



## FROM TIDES TO STORMS: PREPARING FOR NEW HAMPSHIRE'S FUTURE COAST

*Seabrook - Hampton Falls - Hampton - North Hampton - Rye -  
New Castle - Portsmouth*


Assessing the Risk and Vulnerability of NH Coastal  
Communities to Sea Level Rise and Storm Surge

# Tides to Storms






This project is funded by New Hampshire Homeland Security and  
Emergency Management (HSEM) through a Pre-Disaster  
Mitigation Grant from the Federal Emergency  
Management Agency (FEMA)



### FROM TIDES TO STORMS: PREPARING FOR NEW HAMPSHIRE'S FUTURE

## GOALS

- ✓ Assist coastal communities to evaluate risk and vulnerability to flooding from sea level rise and storm surge.
- ✓ Plan for projected future impacts from sea level rise and storm surge to NH's coastal resources and assets.





FROM TIDES TO STORMS:  
PREPARING FOR NEW HAMPSHIRE'S FUTURE

## Hazard Mitigation Plans

# Why?

Goal to reduce loss and damage of  
public and private assets and resources

Long-term plan for sustainable,  
disaster-resilient communities

An approved HMP is required  
for municipalities to be  
eligible for disaster relief  
funds and PDM grants.

Incorporate  
current and future  
conditions and  
vulnerability.

Updated every  
5 years.

Dedicated  
funding source  
to update.



FROM TIDES TO STORMS:  
PREPARING FOR NEW HAMPSHIRE'S FUTURE

## Hazard Mitigation Plans



**NEW!**



## Climate Change Chapter

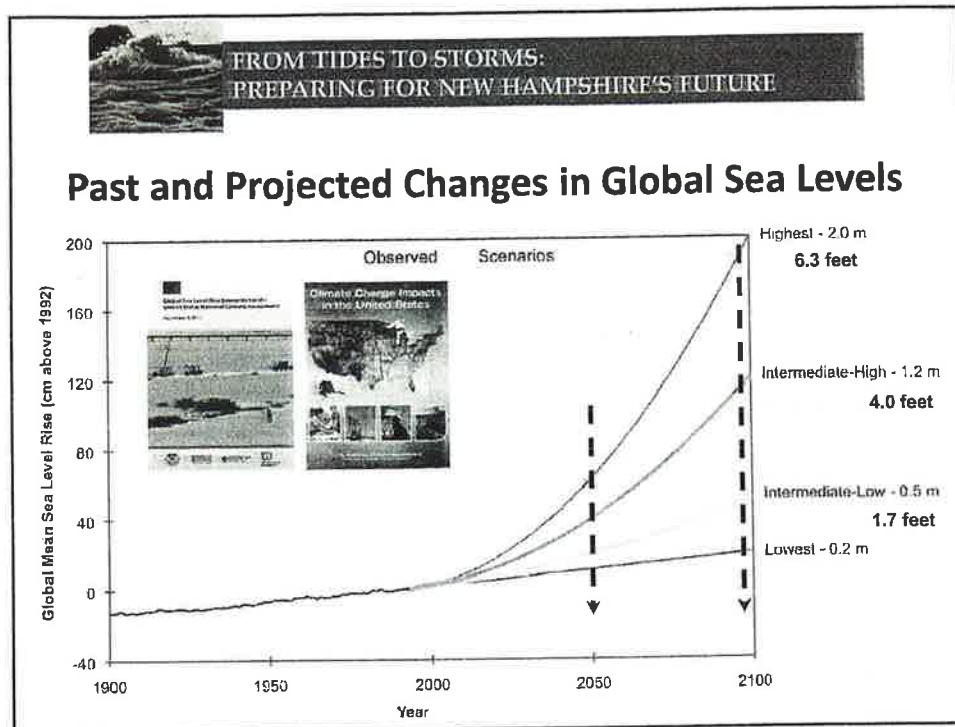


2009 PREP King Tide Photo Contest: Nicole Fel'Dotto

Vulnerability of flooding from future sea level  
rise and coastal storm surge


Maps, statistical data and local knowledge

Recommendations >>> action plan



**FROM TIDES TO STORMS:  
PREPARING FOR NEW HAMPSHIRE'S FUTURE**

## OBJECTIVES



- **Identify** Impacts - maps of assets and resources
- **Quantify** Extent of Impacts - statistical analysis by town
- **Evaluate** Impacts - vulnerability and risk
- Recommend **actions** toward resiliency, long-term, iterative adaptation
- **Communicate findings** to regional and local stakeholders



## FROM TIDES TO STORMS: PREPARING FOR NEW HAMPSHIRE'S FUTURE

### Mapping + Analyses

#### Infrastructure & Utilities

Roads / Highways  
Water / Wastewater  
Wells (public)  
Utilities (electric, gas, telecom)  
Bridges / Culverts / Dams  
Historic & Cultural Landmarks / Structures

#### Critical Facilities

Emergency Shelters  
Emergency Services  
Evacuation Routes  
Hospitals / Healthcare Centers  
High Risk Areas  
Populations

#### Natural Resources

Surfaces Water  
Aquifers / Well Protection Areas  
Wetlands (freshwater, tidal)  
Wildlife Habitat  
Conservation Areas / Lands  
Agricultural Soils  
State and Municipal Parks

#### Transportation

Roads / Highways  
Bridges  
Transit Routes & Facilities  
Bike Paths  
Long Range Plan projects  
Ports / Harbors  
Marinas



## FROM TIDES TO STORMS: PREPARING FOR NEW HAMPSHIRE'S FUTURE

### Outcomes and Priorities

#### Regional Collaborative Approaches

- Management of regional assets
- State/public resource management
- Coordinated actions (federal, state, local)
- NH Coastal Risks & Hazards Commission

#### Municipal Priorities

- Unique conditions and assets
- Level of impact – what, where and when
- Capacity to act
- Political and public support





# FROM TIDES TO STORMS: PREPARING FOR NEW HAMPSHIRE'S FUTURE COAST

Assessing Risk and Vulnerability of Coastal Communities  
to Sea Level Rise and Storm Surge

*Seabrook - Hampton Falls – Hampton - North Hampton – Rye - New Castle - Portsmouth*

Rockingham Planning Commission – with support from the NH Coastal Adaptation Workgroup – will work closely with coastal communities over the next 2 years to evaluate their risk and vulnerability to flooding from sea level rise and storm surge, and identify practical approaches to protecting municipal and private assets, public safety and natural resources.



*Increased flooding has the potential to place coastal populations at risk, threaten infrastructure, intensify coastal hazards and ultimately damage homes, businesses, public infrastructure, recreation areas, public space, coastal wetlands and salt marsh.*



## PROJECT COMPONENTS

The project will provide the following products to coastal NH communities:

- **Maps and Data**  
Detailed maps, risk and impact analyses, mitigation strategies, and recommendations for municipal Hazard Mitigation Plans.
- **Informational Materials**  
Informational outreach materials and tools to help plan future actions and inform public and private investments.
- **Coastal Vulnerability Assessment**  
A regional-scale vulnerability assessment report and map set for NH coastal communities.
- **Town-specific Vulnerability Assessment Summary**  
A report for each community summarizing the impacts of climate change on land, natural resources and infrastructure based on projections of future of sea level rise and storm surge.



This project is funded by New Hampshire Homeland Security and Emergency Management (HSEM) through a Pre-Disaster Mitigation Grant from the Federal Emergency Management Agency (FEMA).



New Hampshire coastal municipalities are confronted by land use and hazard management concerns that include extreme weather events, storm surges, flooding, coastal erosion, and damage to key coastal habitats. These issues are only intensified by recent increases in the frequency and intensity of extreme storm events and increases in sea level.

## How will the vulnerability assessment benefit my community?

The project is intended to assist coastal NH communities to take actions to prepare for increase flood risk, including:

- Enhance preparedness and raise community awareness of future flood risks.
- Identify cost-effective measures to protect and adapt to changing conditions.
- Improve resiliency of infrastructure, buildings and investments.
- Protect life, property and local economies
- Protect services that natural systems provide
- Preserve unique community character



## Overview of the Project Elements and Proposed Timeline

Through Fall 2015, Rockingham Planning Commission staff will meet with towns to discuss the goals of the project, collect local data, identify local priorities and issues of concerns, and prepare detailed maps, risk and impact analyses, mitigation strategies, and recommendations for their Hazard Mitigation Plans.

<b>November 6, 2013</b>	<b>Kick-off Meeting with coastal communities and regional stakeholders</b>
<b>Winter 2015</b>	<b>Presentation of and discussion of draft coastal vulnerability assessment with coastal communities and regional stakeholders.</b>
<b>Winter 2015</b>	<b>Presentation of final coastal vulnerability assessment report and maps to coastal communities and regional stakeholders .</b>
<b>Winter 2015 – Fall 2015</b>	<b>Meetings to evaluate assessment results and maps with Emergency Management Director, Town Administrator/Manager, Elected Officials, Staff, Planning Board and Conservation Commission in each town. Preparation of climate change chapters for town Hazard Mitigation Plans.</b>
<b>Fall 2015</b>	<b>Final informational meeting to present the results of the Coastal Assessment and Hazard Mitigation Planning project to community and regional stakeholders</b>



### For more information:

Julie LaBranche  
[jlabranche@rpc-nh.org](mailto:jlabranche@rpc-nh.org)

156 Water Street  
Exeter, NH 03833  
603-778-0885

ROCKINGHAM  
PLANNING  
COMMISSION



# FROM TIDES TO STORMS: PREPARING FOR NEW HAMPSHIRE'S FUTURE COAST

## VULNERABILITY ASSESSMENT: Identifying Impacts and Opportunities for Climate Adaptation

*Seabrook - Hampton Falls – Hampton - North Hampton – Rye - New Castle - Portsmouth*

As a coastal state, New Hampshire's economy and quality of life have historically been linked to its shores, its vast expanses of productive saltmarshes and sandy beaches. Accounting for changes in sea level that may be expected to occur over the lifetime of infrastructure will help lead to informed decisions for public and private investments by minimizing risk and potential for damage.

### ***What is a Vulnerability Assessment?***

A vulnerability assessment is a method and framework to measure the effects of flooding from sea level rise and storm surge on built structures (public and private), human populations and natural environments. Factors that influence vulnerability include development patterns, the surrounding physical environment and landforms, the distribution of resources, and existing or future conditions. Measurements include:

- inland extent of flooding and its depth
- acres of saltmarsh, forests and undeveloped lands flooded
- key roads, drainage structures and municipal facilities flooded
- changes in impacts between estimated flood scenarios (considers changes in flooding over time)

The assessment information is commonly displayed on maps that reference local landmarks, roads and features and summarized in a report, using narrative, graphic illustrations and statistical data.



### ***How Do Changes in Flooding Affect the Land?***

An increased storm surge height, combined with coastal erosion and loss of saltmarsh, can cause increased flood depths in already flood-prone areas. It may also cause flooding in areas further inland that have not previously been flood-prone.

Salt marsh, sand dunes and sand beaches provide natural protection against floods and storm surge.

### ***How is the Vulnerability Assessment Used?***

Using information from a vulnerability assessment can help guide common sense solutions, strategies and recommendations for local governments, businesses, and citizens to enable them to adopt programs, policies, business practices and make informed decisions.

Planning for the long-term effects of sea level rise may also help communities better prepare in the short-term for periodic flooding from severe coastal storms.



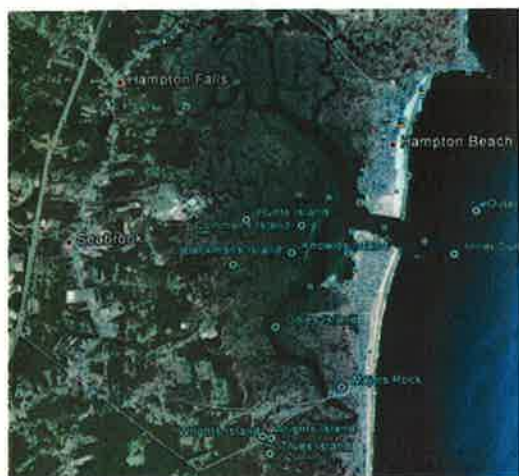
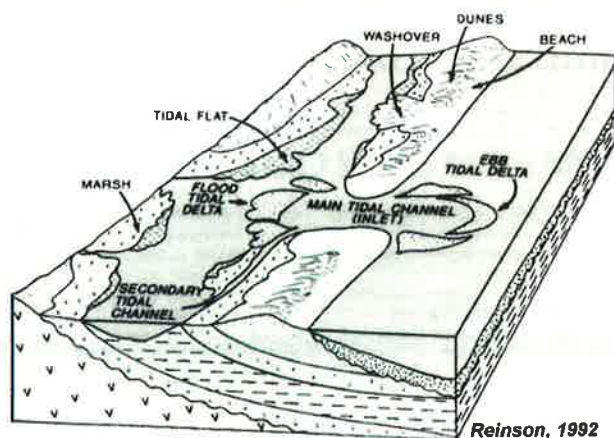
This project is funded by New Hampshire Homeland Security and Emergency Management (HSEM) through a Pre-Disaster Mitigation Grant from the Federal Emergency Management Agency (FEMA).



156 Water Street  
Exeter, NH 03833  
Ph: (603) 778-0885

Our New Hampshire coast is made up of two different types: the southern area is a “barrier beach systems” while northern area has rocky shores with small sandy cove beaches and tidal creeks that flow far inland from the sea.

### ***What is a barrier beach system?***



***Photo of the Hampton-Seabrook Estuary***

Because of their landforms and average elevation, Hampton and Seabrook beaches are particularly vulnerable to the effects of rising sea levels including loss of low-lying land and structures, saltwater intrusion into ground and surface waters, and increased coastal flooding from storm events.

### ***How does tidal action cause flooding inland?***

Tidal creek systems link saltwater and freshwater at the point where upland rain and runoff enters our local waterways and travels to the limit of tide where it mixes with saltwater. When severe rain storms occur at the same time as high tide or a coastal storm, the upland freshwater is prevented from draining out by the “pushing effect” of tidal/storm action. This situation can cause flooding far inland from the coast.



***Tidal channels of Witch Creek in Rye***

Small tidal creeks begin in upland areas and drain into larger creeks forming a network. The creeks increase in size until they join a tidal river, bay or harbor that ultimately connect to the coastal ocean. The upper regions or headwaters of tidal creeks are important habitat for many species and sensitive to changes in water levels, salinity and pollutants.

### ***Are some systems more vulnerable than others?***

How vulnerable a system is to sea level rise and storm surge can be evaluated by observing how sensitive it is to changes. By using computer simulations of high tide and different types of storms, measurements can be made to show at what flood height a saltmarsh, building or road becomes flooded. Here are two examples:

- Buildings and roads can be raised or moved.
- Natural systems – such as saltmarshes, freshwater wetlands or coastal forests - need to either move inland or change altogether growing new species of plants that can survive in response to deeper water, saltier water and stronger tidal action.