

Coastal Adaptation to Climate Change



NECASC
Northeast Climate Adaptation Science Center

The northeastern Atlantic Coast is an area of sensitive fish and wildlife populations and habitats, vibrant commercial enterprises, and vital public infrastructure. Due to climate change, sea levels are rising, water quality and coastal food webs are changing, and keystone and commercially important species are adjusting breeding and migration behavior.

NE CASC coastal research priorities:

- **Ecosystems and habitat** - describe the climate-associated impacts on Atlantic coastal ecosystems and human communities from including sea level rise and changing storm regimes.
- **Impacts** - evaluate the combined impacts of climate change and human activities on coastal environments.
- **Supporting decisions** - create decision-support tools and strategies to increase ecosystem-focused coastal adaptation and resilience options.

Management contexts for research outcomes:

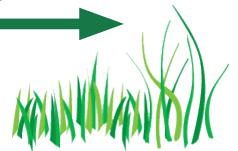
Decreased capacity for adaptation



Human engineered structures, urban areas, bedrock coasts



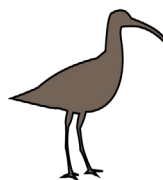
Increased capacity for adaptation



Beaches, barrier islands, wetlands, living shorelines



Rising sea levels contribute to flooding, erode shorelines, increase salt water encroachment, and make coastal infrastructure more vulnerable to storm surge



The impacts of storm surge and extreme weather events on coastal areas vary widely depending on infrastructure and natural capacity for adaptation

**UMASS
AMHERST**

USGS
science for a changing world

This work is supported by the Department of Interior Northeast Climate Adaptation Science Center, which is managed by the National Climate Adaptation Science Center.

Research Topics in Coastal Adaptation



Sea level rise viewer for northeastern Atlantic coast



Eroding peat shoreline



Saltmarsh buffer zone in Virginia

Researchers:

Jon Woodruff, *University of Massachusetts*

Linda Deegan, *Woodwell Climate Research Center*

Brian Yellen, *University of Massachusetts*

Michelle Staudinger, *University of Massachusetts, USGS*

Radley Horton, *Columbia University*

Katherine Kahl, *University of Massachusetts*

Changing Shorelines and Coasts

Overview: Researchers refined modeling of sea level rise, storm surges, and flooding and shared the results with communities. Natural systems (saltmarshes and beaches) have some capacity to adapt to rising sea levels, while human-engineered structures have less capacity to adapt. Rising sea levels combined with increased storm frequency could more than triple coastal flooding for much of the region.

Outcome: Communities can use localized results for decision-making about vulnerable land and structures to reduce coastal hazard risk, and managers can build on a new knowledge co-production network, facilitated through State Climatology Offices and Climate Central.

Tools: Web-based maps are available to explore coastal risk (i.e., sea level rise, flooding) intersection with vulnerable communities, natural systems, infrastructure, and hazardous sites. [Follow the QR code to the Sea Level Rise Viewer:](#)



Multi-Community Risk Assessment

Overview: Six coastal municipalities in MA worked with researchers to learn how community exposure to coastal hazards is likely to change with sea level rise and storm regime change to inform plans for risk reduction.

Outcomes: Geospatial modeling results were organized by community so local officials could easily incorporate them into local planning efforts. Researchers worked with local stakeholders to develop community-specific climate adaptation and other risk-related plans and studies.

Tools: Web-based maps of coastal inundation and 100-year floodplain expansion in the Great Marsh region based on this data. Additionally, researchers developed a guidance flyer that presents the pros and cons of coastal adaptation strategies, including nature-based and gray infrastructure, hybrid solutions, and policy strategies. Also see the 2021 [report on Climate Resilience, surveying Massachusetts municipalities](#).

National Wildlife Refuges

Overview: To address sea level rise and flooding impacts on coastal National Wildlife Refuges (NWRs) in the context of other regional threats, NE CASC worked with NWR staff to develop a structured-decision-making (SDM) model that incorporated refuge capacity and management goals.

Outcomes: A prototype SDM model to help managers make informed choices in managing migratory waterbird habitat (and other resource management priorities) on NWRs, while incorporating stressors at multiple scales and organizational constraints to best achieve management goals. The model serves as a common frame of references for shared sea level rise related management challenges, while facilitating communications about these challenges with other NWRs and surrounding jurisdictions.

Learn more at: necasc.umass.edu

Layout and design by Elsa Cousins

Northeast Climate Adaptation Science Center, 136 Morrill Science Center, 611 N. Pleasant Street, UMass Amherst, Amherst, MA 01003