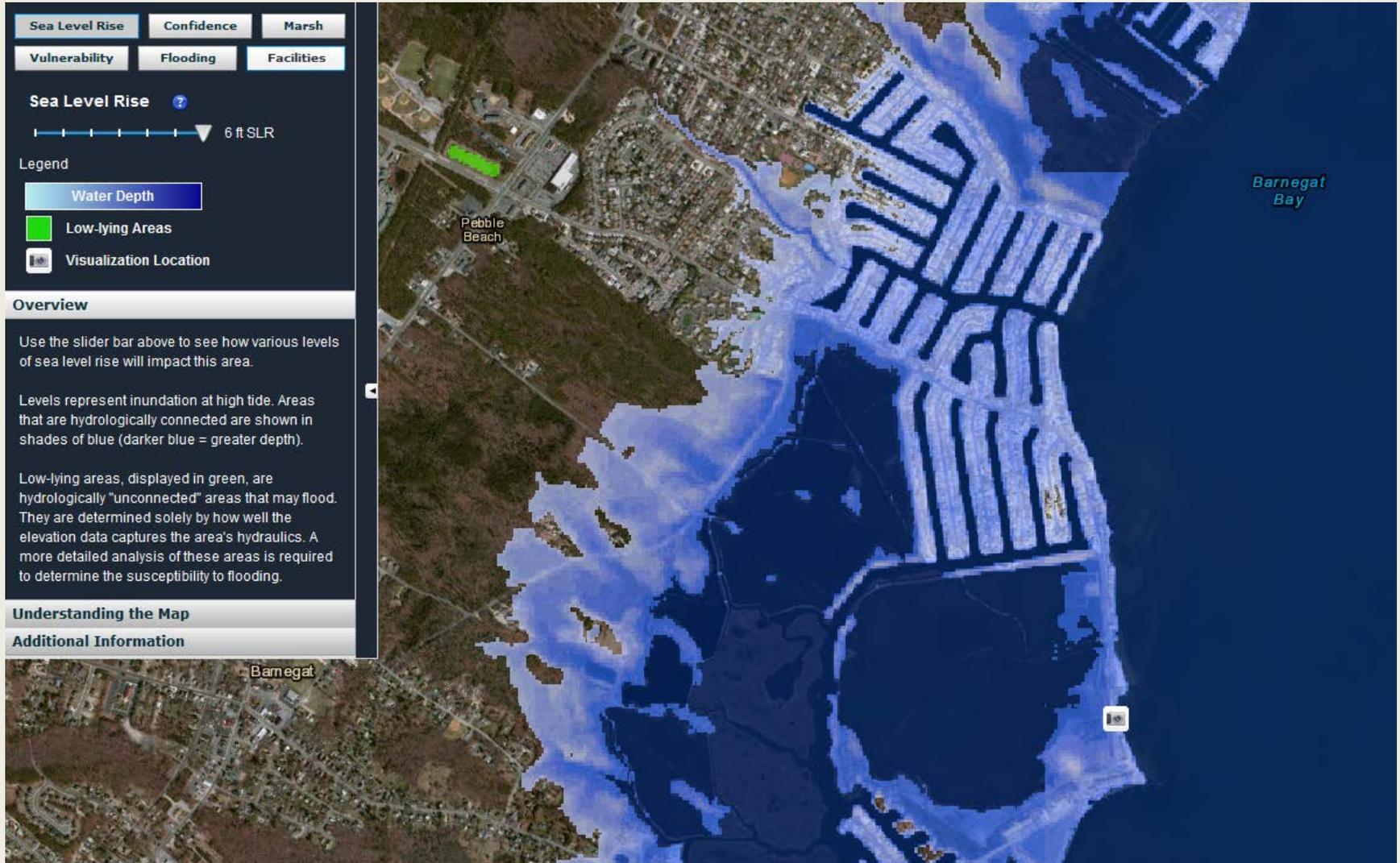
This interactive mapping website was designed and created to provide a user-friendly visualization tool that will help get information into the hands of local communities who need to make decisions concerning flooding hazards and sea level rise.

This website should be used to promote enhanced preparedness and land use planning decisions with considerations for possible future conditions.

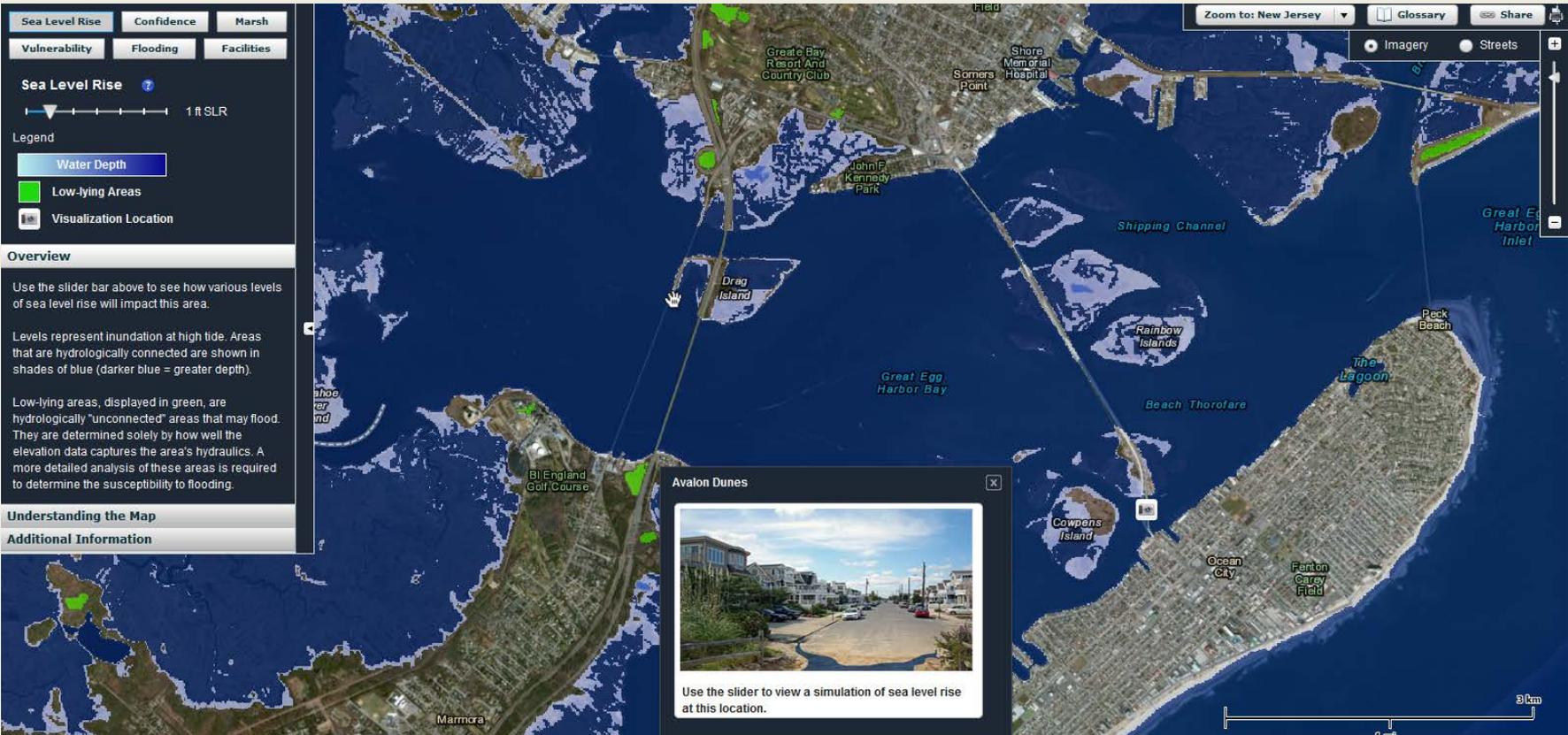
# Navigating the Website



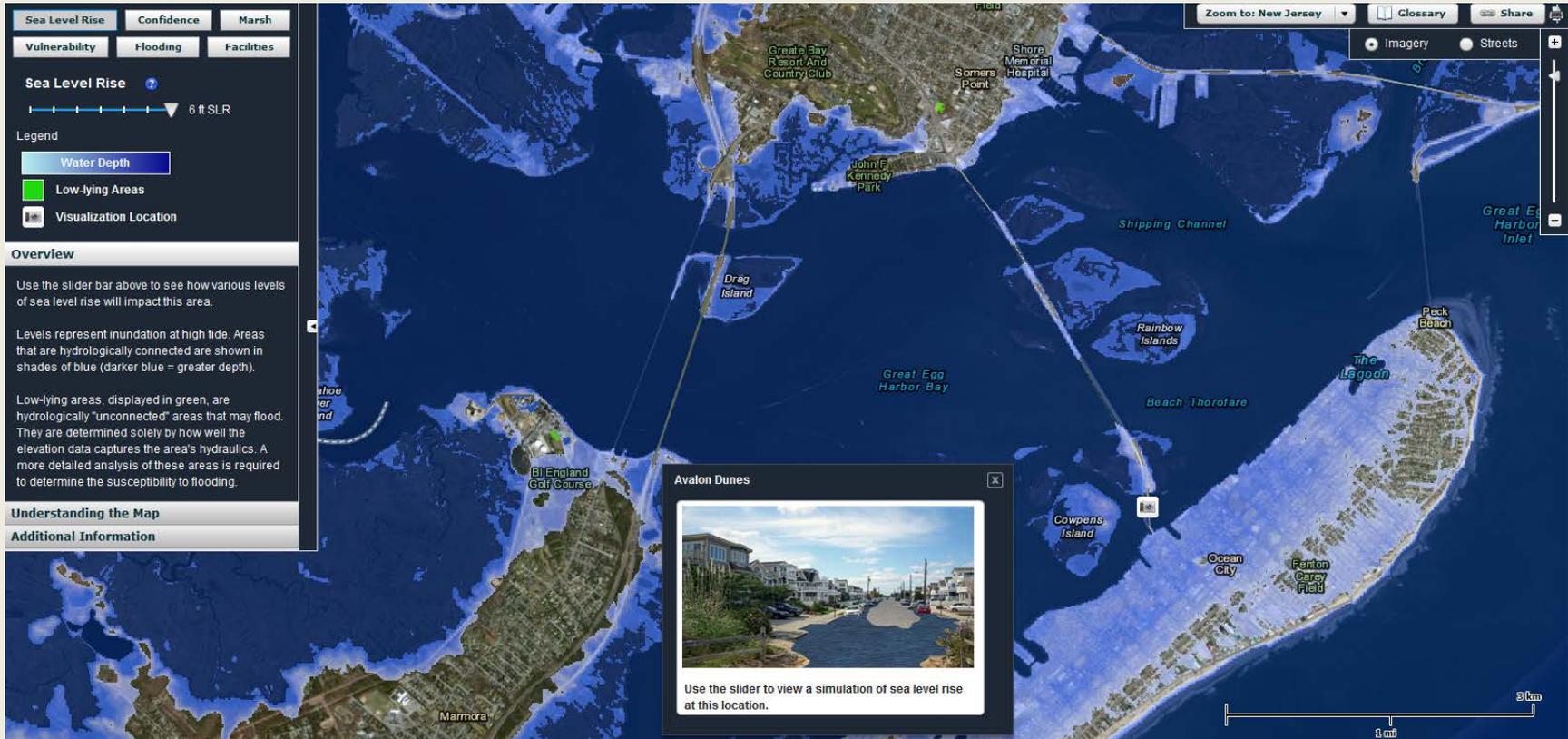
# Sea Level Rise Mapping



# Viewing Sea Level on the Ground



# Viewing Sea Level on the Ground



# Facilities and Sea Level Rise

Sea Level Rise Confidence Marsh

Vulnerability Flooding Facilities

Facility Locations ?

4 ft SLR

Legend

Water Depth

Schools Police Stations

Hospitals Fire Stations

Evacuation Routes

Visibility	Layer Name
<input checked="" type="checkbox"/>	Schools
<input checked="" type="checkbox"/>	Public Safety
<input checked="" type="checkbox"/>	Hospitals
<input checked="" type="checkbox"/>	Evacuation Routes

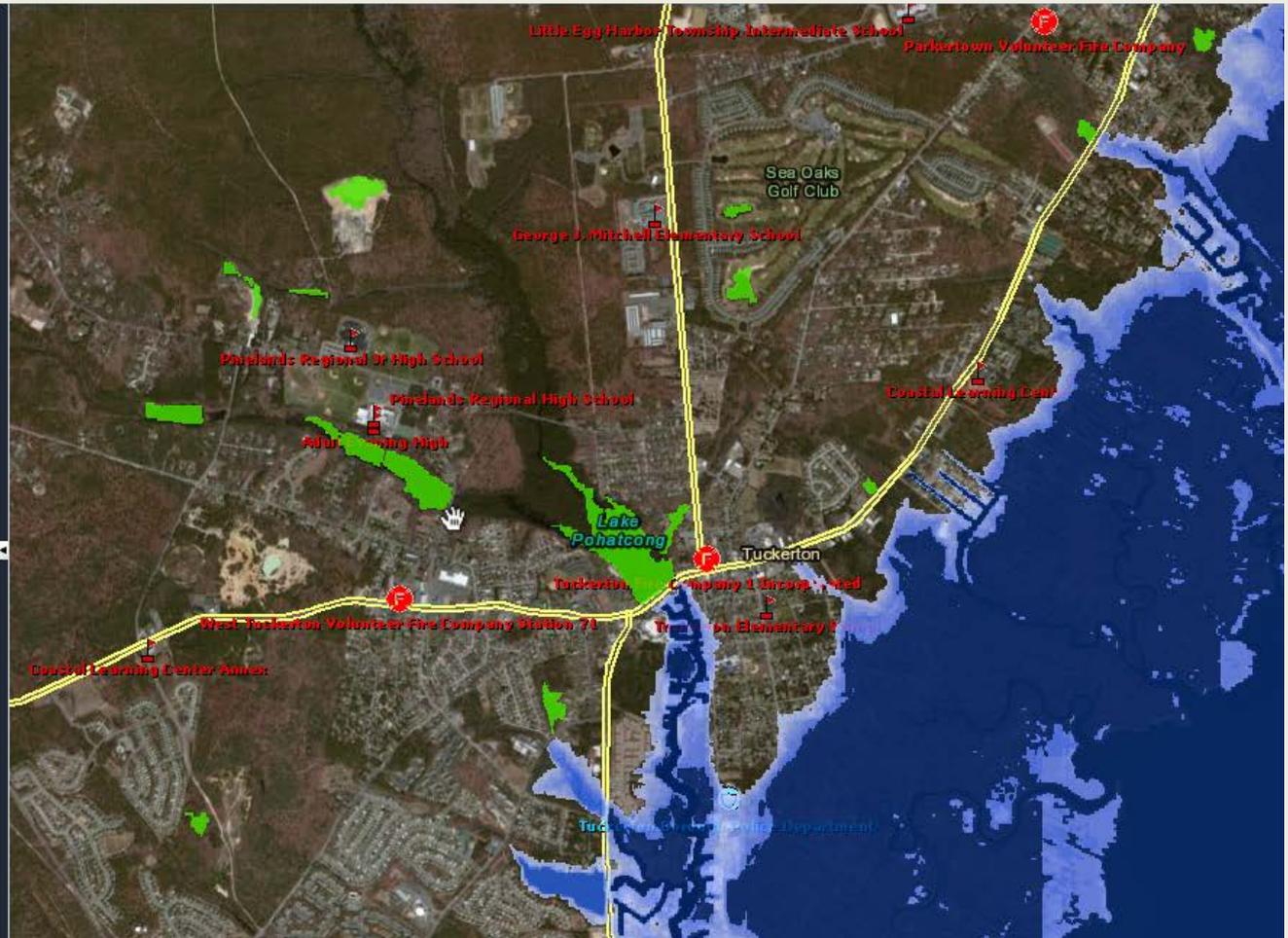
Overview

By overlaying facility locations on a map that depicts sea level rise, a community can identify the potential impact that sea level rise can have on vulnerable locations.

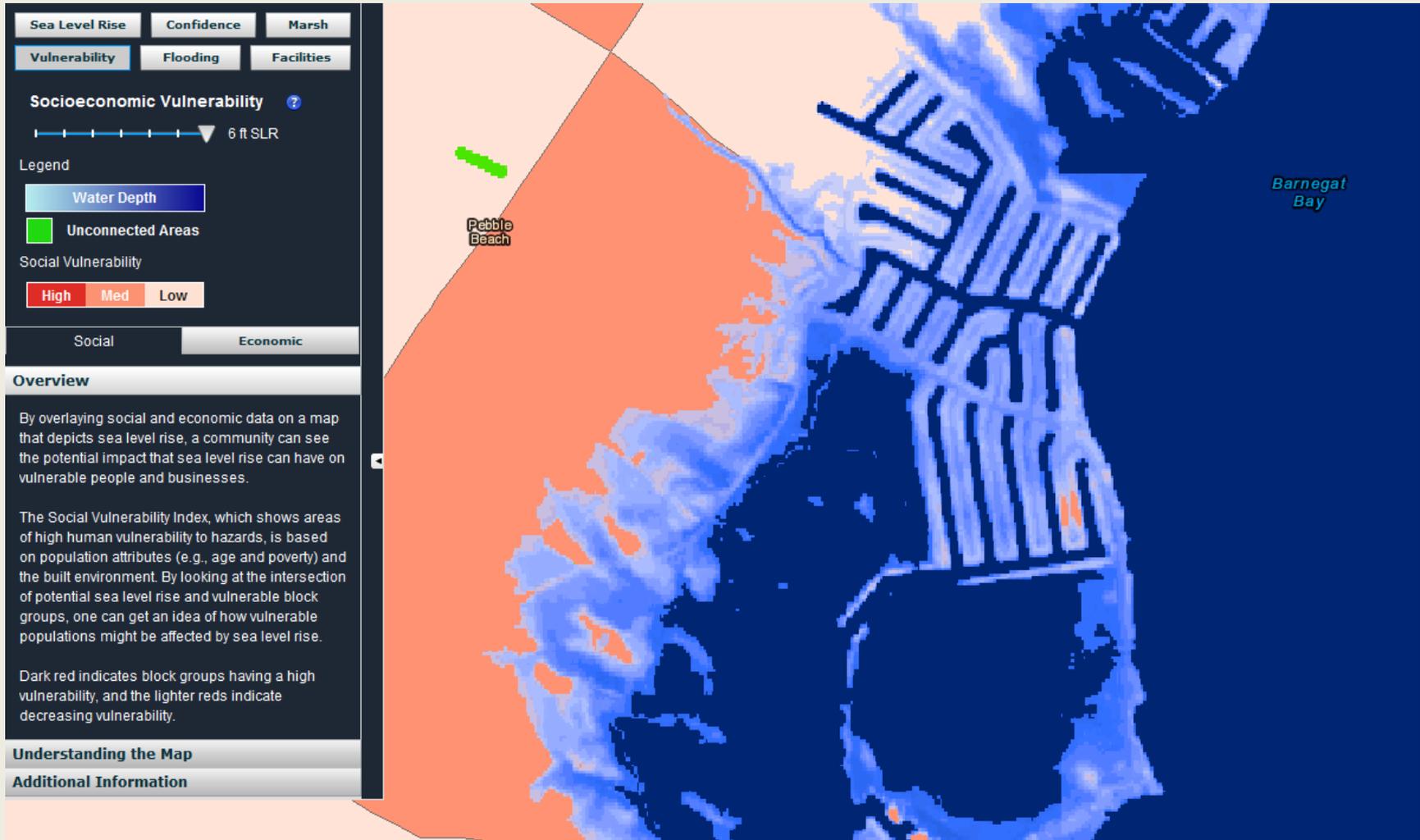
The location of various community facilities are depicted on this map.

Understanding the Map

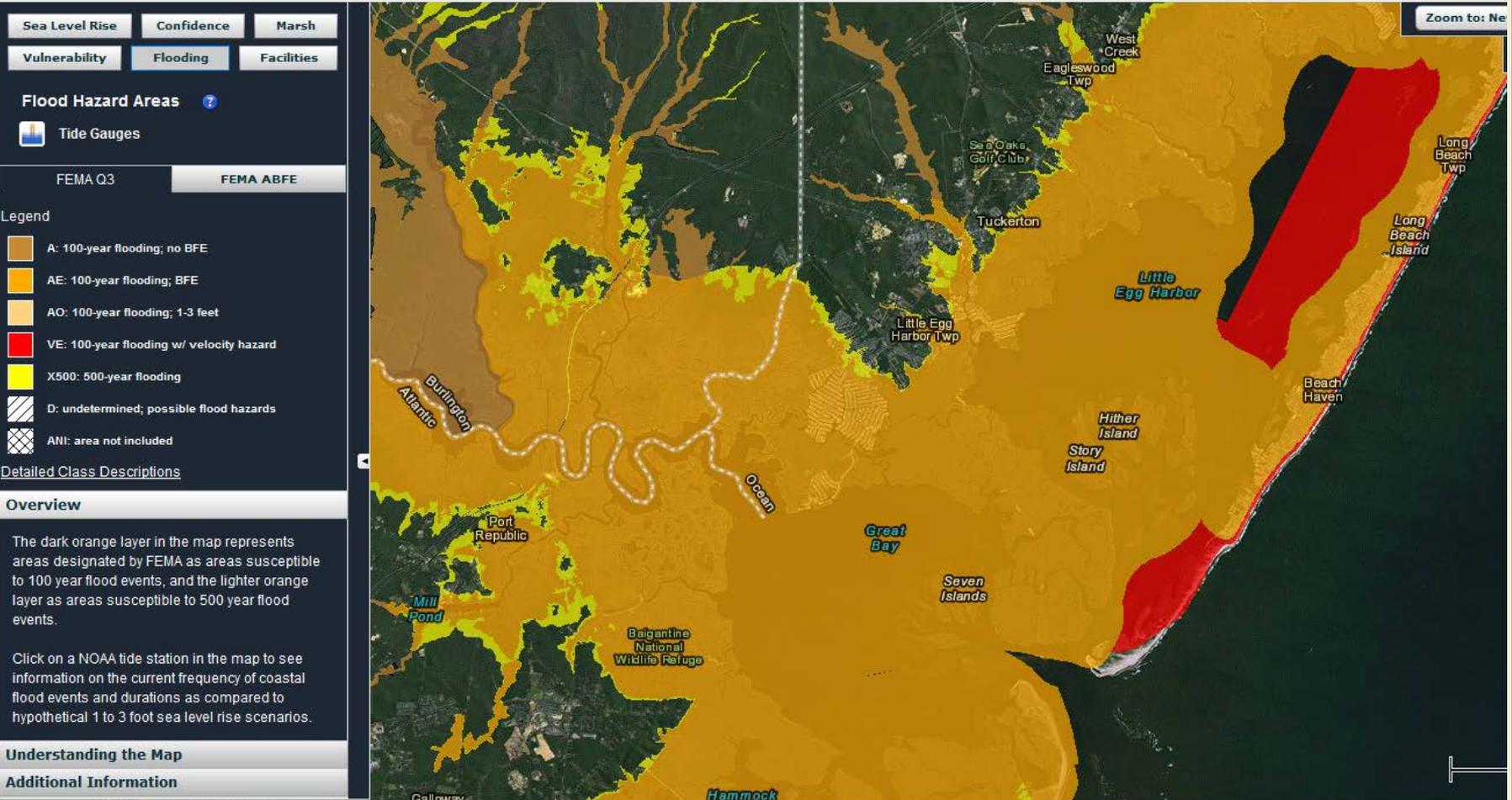
Additional Information



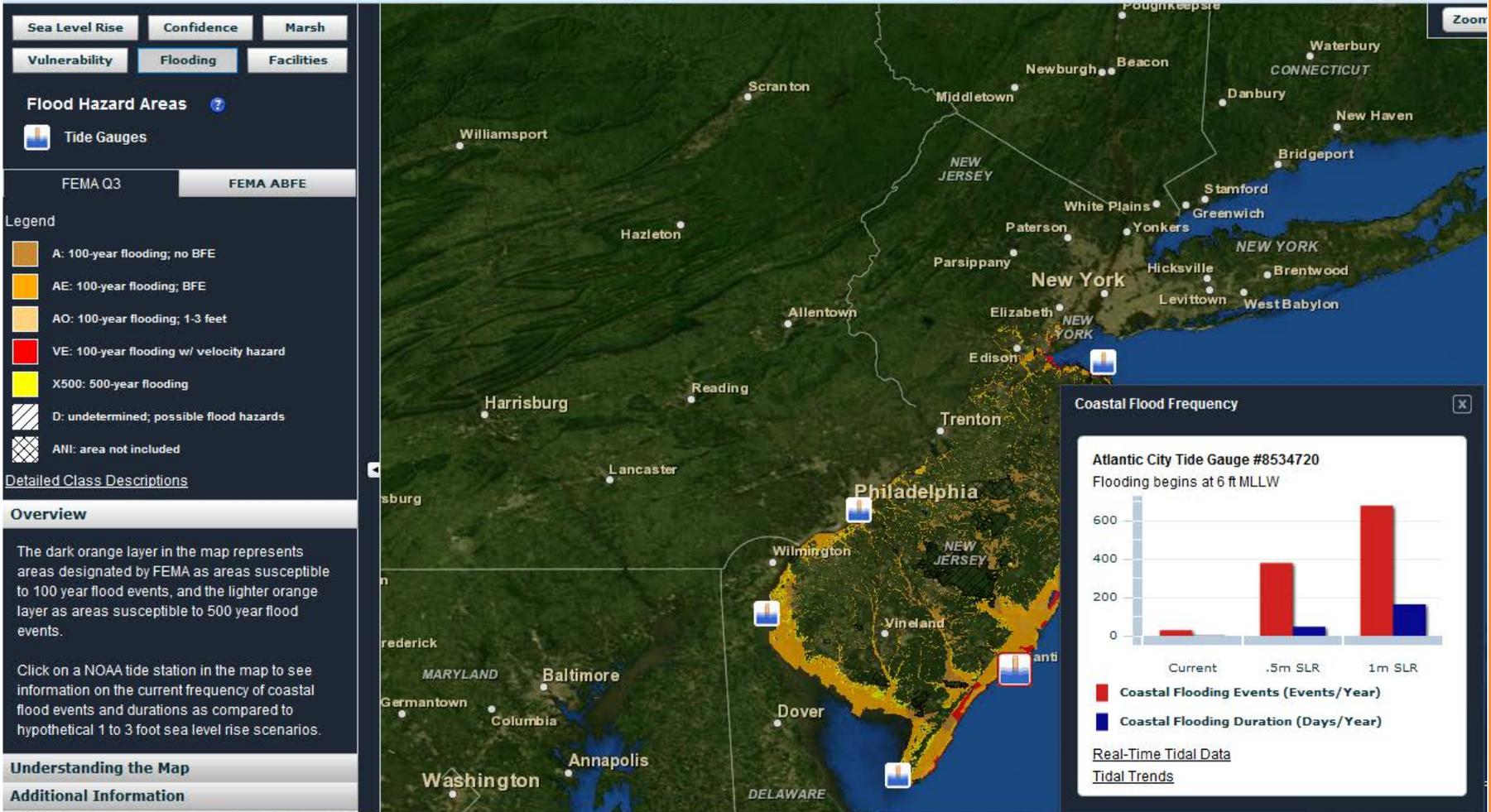
# Social and Economic Vulnerability



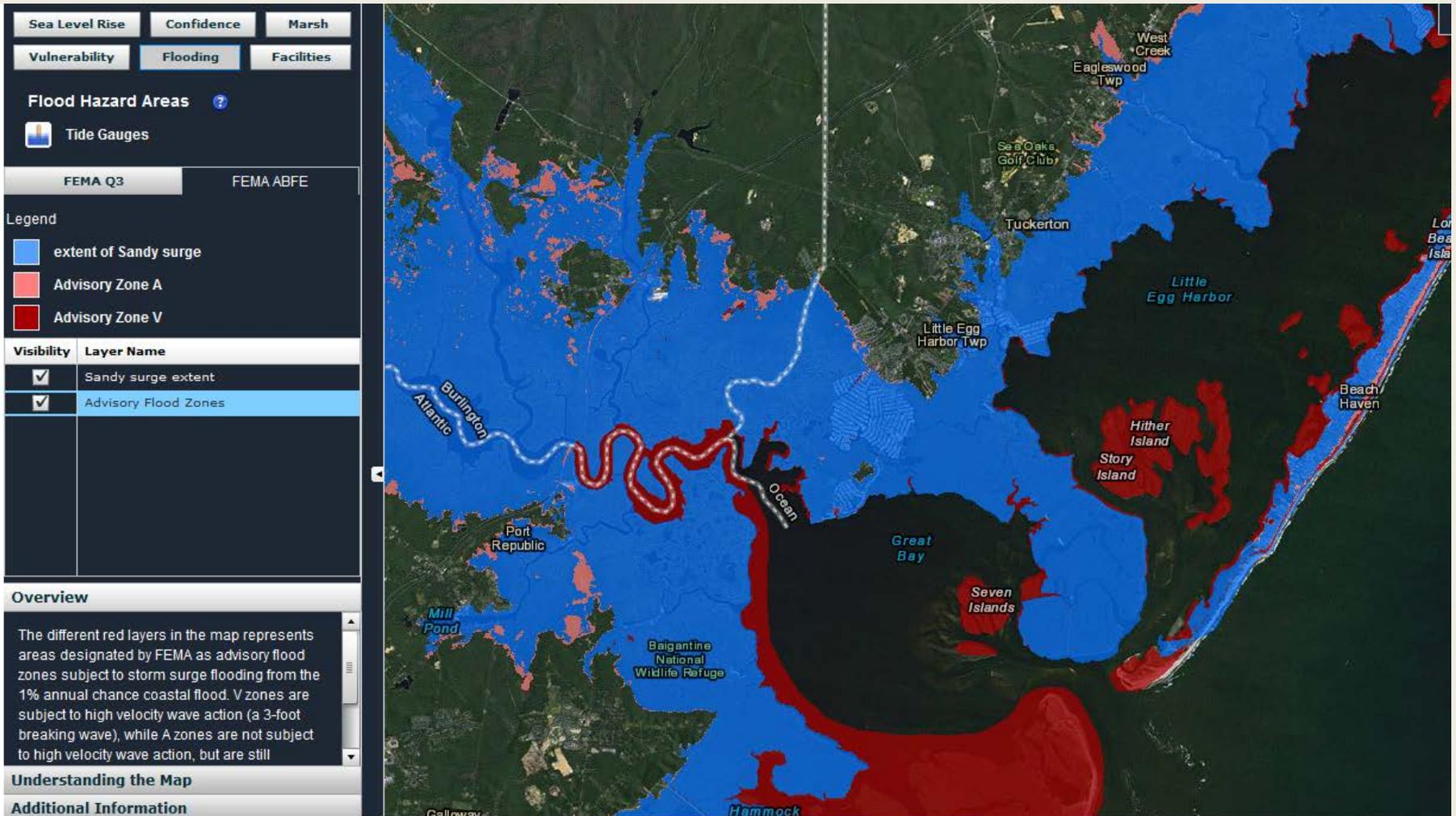
# Flood Hazard Areas



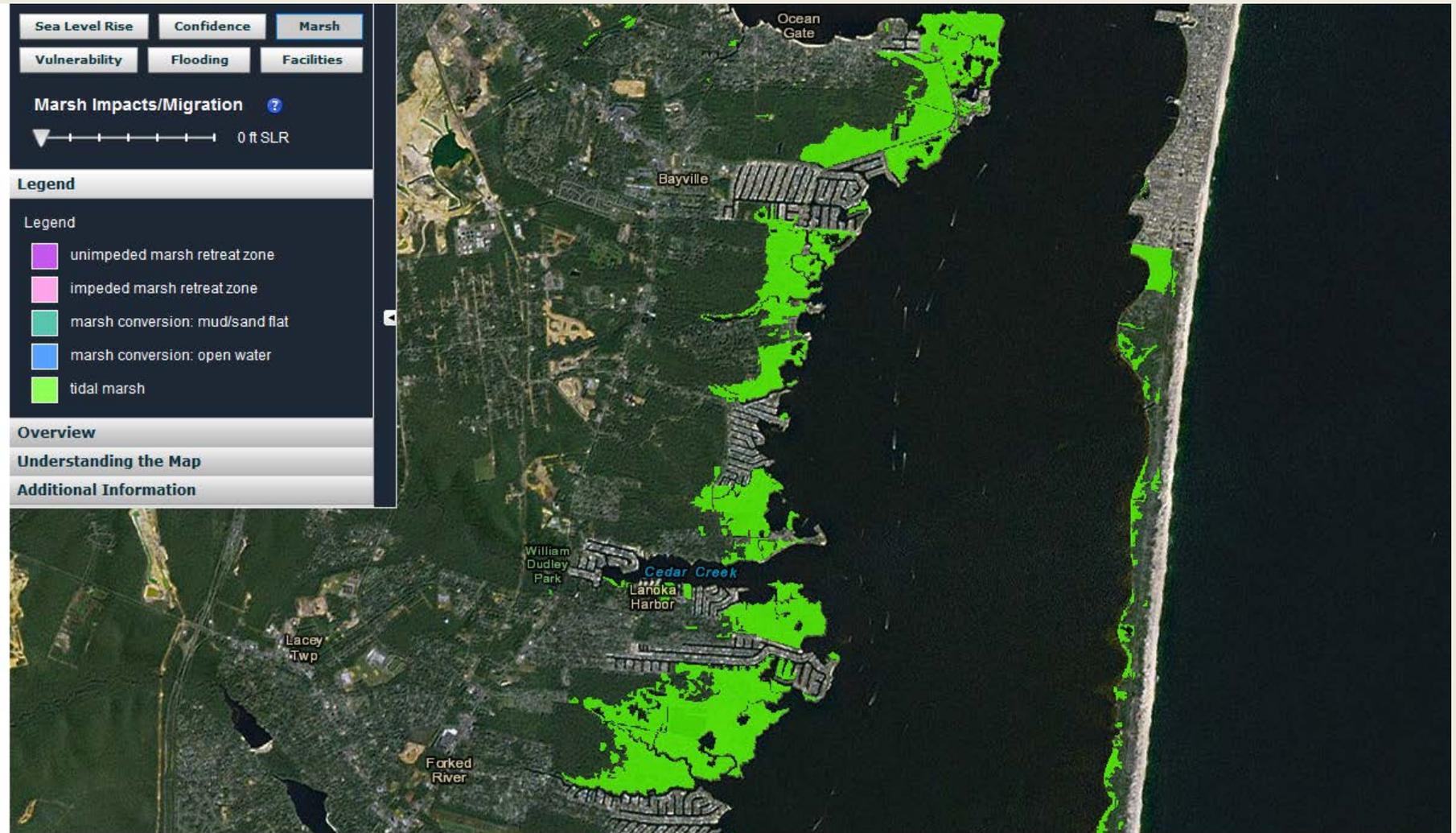
# Flood Hazard Areas



# Flood Hazard Areas



# Marsh Migration



# Marsh Migration

Sea Level Rise   Confidence   **Marsh**

Vulnerability   Flooding   Facilities

Marsh Impacts/Migration ?

4 ft SLR

**Legend**

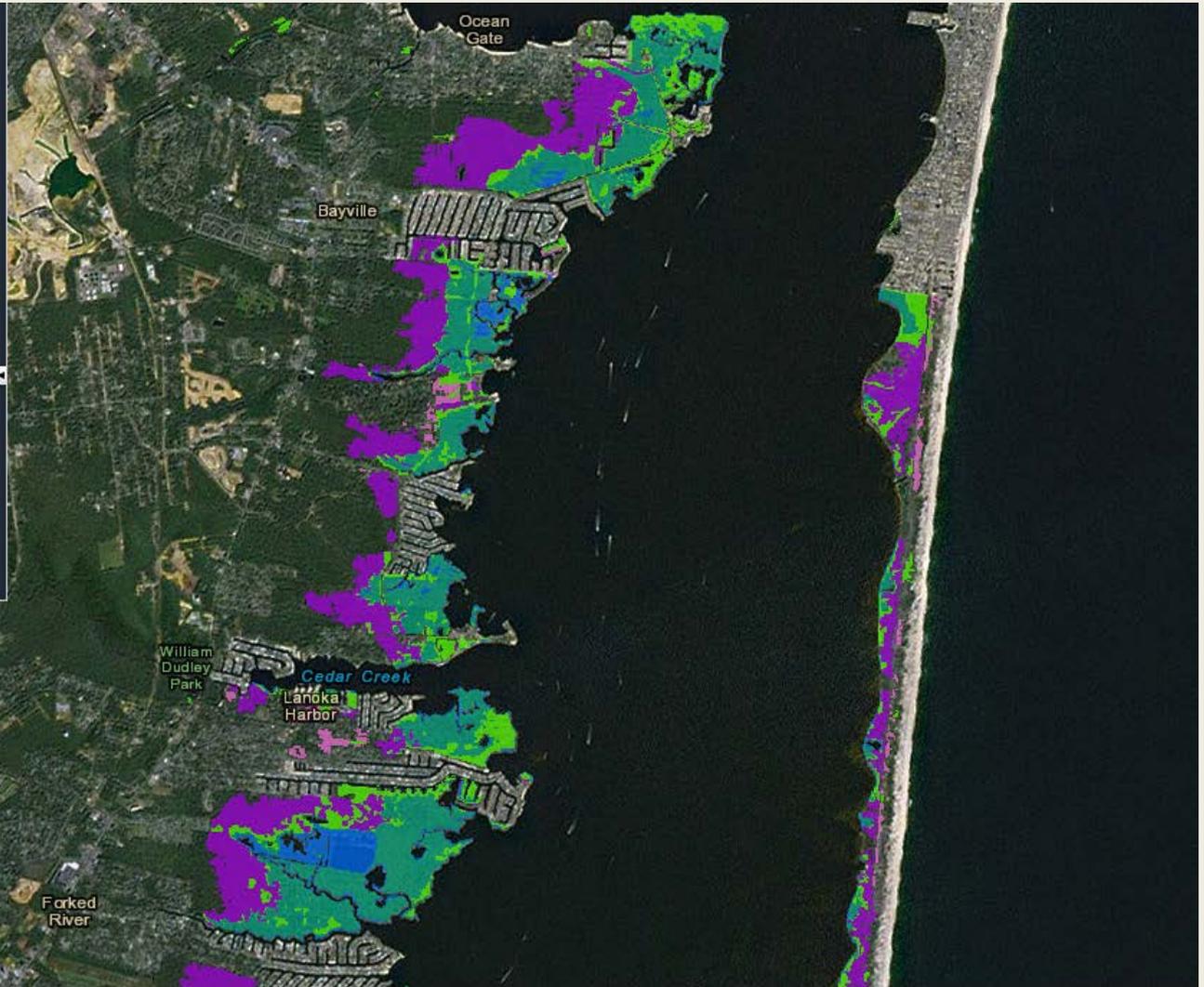
Legend

- unimpeded marsh retreat zone
- impeded marsh retreat zone
- marsh conversion: mud/sand flat
- marsh conversion: open water
- tidal marsh

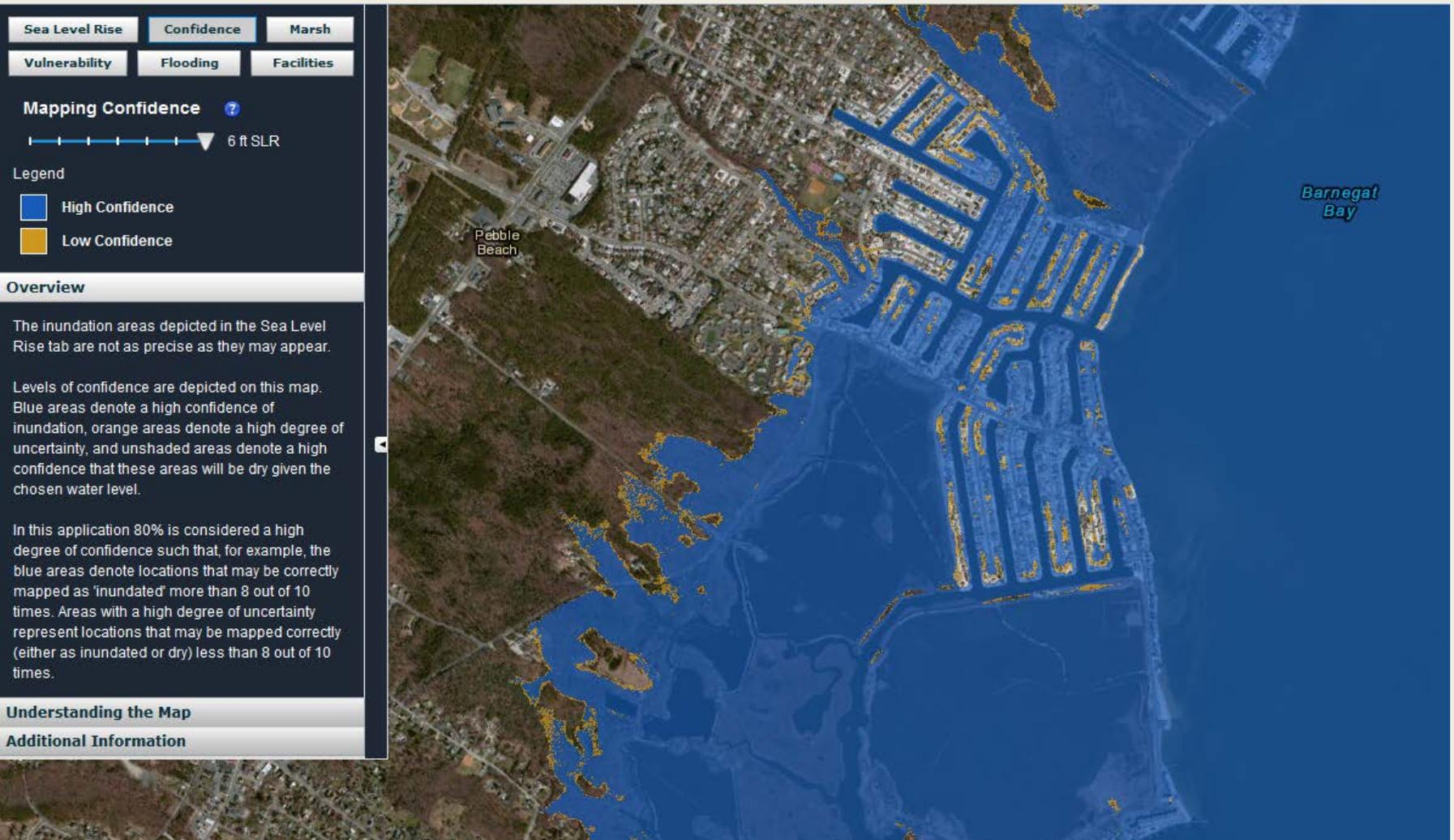
**Overview**

**Understanding the Map**

**Additional Information**



# Mapping Confidence





# Getting to Resilience

## A Community Planning Evaluation Tool

This online self assessment process is a tool to assist communities to reduce vulnerability and increase preparedness by linking planning, mitigation, and adaptation. Through this assessment you will find out how your preparedness can be worth valuable points through FEMA's Community Rating System and Sustainable Jersey.

Plan for your community's future in the face of climate change [Get Started Now](#)

### HOW DO I GET TO RESILIENCE?

Enabling communities to be prepared and more resilient.

- 1 Map Flood Vulnerability**  
 This user-friendly online flood mapper will help you better visualize your community's susceptibility to flooding and sea level rise.
- 2 Assemble Municipal Plans**  
 The Community Plan Checklist includes a list of municipal and county documents that may assist you in the completing your evaluation.
- 3 Complete the Evaluation**  
 Identify planning, mitigation, and adaptation opportunities to reduce vulnerability to flooding and sea level rise and build capacity for community resilience.



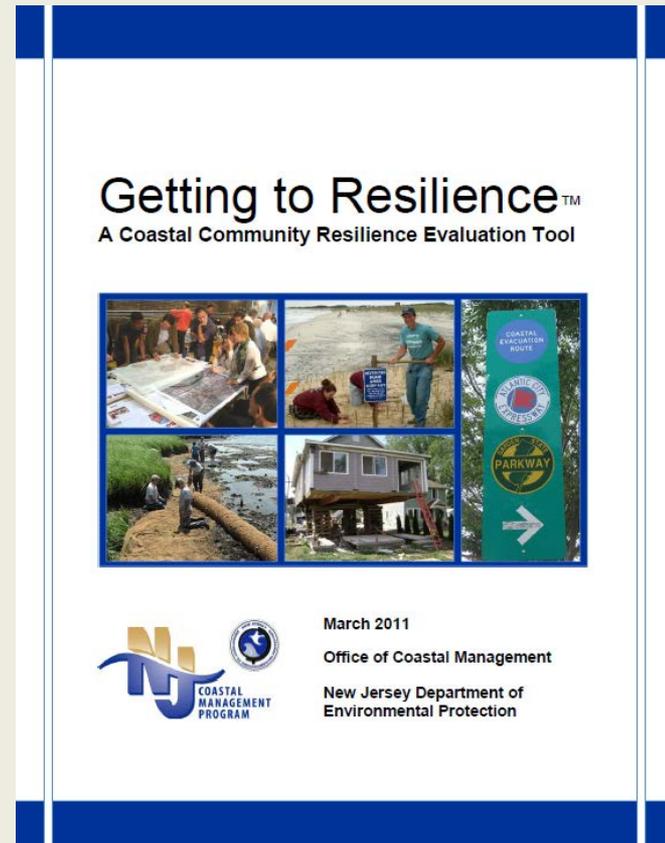
- 4 Discover Links with Other Municipal Programs**  
 This tool will help you identify connections between preparedness and programs like FEMA's Community Rating System, Hazard Mitigation Planning and Sustainable Jersey.
- Explore Related Resources**  
 Additional tools and best management practices that will help you with vulnerability assessments, outreach, integrated planning, storm preparedness and mitigation.



Plan for the Future

# Background on the Tool

- Originally a Paper Document meant to be facilitated.
- Linkages added with FEMA's CRS, hazards Mitigation Planning and Sustainable Jersey.



# [www.PrepareYourCommunityNJ.org](http://www.PrepareYourCommunityNJ.org)



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[Home](#) [Climate Change](#) [Linkages](#) [FAQ](#) [Tutorials](#) [Flood Mapper](#) [Contact](#)

## Getting to Resilience

A Community Planning Evaluation Tool

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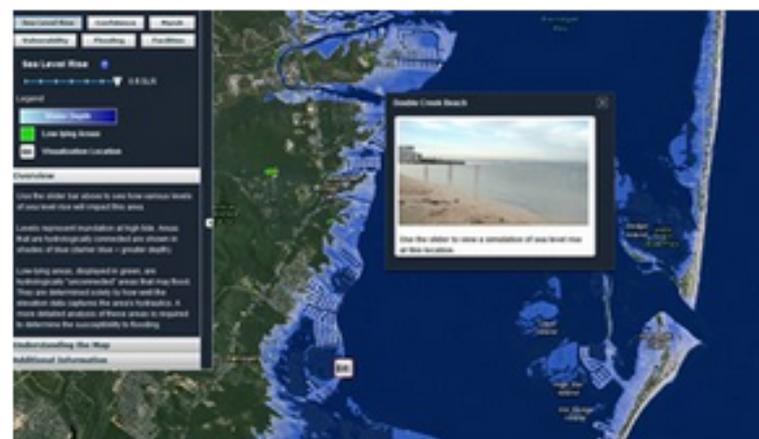
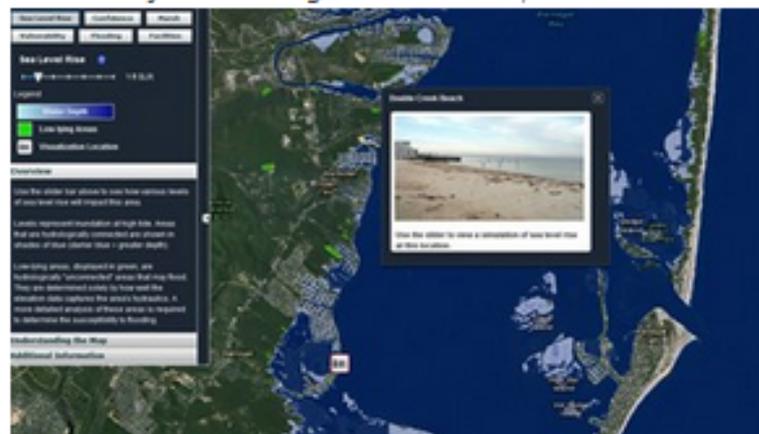
# Using the NJFloodMapper to Understand your Current and Future Risk

In order to answer the evaluation questions posed by the Getting to Resilience you are going to have to know your current and future risk and hazards from flooding. The [NJFloodMapper](#) is sea level rise and flood mapping website that visualizes different inundation scenarios and overlays additional data layers including critical facilities, evacuation routes, FEMA flood maps (regulatory and Advisory Base Flood Elevation Maps) and the extent of inundation from Super Storm Sandy. The site is further enhanced with on-the-ground photo visualizations of inundation impacts at iconic Jersey Shore locations.

Additional data layers to explore include social and economic vulnerability, the potential for marsh migration and percentage of confidence in sea level rise risks.

The [NJFloodMapper](#) uses a Google Maps platform so it is a user friendly tool to help communities visualize their risks. You can print your maps or share your maps electronically using the "share" button.

Explore the website at: [NJFloodMapper.org](http://NJFloodMapper.org)



# Assemble Municipal Plans

Plans, Ordinances, and Codes	Yes	No	Adoption Year	Update Frequency
Municipal Master Plan				
All-Hazards Mitigation Plan				
Floodplain Management Plan				
Evacuation Plan				
Emergency Response Plan				
Continuity of Operations Plan				
Disaster Recovery Plan				
Post-Disaster Recovery Plan				
Capital Improvements Plan				
Economic Development Plan/Strategy				
Coastal Plan or Element				
Shoreline Restoration Plan				
Open Space Plan				
Stormwater Management Plan				

## Create Account

Select a Username

Enter your Email Address

Choose your Password

Confirm your Password

Create Account

SURVEYS

Getting to Resilience JC NERR  
Test »



## My Account

### Account Details

Username

First name

Last name

Email address

### Contact Information

Organization name

Title

Phone

Mobile

Address line 1

Address line 2

City name

## Getting to Resilience JC NERR Test

A Community Planning Evaluation Tool

### Section 1: Risk & Vulnerability Assessments

While the entire New Jersey shore is vulnerable to coastal hazards, the likelihood and severity of these hazards varies depending upon a community's geography and the integrity of its natural buffers. Risk and vulnerability assessments can inform municipal officials of vulnerable populations, businesses, infrastructure, and natural resources. They can also reveal the best location for future development or land acquisition. Simply identifying the risks and vulnerabilities within one's community often builds the knowledge and capacity for hazard avoidance and mitigation.

Question	Yes	No	N/A	Clear
1.1 Are previous coastal hazards and disasters identified and mapped through historical information, existing plans and reports, scientific knowledge, and local knowledge?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="button" value="x"/>
1.2 Are hazard probability, frequency, magnitude, and duration defined?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="button" value="x"/>
1.3 Is coastal erosion and/or shoreline change identified as a hazard?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="button" value="x"/>
1.4 Is sea level rise identified as a hazard?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="button" value="x"/>
1.5 Are historic rates of sea level defined?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="button" value="x"/>
1.6 Are conditions defined that could amplify the impact of a hazard, like storm surge inundation at high tide or erosion rates on stabilized shorelines?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="button" value="x"/>
1.7 Are maps used to define the spatial extent of coastal hazards?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="button" value="x"/>

#### SURVEY SECTIONS

**Section 1: Risk & Vulnerability Assessments**

Section 2: Public Engagement

Section 3: Planning Integration

Section 4: Disaster Preparedness and Recovery

Section 5: Hazard Mitigation Implementation

#### LINKAGES

See your links to other programs

# Linkages with other Municipal Programs

Planning for the future and being prepared is always a good practice for municipalities. It is even better when those preparations can reward your community. Through this online questionnaire, you will find out how your preparedness can be worth valuable points through FEMA's Community Rating System (CRS) and Sustainable Jersey. Also, the outputs provided at the completion of the questionnaire can strengthen local/county all-hazards and emergency operations plans. Ultimately being prepared will save lives and money.

You can find out more about these programs below:



The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements.

As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS:

1. Reduce flood damage to insurable property;
2. Strengthen and support the insurance aspects of the NFIP, and
3. Encourage a comprehensive approach to floodplain management.



Sustainable Jersey is a certification program for municipalities in New Jersey that want to go green, save money, and take steps to sustain their quality of life over the long term.



Mitigation Plans form the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. The planning process is as important as the plan itself. It creates a framework for risk-based decision making to reduce damages to lives, property, and the economy from future disasters. Hazard mitigation is sustained action taken to reduce or eliminate long-term risk to people and

## Getting to Resilience JC NERR Test

A Community Planning Evaluation Tool

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1.7 Are maps used to define the spatial extent of coastal hazards?

#### SURVEY SECTIONS

Section 1: Risk & Vulnerability Assessments

Section 2: Public Engagement

Section 3: Planning Integration

Section 4: Disaster Preparedness and Recovery

Section 5: Hazard Mitigation Implementation

#### LINKAGES

See your links to other programs

## Section 1: Risk & Vulnerability Assessments

### 1.1 Are previous coastal hazards and disasters identified and mapped through historical information, existing plans and reports, scientific knowledge, and local knowledge?

#### CRS Suggestions

Section 410 of FEMA's Community Rating System offers points for communities conducting a flood study; it must map and regulate areas of special flood related hazards. Mapping previous coastal hazards through examining historical information, existing plans and reports, and scientific/local knowledge can be included in this type of study.

*CRS points : 460*

#### Hazard Mitigation Suggestions

A Hazard Mitigation Plan in development should include the identification and mapping of previous coastal hazards and disasters, through historical information, existing plans and reports, scientific knowledge, and local knowledge. An existing plan, if lacking, can include this element when updating the plan.

---

### 1.2 Are hazard probability, frequency, magnitude, and duration defined?

#### Things to Consider

Defining the probability, frequency, magnitude and duration of coastal hazards can be included in the development or update of the community's Hazard Mitigation Plan.

---

### 1.3 Is coastal erosion and/or shoreline change identified as a hazard?

#### Inland Suggestions

Inland communities should consider the identification of other climate-change related hazards; such as flash flooding, stream bank erosion/destabilization, etc.; as important elements to include in the development or update of the community's Hazard Mitigation Plan.

#### Hazard Mitigation Suggestions

The identification of erosion and/or shoreline change as a hazard for coastal communities can be included in the development or update of the community's Hazard Mitigation Plan.

## LINKAGES RESULTS

Section 1: Risk & Vulnerability Assessments

Section 2: Public Engagement

Section 3: Planning Integration

Section 4: Disaster Preparedness and Recovery

Section 5: Hazard Mitigation Implementation

---

## SURVEY

[Return to Survey](#)

# Suggestions

Getting to Resilience1

## Section 1: Risk & Vulnerability Assessments

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### 1.2 Are hazard probability, frequency, magnitude, and duration defined?

Filter Suggestions by ▾

Full Report

Things to Consider

CRS Suggestions

Sustainable Jersey Suggestions

Hazard Mitigation Suggestions

Inland Suggestions

Section 4: Disaster  
Preparedness and Recovery

Section 3: Planning Integration

Section 5: Hazard Mitigation  
Implementation

---

SURVEY

Return to Survey

---

COLLABORATORS

Christine Lynn

Martha Doyle

kevin hassell

# Related Resources

## Tools and Best Management Practices

The questionnaire refers to numerous ways to improve coastal community resilience by completing a risk and vulnerability assessment, providing public outreach, integrating existing planning efforts, preparing and responding to coastal storms, and mitigating vulnerabilities within your community. The following are a handful of the tools and best management practices being utilized throughout the country. Take this opportunity to explore these tools and identify how to incorporate them into your municipal efforts. If you are a New Jersey community with a municipal tool or best management practice targeted to improve coastal resilience, please contact Lisa Auermuller (Jacques Cousteau National Estuarine Research Reserve) at [auermull@marine.rutgers.edu](mailto:auermull@marine.rutgers.edu), or Martha Maxwell-Doyle (Barnegat Bay Partnership) at [mmdoyle@ocean.edu](mailto:mmdoyle@ocean.edu) or Dorina Frizzera (Consultant) at [dfrizzera@icloud.com](mailto:dfrizzera@icloud.com). We are looking for local initiatives to share with other coastal communities.

## Risk and Vulnerability Assessments

- HAZUS-MH
  - Software: <http://www.fema.gov/plan/prevent/hazus/>
  - Training: [http://www.fema.gov/plan/prevent/hazus/hz\\_trngconf.shtm#3](http://www.fema.gov/plan/prevent/hazus/hz_trngconf.shtm#3)
- SLOSH
  - Website: <http://www.nhc.noaa.gov/HAW2/english/surge/slosh.shtml>
  - Obtain Access to GIS Data: <http://slosh.nws.noaa.gov/sloshPub/disclaim.php>
- NOAA Coastal Inundation Training: <http://www.csc.noaa.gov/digitalcoast/training/inundationmap.html>
- Coastal GIS Training: <http://www.csc.noaa.gov/digitalcoast/training/index.html>
- Coastal Community Vulnerability Assessment and Mapping Protocol: <http://www.nj.gov/dep/cmp/docs/ccvamp-final.pdf>

## Public Outreach and Engagement

- Public Participatory Mapping: [http://www.csc.noaa.gov/cms/human\\_dimensions/participatory\\_mapping.pdf](http://www.csc.noaa.gov/cms/human_dimensions/participatory_mapping.pdf)
- Register Ready: <https://www13.state.nj.us/SpecialNeeds/>
- Flood Signage
  - High Water Mark Signs: [http://www.weather.gov/os/water/high\\_water/](http://www.weather.gov/os/water/high_water/)
  - Storm Surge Height Signs: <http://www.hillsboroughcounty.org/pgm/hazardmit/stormsurge/>
- Storm Ready
  - National Weather Service: <http://www.stormready.noaa.gov/>
- Storm Preparedness

## RELATED RESOURCES NAVIGATION

Risk and Vulnerability  
Assessments

Public Outreach and  
Engagement

Planning Integration

Disaster Preparedness and  
Recovery

Hazard Mitigation  
Implementation

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# Ocean County HMP

Search this site

## Navigation

Welcome to the Ocean County  
2013 Hazard Mitigation Plan  
Project Website

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[What is Hazard Mitigation?](#)

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[Project Calendar](#)

[Project Partners](#)

[Project Documents](#)

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[Ocean County Online](#)

## Hazard Mitigation Links

[FEMA Mitigation Home Page](#)

[FEMA Mitigation Planning  
Home Page](#)

[FEMA Mitigation Grants Home  
Page](#)

[New Jersey Office of  
Emergency Management Home  
Page](#)

[New Jersey Department of  
Environmental Protection  
Home Page](#)

Welcome to the Ocean County 2013 Hazard Mitigation Plan Project Website



Implement  
and Adapt



**RUTGERS**  
Institute of Marine  
and Coastal Sciences

# The “Jersey Girls”



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