

COMMUNITY RESILIENCE IN COASTAL NEW HAMPSHIRE

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Coastal Hazard Vulnerability Concerns in New Hampshire



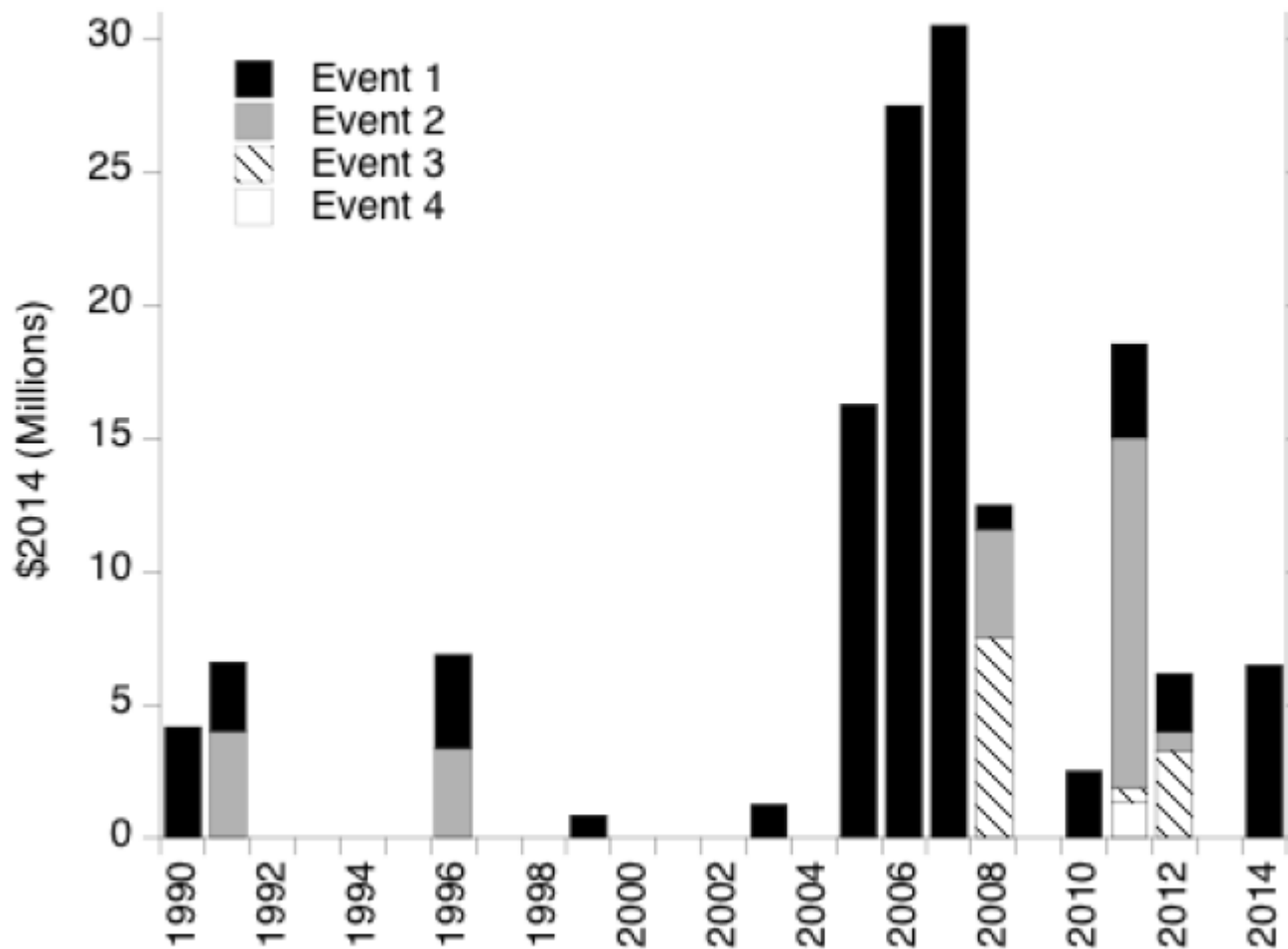
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OVER \$19 BILLION OF
N.H.'S G.D.P. COMES FROM
COASTAL ZONE COUNTIES

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420,000+ PEOPLE
LIVE IN A NEW HAMSHIRE
COASTAL ZONE COUNTY

Federal Expenditures on FLOOD RELATED Presidentially Declared Disasters And Emergency Declarations in NH



<http://www.fema.gov/disasters>

Vulnerability Highlights

Tides to Storms (RPC, 2015)

FIGURE 5. Illustration of the extent of flooding from three sea-level rise scenarios in the Hampton-Seabrook estuary.

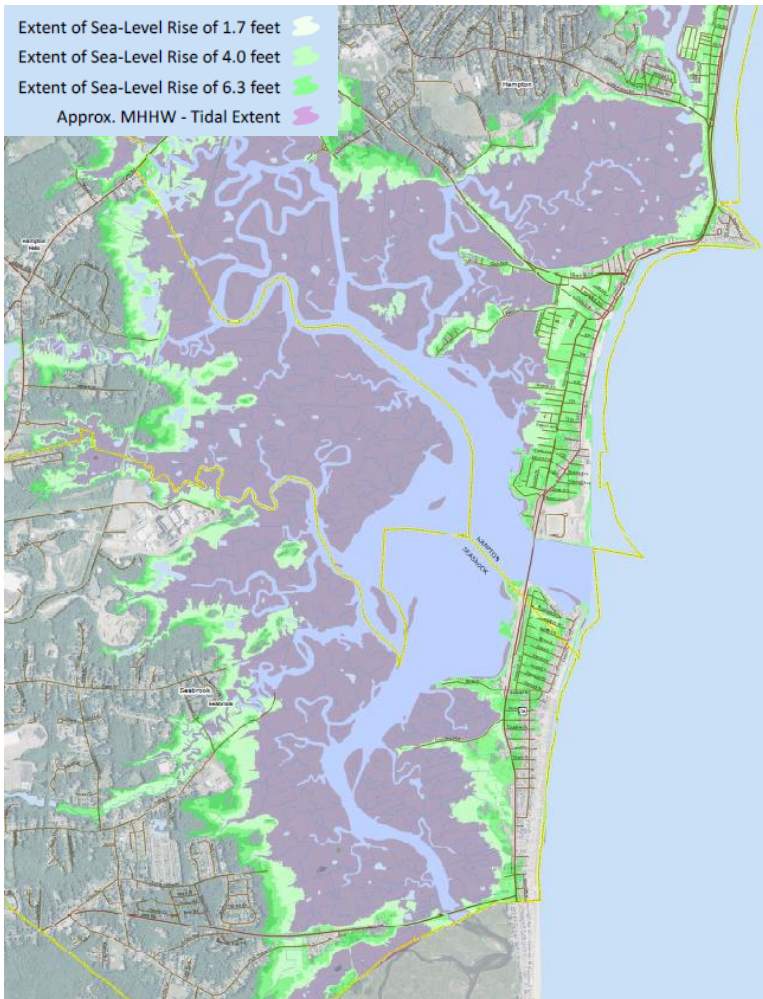
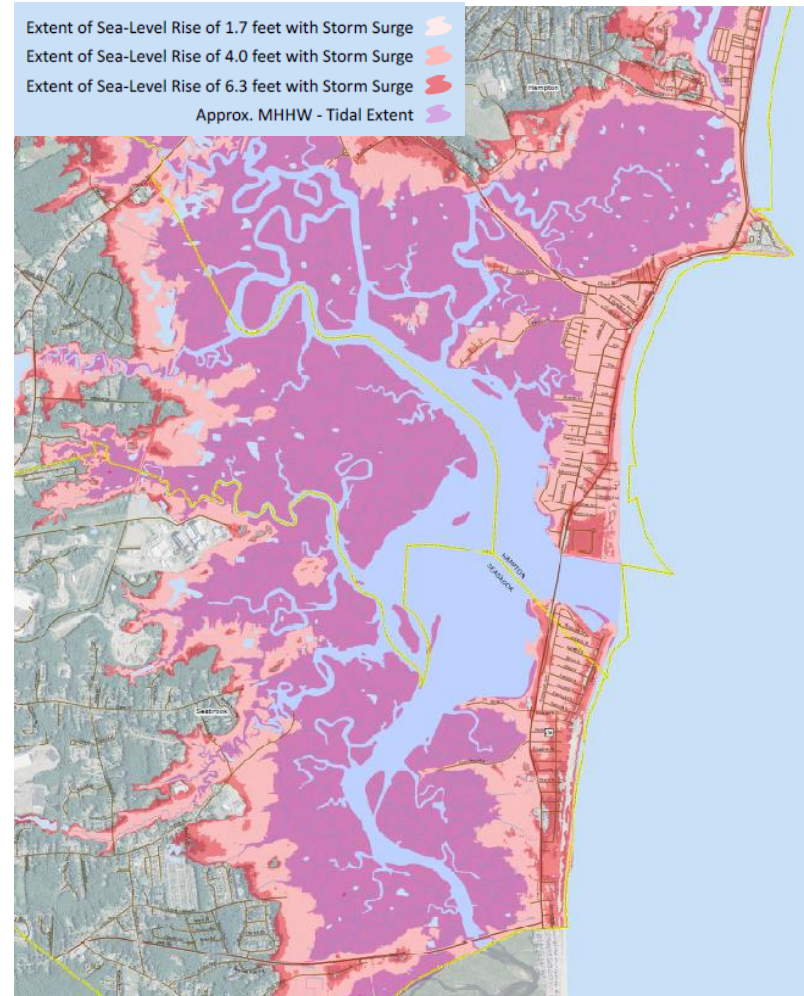
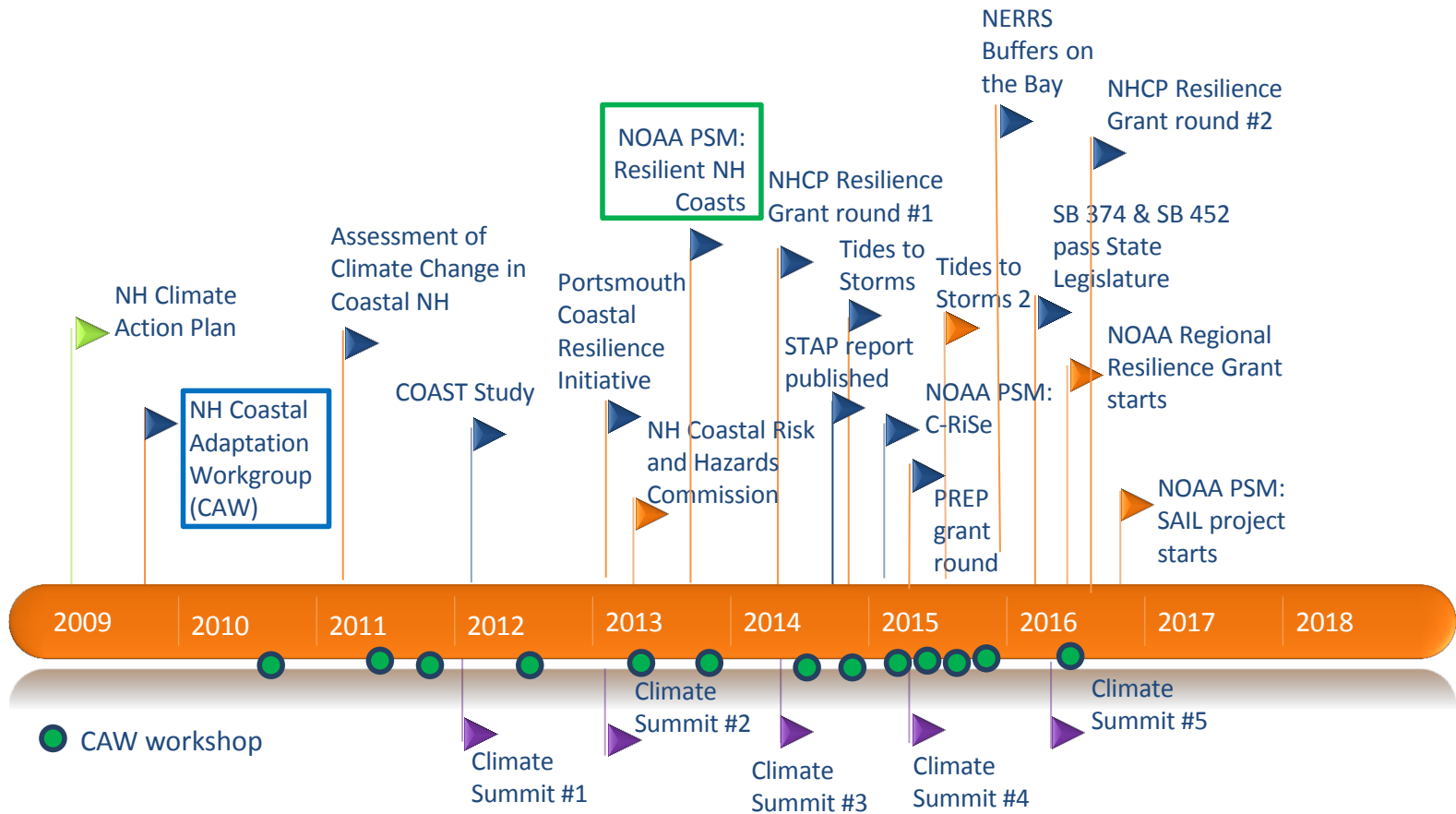


FIGURE 6. Illustration of the extent of flooding from three sea-level rise scenarios with a 100-year/one-percent-annual-chance storm surge in the Hampton-Seabrook estuary.





NH Coastal Adaptation Workgroup (CAW)

nhcaw.org





CAW RELATED PROJECTS



SINCE 2009

46 PROJECTS

\$5,000,000+
TOTAL FUNDING

NOAA, EPA, FEMA, HUD, NSF, HHS, USDOT

Recognizing Climate Adaptation Champions



Preparing for Climate Change: Rye

Workshop #1 – The Climate Café

Climate change presentation, question & answer, small group discussion, prioritization



Workshop #2 – What Tools Are Available?

Overview of planning and regulatory tools for adaptation (e.g., how to incorporate climate change into master plan, zoning, subdivision and site plan).



Workshop #3 – A Field Trip to Rye's Salt Marshes

Learning how salt marshes protect Rye from storm surge, and how sea-level rise affects salt marshes.



Workshop #4 – Transitioning into Next Steps

Connecting the local "Preparing for Climate Change in Rye" project into an upcoming regional project.



Preparing for Climate Change: Dover

Workshop #1 – The Climate Café

Climate change presentation, question & answer, small group discussion, prioritization



Workshop #2 – Green Infrastructure, Land Use Regulations, and Community Gardens

Overview of what Green Infrastructure is, what the City's land use regulations are and how they fit with climate change, and what community gardens are in Dover (mitigation!)



Workshop #3 – Working Groups

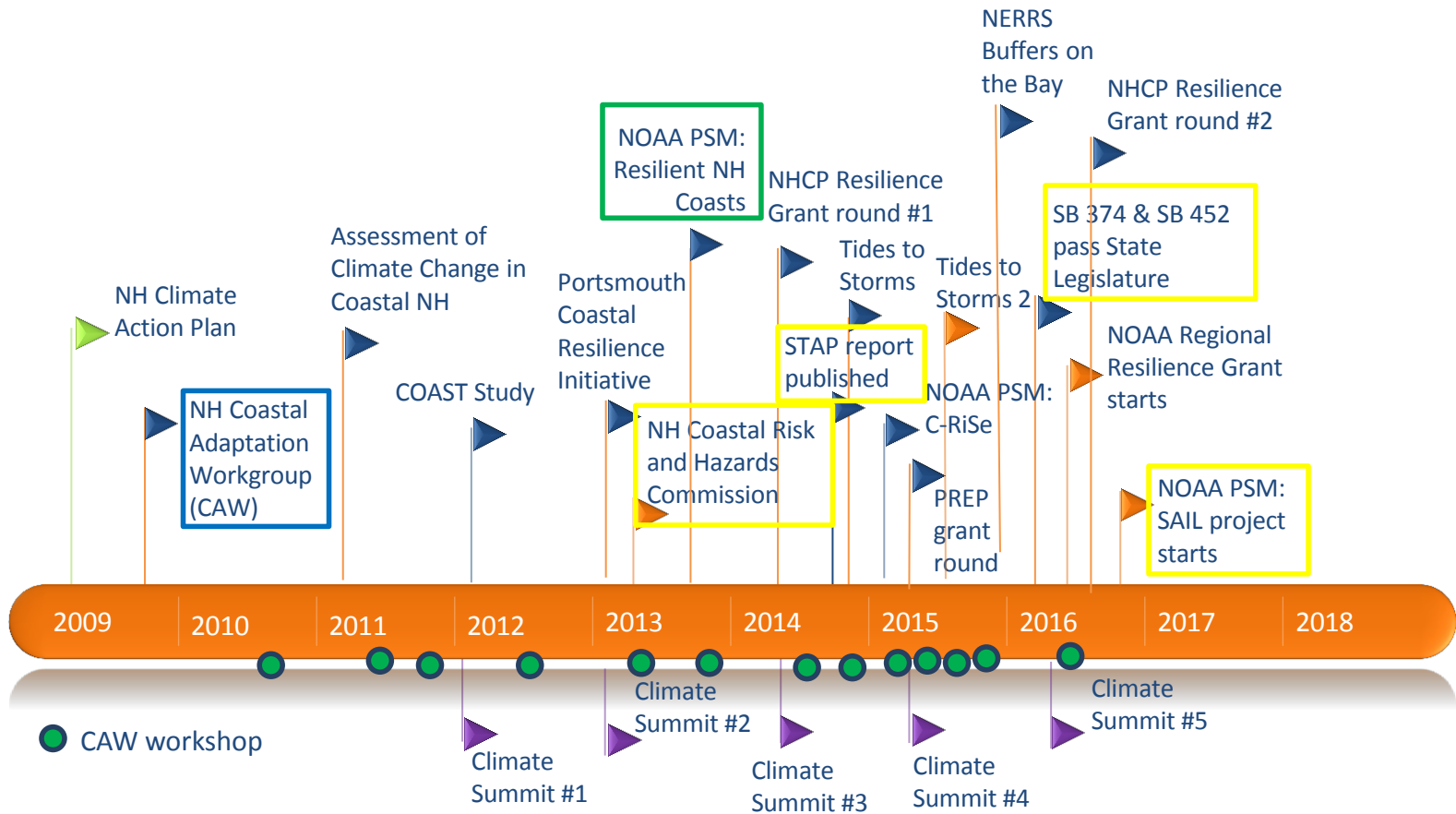
Working groups developed action items to address the priority areas



Workshop #4 – Working Groups, next steps

Working groups continued to identify action items, and a citizen's group continued to meet quarterly to shepherd the action items into City policies and plans





NEW HAMPSHIRE COASTAL RISK AND HAZARDS COMMISSION



Coastal Risk and Hazards Commission

- SENATE BILL 163 // RSA Chapter 483-E (eff. July 2, 2013)
- CLEAR MISSION: “...to recommend legislation, rules, and other actions to prepare for projected sea-level rise and other coastal and coastal watershed hazards such as storms, increased river flooding, and storm water runoff, and the risks such hazards pose to municipalities and state assets in New Hampshire...”
- BROAD-BASED MEMBERSHIP (37 appointees):
 - 4 General Court Members (2 Senators; 2 House Reps.)
 - Reps. from 17 Coastal Zone Municipalities
 - State Agency Designees:
 - NHDES
 - NH Fish & Game
 - DRED
 - NHDOT
 - Div. of Public Works Design & Construction (DAS)
 - Div. of Parks and Recreation (DRED)
 - Div. of Historical Resources (DCR)
 - Office of Energy and Planning
 - Other Stakeholders:
 - Seacoast Board of Realtors
 - NH Sea Grant
 - NH PRIMEX³
 - NH Homebuilders Association
 - University of New Hampshire
 - NH Municipal Association
 - Rockingham Planning Commission
 - Strafford Regional Planning Commission
- SUNSET: December 1, 2016



Understanding What We're Facing

2014 Science and Technical Advisory Panel (STAP) Report

2014 SCIENCE AND TECHNICAL ADVISORY PANEL REPORT SUMMARY

Sea-level Rise, Storm Surges, and Extreme Precipitation in Coastal New Hampshire: Analysis of Past and Projected Future Trends

Climate change is expected to have significant impacts on critical infrastructure and natural and cultural resources in coastal New Hampshire over the next century and beyond.

This report is intended to help municipal and state decision-makers prepare for projected sea-level rise and other coastal hazards and minimize the risks those hazards pose to municipalities and state assets.

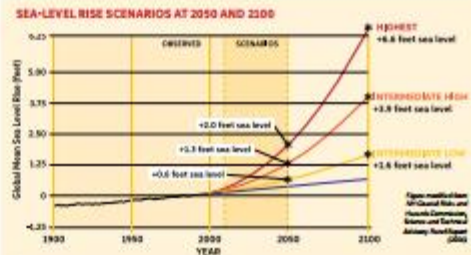


SEA-LEVEL RISE

Global sea levels have been rising and are expected to continue rising well beyond the end of the 21st century. Rising seas pose significant risks to our communities and ecosystems, cultural resources and other coastal property and infrastructure.

PROJECTIONS

Forecasting rates of global greenhouse gas emissions is challenging, but research shows that current greenhouse gas concentrations and current or accelerated emissions will continue to influence sea levels in the future.



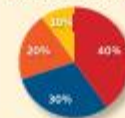
PRECIPITATION

Mean annual precipitation in the northeastern United States increased by approximately 5 inches (more than 10%) between 1895 and 2011.

PROJECTIONS

Annual precipitation is expected to increase by as much as 20% between 2071 and 2099 compared to the late 20th century. Most of the precipitation increases will be in winter and spring in the form of rain or snow. Fall and summer will experience less of an increase.

PROCESSES CAUSING SEA LEVELS TO RISE



- 40% Ocean warming or thermal expansion
- 30% Melt of land-based glaciers
- 20% Melt of Antarctic and Greenland ice sheets
- 10% Vertical land movements, shifts in Earth's gravity field and ocean dynamics

EXTREME PRECIPITATION

The Northeast experienced a 50% increase in total annual precipitation from storms classified as extreme events between 1901 and 2002. Here, "extreme" is defined as the number of times each year that the 24-hour rainfall amount exceeds the largest 1% of precipitation events in that year.

PROJECTIONS

Extreme precipitation events are projected to increase in frequency and in the amount of precipitation produced. In particular, the rainfall amount produced by hurricanes is projected to increase. However, current climate models and analyses are not as good at projecting future changes in the frequency or magnitude of extreme precipitation events.

STORM SURGE

The New Hampshire coast is significantly impacted by both Nor'easters and hurricanes. Winds from these storms drive ocean water towards the land, resulting in the short-term rise in water levels called storm surge. The actual height of a flood is determined by factors such as storm intensity, forward speed, storm area size, coastline characteristics, and angle of approach to the coast, in addition to tide height. Nor'easters can impact the region for several days and produce a storm surge with or without the addition of inland runoff from heavy precipitation. Over the past ten years the largest storm surges observed in New Hampshire occurred during Nor'easters.



PROJECTIONS

Considering changes in water levels due to sea-level rise alone, today's extreme storm surge events (i.e. 100-year flood) will have a greater inundation extent and occur more frequently over time. Due to increased coastal development, there has been a significant increase in impacts from hurricanes nationwide over the 20th century. However, there is some uncertainty in the projection of trends in hurricane frequency and intensity in any given region, and no research consistently finds a trend in the frequency and intensity of Nor'easters.

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**

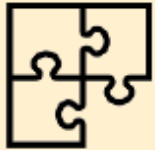
Our Goals, Recommendations, and Actions

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.

Understanding What We've Done Already & What's Next...

- ✓ **Senate Bill 374 passed Legislature:** Requiring DES to coordinate update to science every 5 years
- ✓ **Senate Bill 452 passed Legislature:** Requiring some state agencies to conduct audit of regs and rules and use STAP as guidance
- **NOAA Project of Special Merit 2016-2018:** Carrying out SAIL (science, assessment, implementation, legislation)
- Some “in-the-ground” pilot living shoreline demonstration projects are in the work
- ❑ Need to continue creating local champions through trusted partnership groups & tailored technical assistance
- ❑ Need improvements in the range of uncertainty re: timing and magnitude
- ❑ Need funding to get beyond planning and design
- ❑ Need assistance dealing with some major legal/policy questions

Questions?



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