

NEW HAMPSHIRE COASTAL RISK AND HAZARDS COMMISSION

Preparing New Hampshire for Projected Storm Surge, Sea-Level Rise, and Extreme Precipitation

Final Report Summary

[Presenter's Name]

[Presenter's Affiliation]

[Date]

[Meeting/Venue]



Coastal Risk and Hazards Commission



Clear & Focused Mission

Broad-based Membership

Sunset Date: December 1, 2016

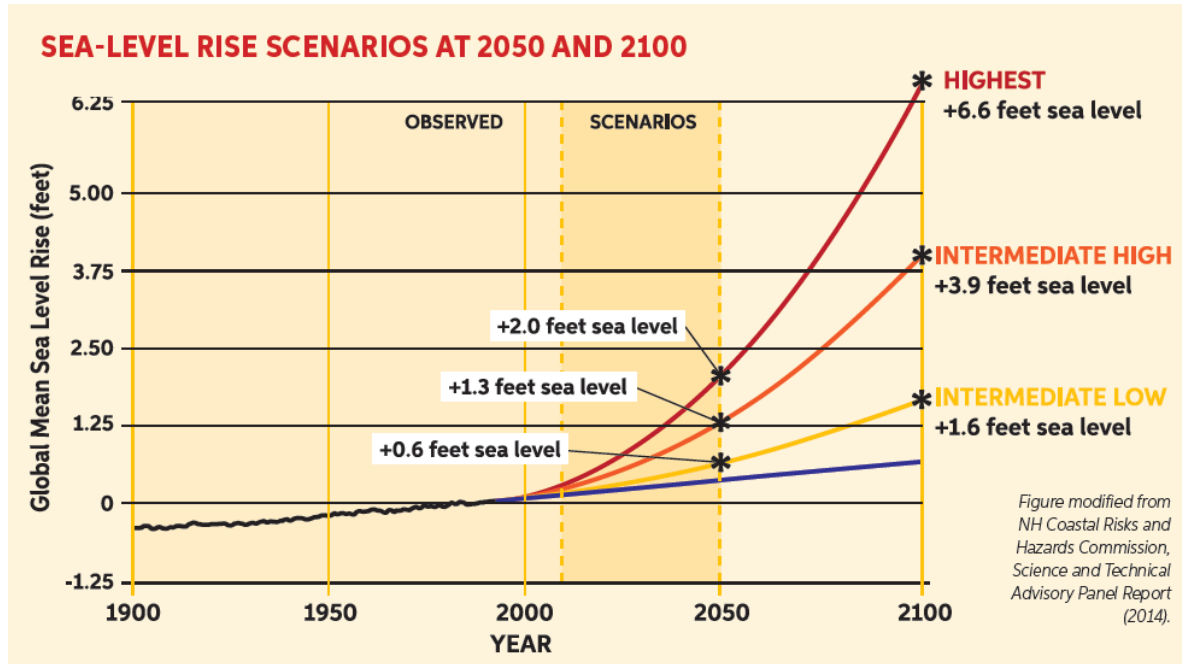
Photo credit: Maren Bhagat

Senate Bill 163 | 2013 | Chapter Law 188 (RSA 483-E)

Understanding What We're Facing

2014 Science and Technical Advisory Panel (STAP) Report

SEA-LEVEL RISE



PROJECTIONS

- ↑ 0.6 – 2.0 ft. by 2050
- ↑ 1.6 – 6.6 ft. by 2100

HOW TO PREPARE

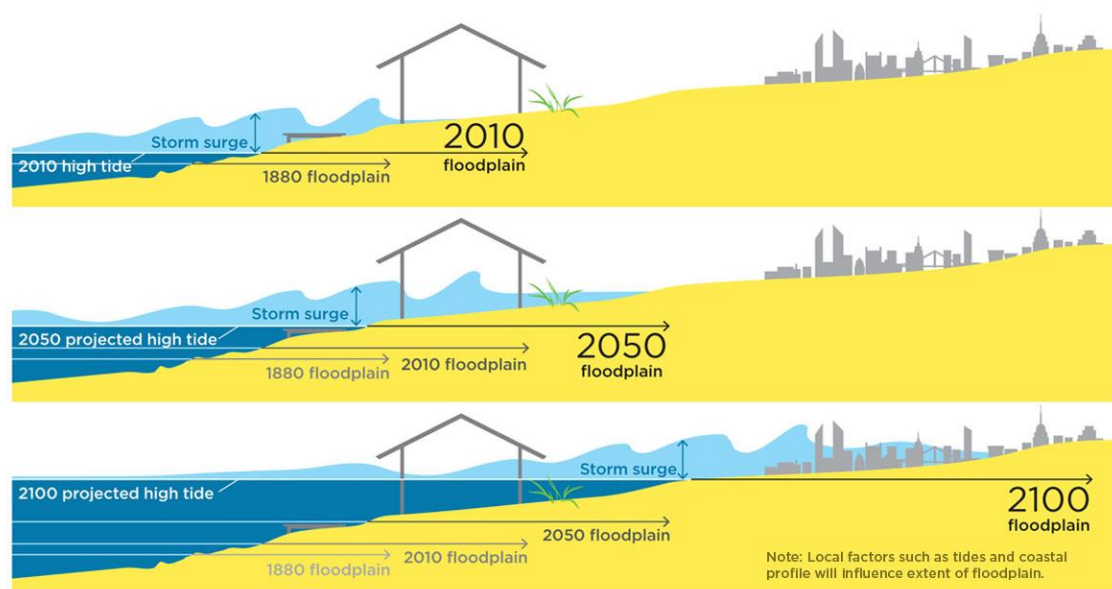
1. Select time period
2. Commit to manage *intermediate high*
3. Adjust if necessary

Example: If the design time period is 2050-2100, commit to manage 3.9 ft. of sea-level rise, but be prepared to manage and adapt to 6.6 ft. if necessary.

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2014 Science and Technical Advisory Panel (STAP) Report

STORM SURGE



Sea level sets a baseline for storm surge—the potentially destructive rise in sea height that occurs during a coastal storm. As local sea level rises, so does that baseline, allowing coastal storm surges to penetrate farther inland. With higher global sea levels in 2050 and 2100, areas much farther inland would be at risk of being flooded. The extent of local flooding also depends on factors like tides, natural and artificial barriers, and the contours of coastal land.

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PROJECTIONS

Today's storm surge events (i.e., 100-year flood) will:

- ↑ Inundation extent
- ↑ Frequency
- ↑ Flood duration

HOW TO PREPARE

Add projected sea-level rise heights to current storm surge heights (i.e., 100- and 500-year flood)

Understanding What We're Facing

2014 Science and Technical Advisory Panel (STAP) Report

EXTREME PRECIPITATION



Photo credit: UNH Stormwater Center

PROJECTIONS

- ↑ Frequency
- ↑ Amount

HOW TO PREPARE

- 1. 2014–2050:** design to withstand extreme precipitation intensities based on the most current data.
- 2. 2051–2100:** design to manage a 15% increase in the amount of precipitation produced

Understanding our Risks and Vulnerabilities

Key Topic Areas



OUR ECONOMY is the systematic and productive exchange and flow of goods, services and transactions that must be intact, functioning, and resilient to coastal risk and hazards in order to create and sustain jobs and a high quality of life in coastal New Hampshire.



OUR BUILT LANDSCAPE is the network of structures and facilities owned by state and municipal governments and private entities in coastal New Hampshire. Our built landscape must be prepared to adapt and respond to coastal risk and hazards.



OUR NATURAL RESOURCES are the natural systems that support important species and biodiversity in coastal New Hampshire and provide critical and important services to coastal New Hampshire like food, flood protection, fresh water, raw materials, and recreation opportunities.



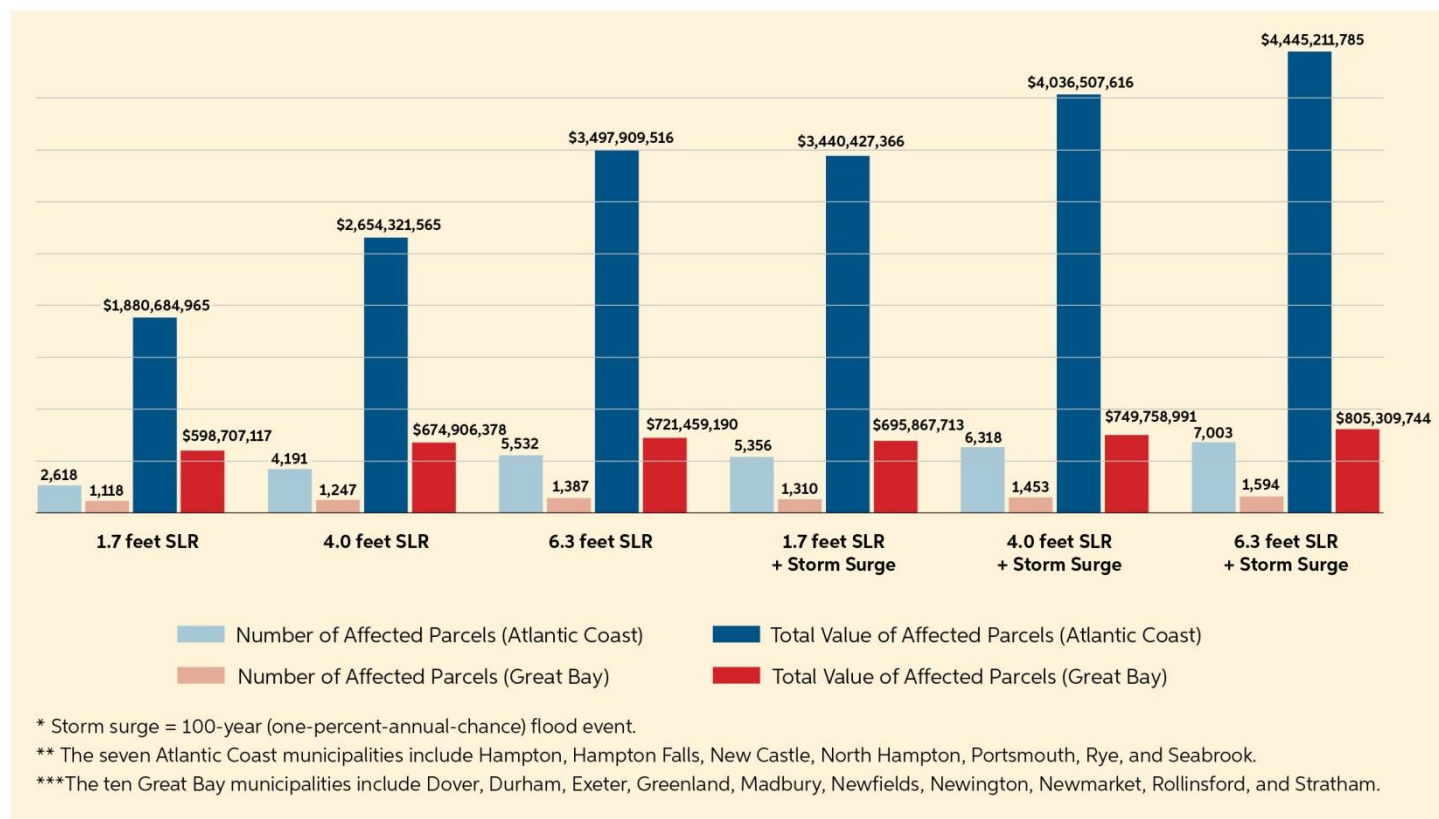
OUR HERITAGE encompasses the abundance of recreational, cultural, and historic resources, including economic assets and elements of the built landscape, in coastal New Hampshire that our state and municipalities wish to protect from coastal risk and hazards.

Vulnerability Highlights



OUR ECONOMY is the systematic and productive exchange and flow of goods, services, and transactions that must be intact, functioning, and resilient to coastal risks and hazards in order to create and sustain a high quality of life in coastal New Hampshire.

Number and aggregated assessed value of parcels affected by sea-level rise (SLR) and storm surge* scenarios for the Atlantic Coast** and Great Bay*** municipalities. *Source: RPC (2015); NHDES et al. (In-Progress).*



Vulnerability Highlights



OUR BUILT LANDSCAPE is the network of structures and facilities owned by state and local governments and private entities in coastal New Hampshire. Our built environment must be prepared, adaptive, and responsive to coastal risks and hazards.

Summary of flood impacts from sea-level rise and storm surge* scenarios for the ten Great Bay municipalities**

Source: NHDES et al. (In-Progress).

Sea-Level Rise (SLR) Scenarios	1.7 feet SLR	4.0 feet SLR	6.3 feet SLR	1.7 feet SLR + Storm Surge	4.0 feet SLR + Storm Surge	6.3 feet SLR + Storm Surge
Upland*** (acres)	914	83	2,309	1,894	2,604	3,343
BUILT LANDSCAPE						
Infrastructure (# of sites)	4	23	115	69	167	304
Critical Facilities (# of sites)	0	0	1	0	1	4
Roadways – Local (miles)	0	1	3	2	4	5
Roadways – State (miles)	0	0	1	1	2	4
Transportation Assets (# of sites)	46	46	49	47	52	57
100-year floodplain (acres)	739	1,234	1,355	1,316	1,397	1,461

* Storm surge = 100-year (one-percent-annual-chance) flood event.

** The ten Great Bay municipalities include Dover, Durham, Exeter, Greenland, Madbury, Newfields, Newington, Newmarket, Rollinsford, and Stratham.

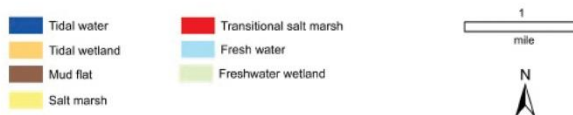
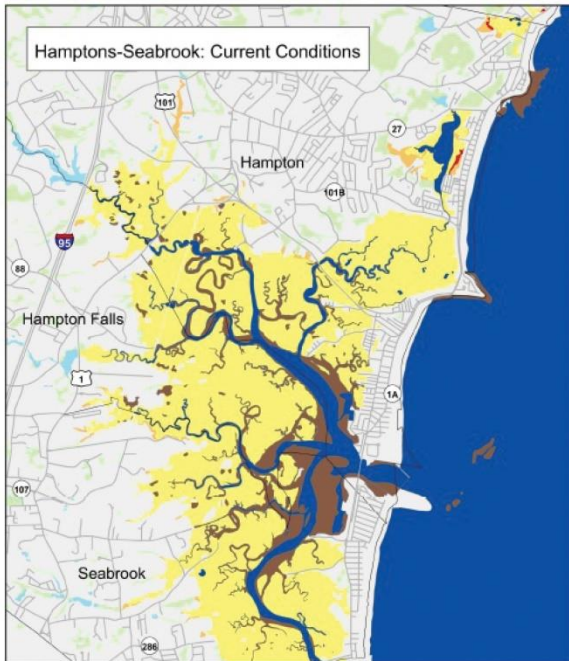
*** Upland refers to land above mean higher high water (highest tidal extent). The ten Great Bay municipalities have approximately 86,210 acres of upland.

Vulnerability Highlights



OUR NATURAL RESOURCES are the natural systems that support important species and biodiversity in coastal New Hampshire and provide critical and important services to coastal New Hampshire like food, flood protection, fresh water, raw materials, and recreation opportunities.

Current Hampton-Seabrook Estuary tidal wetlands. Source: NHFG (2014).



Modeled Hampton-Seabrook Estuary tidal wetlands in 2100 with 6.6 feet of sea-level rise. Source: NHFG (2014).

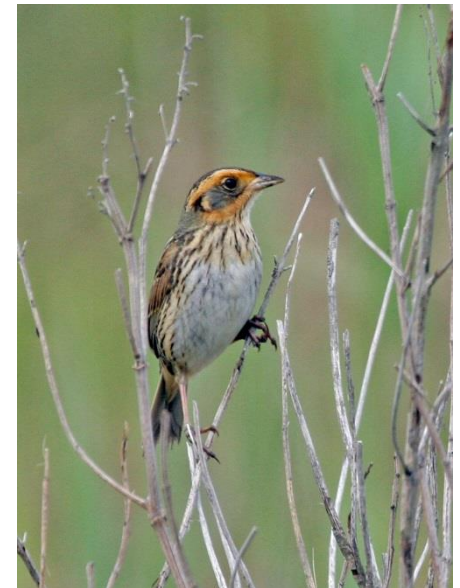
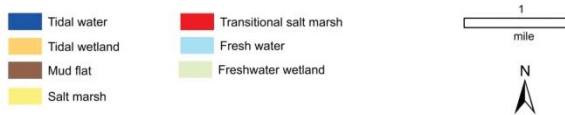
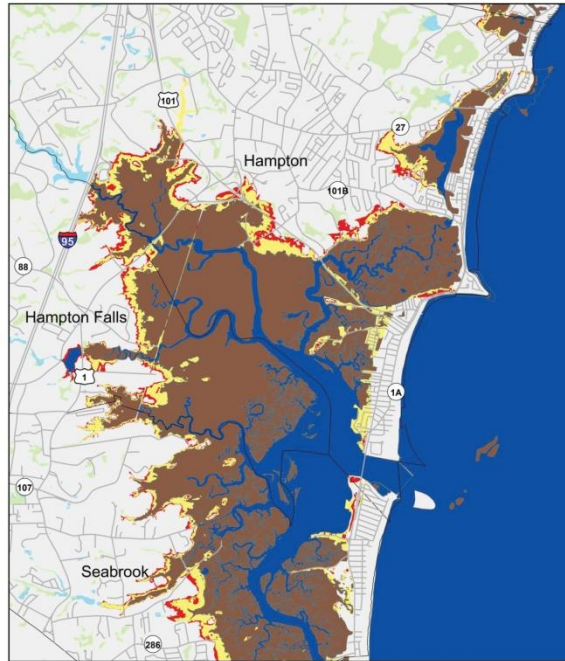


Photo credit: Magnus Manske

Vulnerability Highlights



OUR HERITAGE encompasses the abundance of recreational, cultural, and historic resources, including economic assets and elements of the built landscape, in coastal New Hampshire that our state and communities wish to protect in the face of coastal risk and hazards.

Proportion of area surveyed for above-ground historical resources.* Source: DHR (2016).

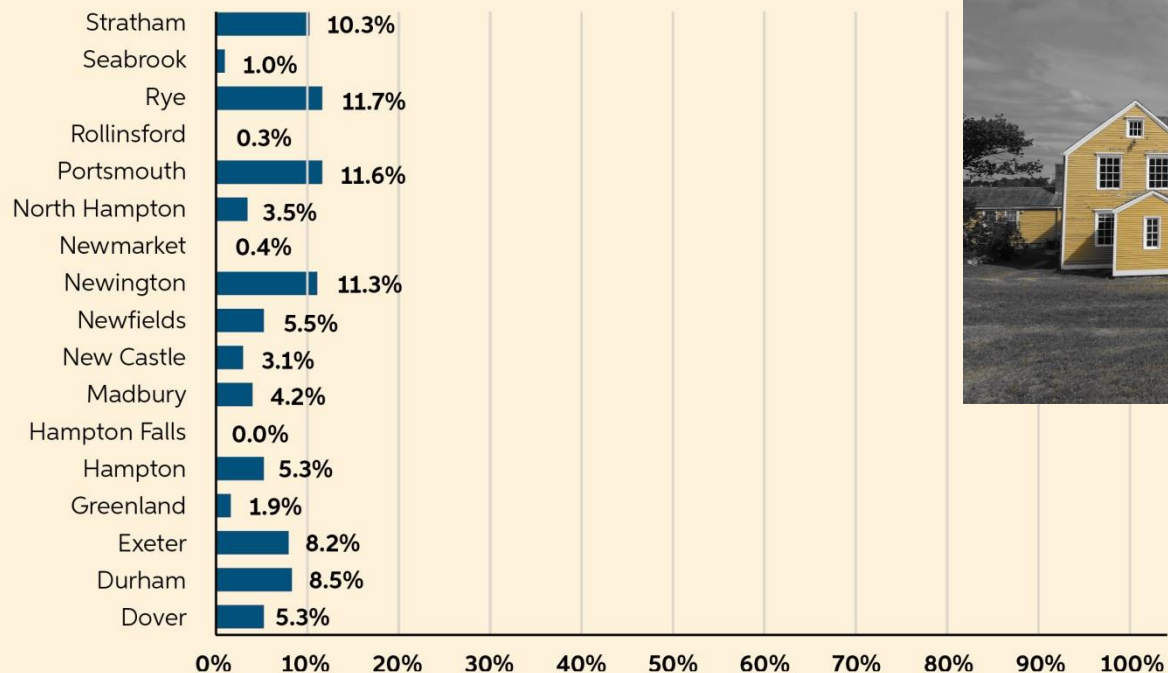


Photo credit: Andy Willey

* Data does not include all National Register-listed properties, and includes only information in the databases as of this report publication. Dataset should not be considered complete and is included for informational purposes only.

Understanding What We Need to Do

Our Guiding Principles



- **Act Early**
- **Respond Incrementally**
- **Revisit and Revise**
- **Collaborate and Coordinate**
- **Incorporate 'Risk Tolerance' in Design**
- **Make 'No Regrets' Decisions**

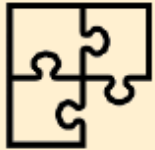
Our Goals, Recommendations, and Actions

SAIL: Four Goals for a Resilient Coast



Goal 1: SCIENCE

Research, understand, establish, and use the best available science about current and future coastal hazards in New Hampshire relating to storm surge, sea-level rise, and extreme precipitation



Goal 2: ASSESSMENT

Identify assets and resources within our economy, our built landscape, our natural resources, and our heritage that are vulnerable to storm surge, sea-level rise, and extreme precipitation; understand the scope of that vulnerability; and evaluate existing statutes, ordinances, rules and regulations, policies, programs, and plans to determine whether changes should be made to reduce vulnerabilities.



Goal 3: IMPLEMENTATION

Identify and implement strategies that will enable the State and coastal municipalities to effectively protect, adapt, and sustain our current and future economy, built landscape, natural resources, and heritage.



Goal 4: LEGISLATION

Recommend timely considerations for legislation that leads to actions, both immediate and long-term, that reduce and/or eliminate vulnerability and result in adaptation to existing and future coastal hazards.

Recommendation Highlights



Science Recommendations

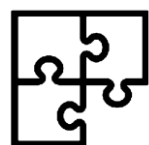
- S1. Legislatively authorize a state agency to convene a Science and Technical Advisory Panel to review and evaluate the current state of climate change science in order to periodically update storm surge, sea-level rise, extreme precipitation and other relevant climate projections and provide planning guidance at least once every five years. *[Lead: State Legislature]*.

SB 374 (2016) – requiring the department of environmental services to update a report on coastal flooding trends every 5 years

Approved: May 20, 2016
Effective Date: July 19, 2016



Recommendation Highlights



Assessment & Implementation Recommendations: **Cross-Cutting**

CC3. Review whether existing state statutes and rules adequately permit state agencies and municipalities to prepare and adapt to best available climate science and impacts, and make recommendations for amendments or new regulations where necessary. *[Lead: State Agencies]*.

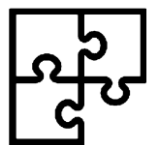
SB 452 (2016) – requiring certain state agencies to conduct an audit of laws governing coastal regions to enable authorities to take appropriate actions

Approved: June 6, 2016
Effective Date: June 6, 2016



CC5. By 2019^{vi}, state agencies will consider and use best available climate science in their activities and plans. *[Lead: State Legislature]*.

Recommendation Highlights



Assessment & Implementation Recommendations: **Economy**

- E3. Use appropriate and available mechanisms, including but not limited to incentives and market-based tools to fund climate adaptation strategies. *[Lead: State Agencies; Municipalities]*.

Stormwater utilities to fund retrofits to existing development and future improvements

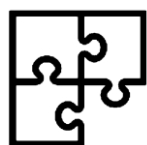
Special overlay districts, tax credits, and revolving loan funds to discourage development in vulnerable areas

- E4. Improve information available to property owners and prospective buyers about coastal hazards and vulnerabilities. *[Lead: State Agencies; Municipalities]*.

Improve consumer protection disclosure of properties vulnerable to coastal flooding

Encourage homeowners in moderate to low-risk areas to purchase Preferred Risk Policy

Recommendation Highlights



Assessment & Implementation Recommendations: **Built Landscape**

BL2. Implement regulatory standards and/or enact enabling legislation to ensure that the best available climate science and flood risk information are used for the siting and design of new, reconstructed, and rehabilitated state-funded structures and facilities, municipal structures and facilities, and private structures. *[Lead: State Legislature; State Agencies; Municipalities].*

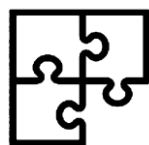
Require state agencies and encourage municipalities to use one of three approaches for establishing flood elevation and extent when building, or significantly retrofitting or repairing, state-funded, municipal, and private structures and facilities in and around floodplains:

Utilizing best-available, actionable data and methods that integrate current and future changes in flooding based on science

Two or three feet of elevation above the 100-year (1%-annual-chance) flood elevation, depending on the criticality of the building

500-year (0.2%-annual-chance) flood elevation

Recommendation Highlights



Assessment & Implementation Recommendations: **Natural Resources**

NR3. Protect land that allows coastal habitats and populations to adapt to changing conditions and also provides ecosystem services that protect people, structures, and facilities. *[Lead: State Legislature; State Agencies; Municipalities].*

Prioritize land conservation efforts to adequately account for future sea level rise and coastal flooding

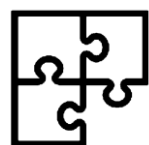
Protect areas where salt marshes are expected to migrate in the future as sea level rises

NR4. Encourage state agencies and municipalities to consider ecosystem services provided by natural resources in land use planning, master plans, and asset decisions. *[Lead: State Agencies; Municipalities].*

Restore pervious surfaces, provide nutrient barriers, protect vegetated buffers, maintain wildlife passage

Minimize shoreline hardening and promote natural or hybrid shoreline protection strategies

Recommendation Highlights



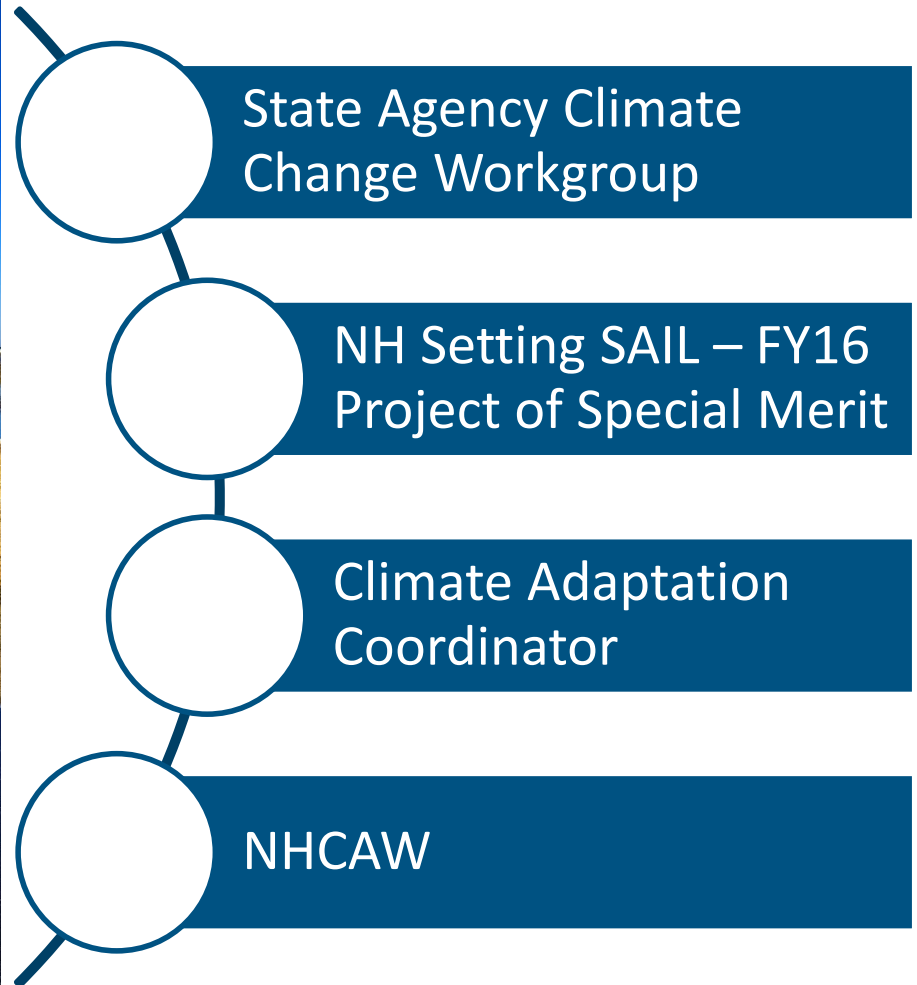
Assessment & Implementation Recommendations: **Heritage**

- H1. Identify and survey recreational resources and assess their vulnerability to coastal risk and hazards based on best available climate science. *[Lead: State Agencies; Municipalities]*.
- H3. Identify and survey cultural and historic resources and assess their vulnerability to coastal risk and hazards based on best available climate science. *[Lead: State Agencies; Municipalities]*.
- H5. Allocate FY2018-2019 Biennial Budget funding and authority to expend funds for recreational and cultural resource vulnerability surveys, planning efforts, and implementation of the resulting plans. *[Lead: State Legislature]*.

Where We Go From Here



Photo credit: Nathalie Morison



Questions?

For more information, visit:

<http://nhcrhc.org/>



Photo credit: Ron Sher

Nathalie Morison

Coastal Resilience Specialist

NHDES Coastal Program

nathalie.morison@des.nh.gov

(603) 559-0029