

# PREPARING FOR CLIMATE CHANGE IN RYE:

Gaining Insights and Charting a Course

Workshop #4 - August 27, 2014

## Tides to Storms:

# New Hampshire Coastal Vulnerability Assessment



**Julie LaBranche**

# Climate Change Resiliency + Adaptation

The background image shows a flooded highway with several trucks stuck in the water. In the distance, a bridge spans the water. The scene illustrates the impact of climate change on infrastructure.

**Resiliency:** Capacity to respond to changes in environmental conditions or disturbance by resisting damage and recovering quickly.

**Adaptation:** Deliberate and considered actions to avoid, manage, reduce or prevent impacts of a changing climate and to take advantage of the opportunities that such changes may create.

# Climate Change Resiliency + Adaptation

For every \$1 spent in anticipatory adaptation saves \$4 to repair/recover

Minimize/Prevent  
Vulnerability, Loss

Public Health  
and Safety

Control Costs -  
Proactive/Repair/Rebuild

CONTINUITY-DISRUPTION

ECOSYSTEM SERVICES

INVESTMENT

COMMUNITY

HISTORY



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

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

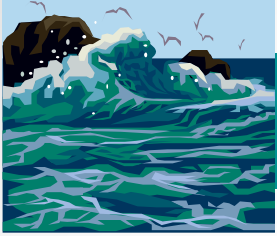
Assessing the Risk and Vulnerability of NH Coastal  
Communities to Sea Level Rise and Storm Surge

## 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)



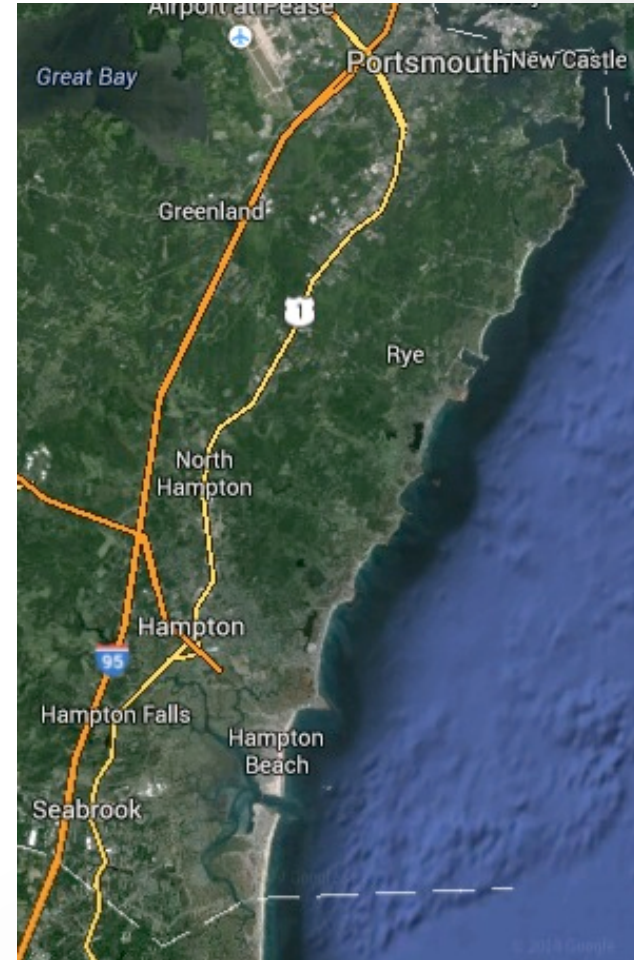


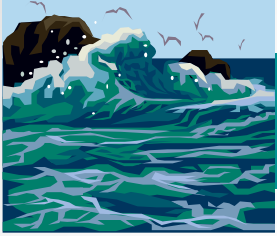
## FROM TIDES TO STORMS: PREPARING FOR NEW HAMPSHIRE'S FUTURE

### Project 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

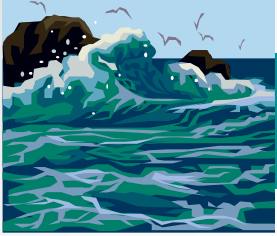
Long-term plan for sustainable, disaster-resilient communities

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.

Existing tool with multiple functions.



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

### Hazard Mitigation Plans



**NEW!**



### Climate Change Chapter

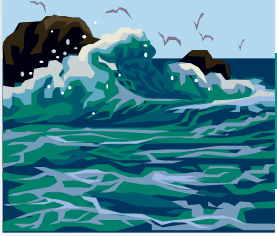


2009 PREP King Tide Photo Contest: Nicole Fel'Dotto

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

Maps, statistical data and local knowledge

Recommendations >>> action plan



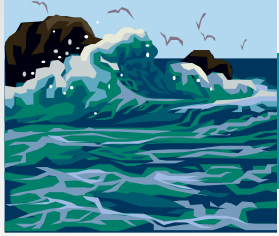
## FROM TIDES TO STORMS: PREPARING FOR NEW HAMPSHIRE'S FUTURE

# Project Objectives

- Identify **Location and Type** of Impacts
- **Quantify** the Extent of Impacts - statistical analysis for region and by town
- Evaluate Impacts – **vulnerability, risk**
- Recommend **actions** toward resiliency and long-term and iterative adaptation
- **Communicate findings** to regional and local stakeholders





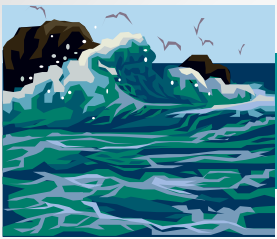


## FROM TIDES TO STORMS: PREPARING FOR NEW HAMPSHIRE'S FUTURE

# Outreach and Engagement

- Informational materials, project webpage, presentations
- Regional stakeholder meetings
- Meet with town officials, staff, boards/ commissions
- Invite business owners, residents
- Coordinate activities with NH CAW, other practitioners and in coastal regions





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

# COASTAL VULNERABILITY ASSESSMENT

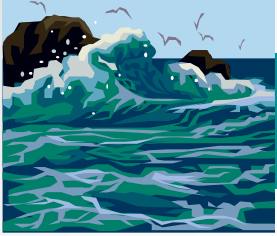
## Regional Collaborative Approaches

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

## Municipal Priorities

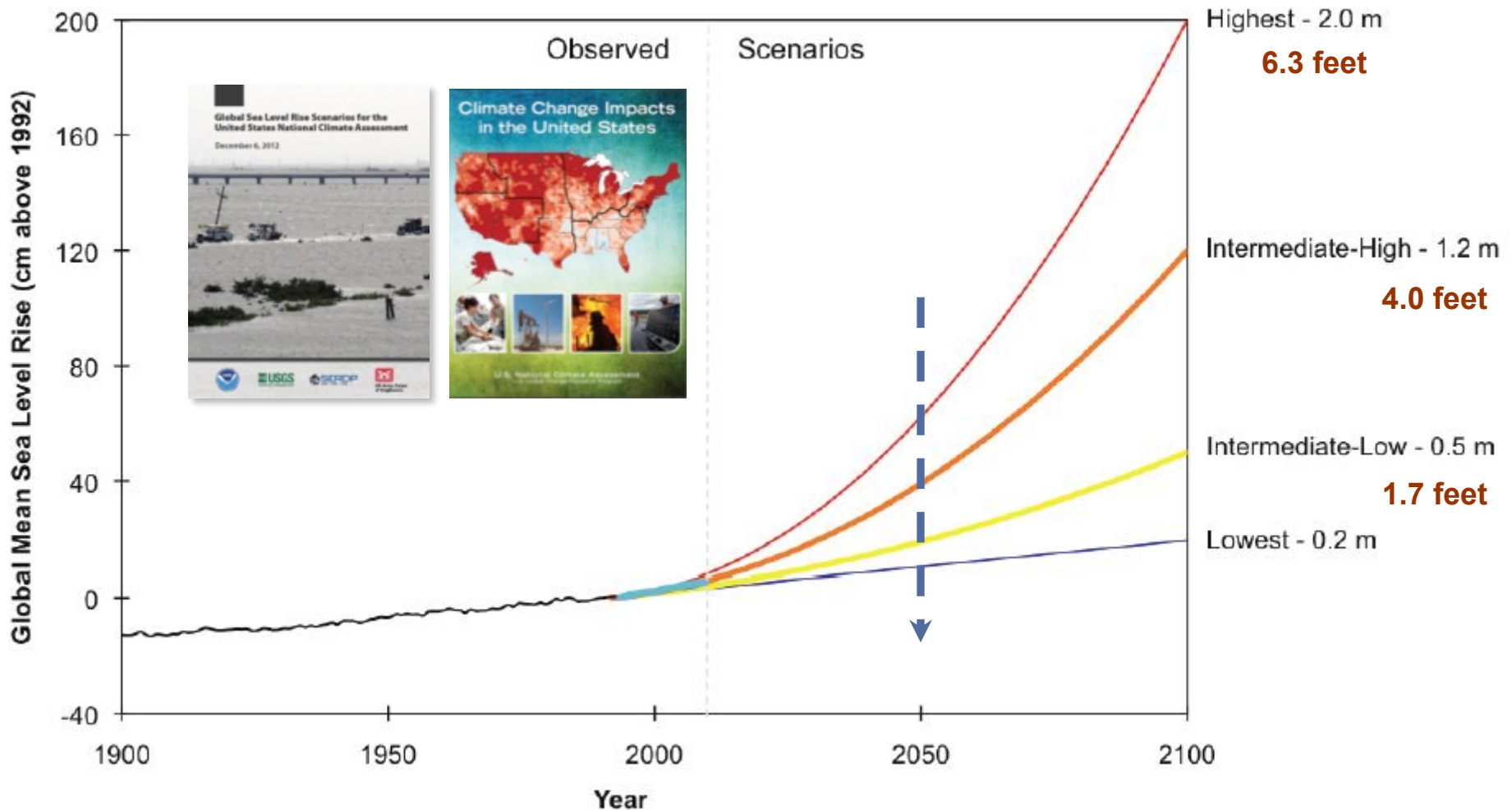
- Unique conditions and assets
- Level of impact – what, where and when
- Capacity to act
- Political and public support

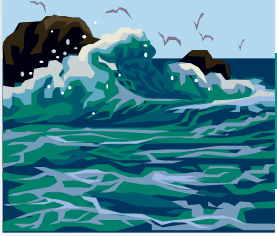




## FROM TIDES TO STORMS: PREPARING FOR NEW HAMPSHIRE'S FUTURE

### Past and Projected Changes in Global Sea Levels





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

# Mapping Flood Levels: Projected Sea Level Rise + Storm Surge

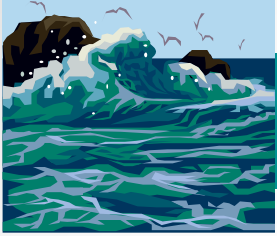
**Sea Level Rise  
at 2100**

+ 1.7 feet Intermediate Low scenario  
+ 4.0 feet Intermediate High scenario  
+ 6.6 feet Highest scenario

**Mean Higher High Water  
+  
Sea Level Rise**

**Mean Higher High Water  
+  
Sea Level Rise  
+  
100-year Coastal Storm Surge**





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

## Mapping + Analysis

### 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



**Flood Depths**

0 - 3 Feet
3 - 6 Feet
6 - 9 Feet
9 - 12 Feet
> 12 Feet

**Legend**

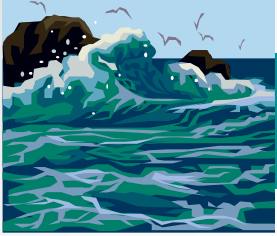
- Street Area Boundaries
- High Water Line
- Buildings Impacted
- Rail Tracks
- Portsmouth Boundary
- All Buildings

North  
Central  
South

Portsmouth Naval Shipyard  
Riverside Cemetery

Downtown Portsmouth, NH

# Downtown Portsmouth, NH



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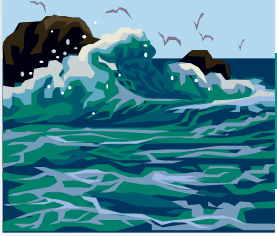
# Hazard Mitigation Plan - Climate Change Chapter

## Iterative Process

- Short- to long-term actions
- Periodic review and adjustment

## Adaptive Approaches

- Phased actions - accommodate, protect, retreat
- Reuse as conditions change
- Incorporate new technology and practices
- Consider multiple benefits of action
- Invest now or accept risk in future
- Defer until conditions warrant action



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

# Hazard Mitigation Plan - Climate Change Chapter

## Regulatory Strategies

- zoning, land development and subdivision regulations, building codes

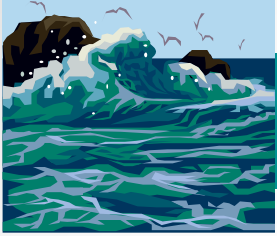
## Non-Regulatory Strategies

- buyouts/acquisition, land conservation, easements
- stewardship, public awareness and support
- collaboration with practitioners

## Policy and Plans

- Master Plan, open space plan, capital improvement plan, municipal budget (staff, equipment etc.)





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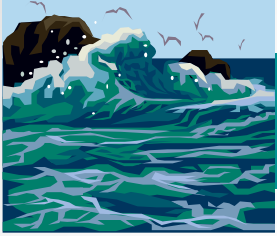
# Hazard Mitigation Plan - Climate Change Chapter

## Many sectors and interests at the table

- Emergency Management Team
- Municipal staff, land use boards, elected officials, other committees

## Ownership and Implementation

- Evaluate feasibility/impact, needs, timeframes
- Recommend strategies, actions
- Identify best mechanisms to implement
- Assign responsible party



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

# Municipal Audit



Evaluate policies, zoning, regulations and plans to *identify level of protection* for areas vulnerable to hazards and changes in climate

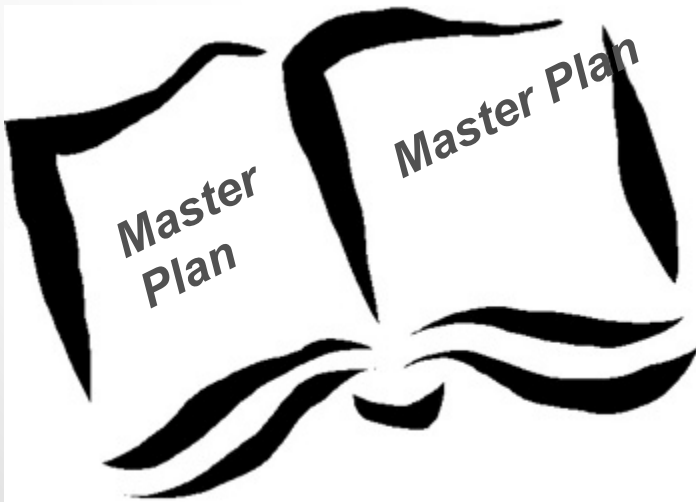
Link public investment, public safety and private development to *promote safe growth and resiliency* both before and after an event

# Non-Regulatory Approaches to Climate Change

## Master Plan

Establish broad goals for

- Public health and safety
- Adaptation/Resilience
- Environment/Resources
- Municipal Assets
- Protection of property



*Unpredictable future conditions*

*Importance of taking action despite uncertainty*



# Regulatory Approaches to Climate Change

## New Hampshire Enabling Statutes

RSA 672:1     Planning and Zoning –  
Declaration of Purpose

RSA 674:17    Purposes of Zoning  
Ordinances

RSA 674:2     Master Plan -  
Purpose and Description

RSA 674:21    Innovative Land Use Controls

“...set down as clearly and practically as possible the best and most appropriate future development ..., to aid .... in designing ordinances that result in preserving and enhancing the unique quality of life and culture of [NH], and to guide the board ... in a manner that achieves the principles of smart growth, sound planning, and wise resource protection.”



# Regulatory Approaches to Climate Change

## Zoning Ordinance

Floodplain Standards (NFIP)

Flood Hazard Overlay Districts

- land uses, development standards

Design-Performance Standards

- setbacks, building height, flood-proof designs

Environmental Protection

- shoreland standards



# Regulatory Approaches to Climate Change

## Site Plan and Subdivision Regulations

### Design-Performance Standards

- landscaping, impervious surface coverage, stormwater management, site design, road standards

### Open Space Preservation (i.e. high risk areas)

### Environmental Protection

- Water quality, habitat protection, recreation, flood storage, cultural and historical resources





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