

ResilientCoasts

DRAFT PLAN

EXECUTIVE SUMMARY



ResilientMass



ResilientCoasts

May 2025

The Executive Summary summarizes the purpose, process, and key findings from the ResilientCoasts Plan, and provides an overview of the current and planned steps the Commonwealth will take to achieve coastal resilience.

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For more information and access to the full plan, visit mass.gov/info-details/resilientcoasts-initiative



Purpose of ResilientCoasts

The ResilientCoasts Plan puts forward a comprehensive statewide framework for coastal resilience over the next 50 years. The plan outlines actionable guidance and strategies that address near- and long-term vulnerability, both regionally and coastwide, to hazards like sea level rise, storm surge, and erosion.

Over three million Massachusetts residents live in a community expected to experience coastal impacts between now and the end of the century, putting people as well as significant environmental, cultural, economic, and recreational resources at risk.

The Commonwealth cannot afford the cost of inaction on climate change. Since 1980, weather and climate disasters have cost Massachusetts an estimated \$10-20 billion in costs. While not all of these disasters can be attributed to coastal storms, the frequency of coastal flooding is increasing, and that trend is expected to continue as sea level rises.

The Massachusetts Climate Change Assessment (2022) and the ResilientMass Plan (2023) estimate some of the future environmental and economic consequences of coastal hazards¹:

- Coastal property damage could reach **over \$1 billion a year**, on average, by the 2070s with over 70% of the damage in the Boston Harbor region².
- Massachusetts municipalities could experience **\$104 million** in lost revenues a year by mid-century with 3 feet of sea level rise and **\$946 million** per year by end of century with 6 feet of sea level rise.³
- Annual expected loss of or damage to state-owned buildings and infrastructure from coastal flooding is estimated at **\$8 million today** and may grow to **\$36 million by 2050** and over **\$52 million by 2070**⁴.

While these are some of the projected economic impacts, the full range of consequences from coastal hazards will include potential loss of life, health-care related costs, and damages to ecosystem services. Indirect effects flowing from coastal hazards will likely also impact the rest of the state.

The costs of inaction are daunting, but preparedness pays off. By proactively investing in resilience, the Commonwealth can avoid the worst impacts and save money doing it. **Every \$1 invested in resilience and disaster preparedness can yield up to \$13 in cost savings**⁵.

¹ Read the full [Massachusetts Climate Change Assessment \(2022\)](#)

² Massachusetts Climate Change Assessment (2022), Vol II - Statewide Report, Page 72.

³ Massachusetts Climate Change Assessment (2022), Vol II - Statewide Report, Page 114.

⁴ ResilientMass Plan (2023) Section 5.1-39. [Chapter 5. Risk Assessment and Hazard Analysis](#)

⁵ Based on the study [“The Preparedness Payoff: The Economic Benefits of Investing in Climate Resilience”](#) by the U.S. Chamber of Commerce. Savings includes amount saved in both economic impact and cleanup costs.

Scope of the Initiative

The Massachusetts coastal zone encompasses 78 coastal communities. Over the next 50 years, the number is expected to grow by 20 additional communities as climate changes and sea level rises. Therefore, the geographic planning area of ResilientCoasts includes all 98 of these communities.

The ResilientCoasts Plan looks at both near- and long-term vulnerability to coastal hazards. To assess near-term coastal flood vulnerability, the plan relies on data from the Massachusetts Coast Flood Risk Model (MC-FRM) that projects the 1% annual chance flood event for the 2030s, based on a sea level rise scenario of 1.3 feet above the 2008 baseline. To assess long-term coastal flood vulnerability, the plan uses MC-FRM data on the 0.1% annual chance flood event for the 2070s, based on a sea level rise scenario of 4.3 feet above the 2008 baseline.

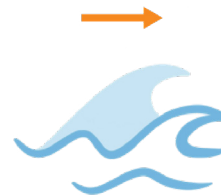
The focus of the ResilientCoasts Plan is on the coastal hazards of sea level rise, storm surge, wave action, and coastal erosion. This plan does not assess risks associated with compound flooding.⁶ These risks will be studied in a future phase.



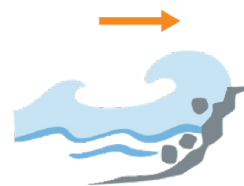
SEA LEVEL RISE



STORM SURGE



WAVE ACTION



EROSION

⁶ Compound flooding is the flooding that results from combined effects of sea level rise on storm surge, non-storm tidal flooding, groundwater flooding, and stormwater from rainfall events. For some areas along the coast, accounting for these compound risks may result in greater flood depths and extents than analyzing sea level rise and storm surge alone.

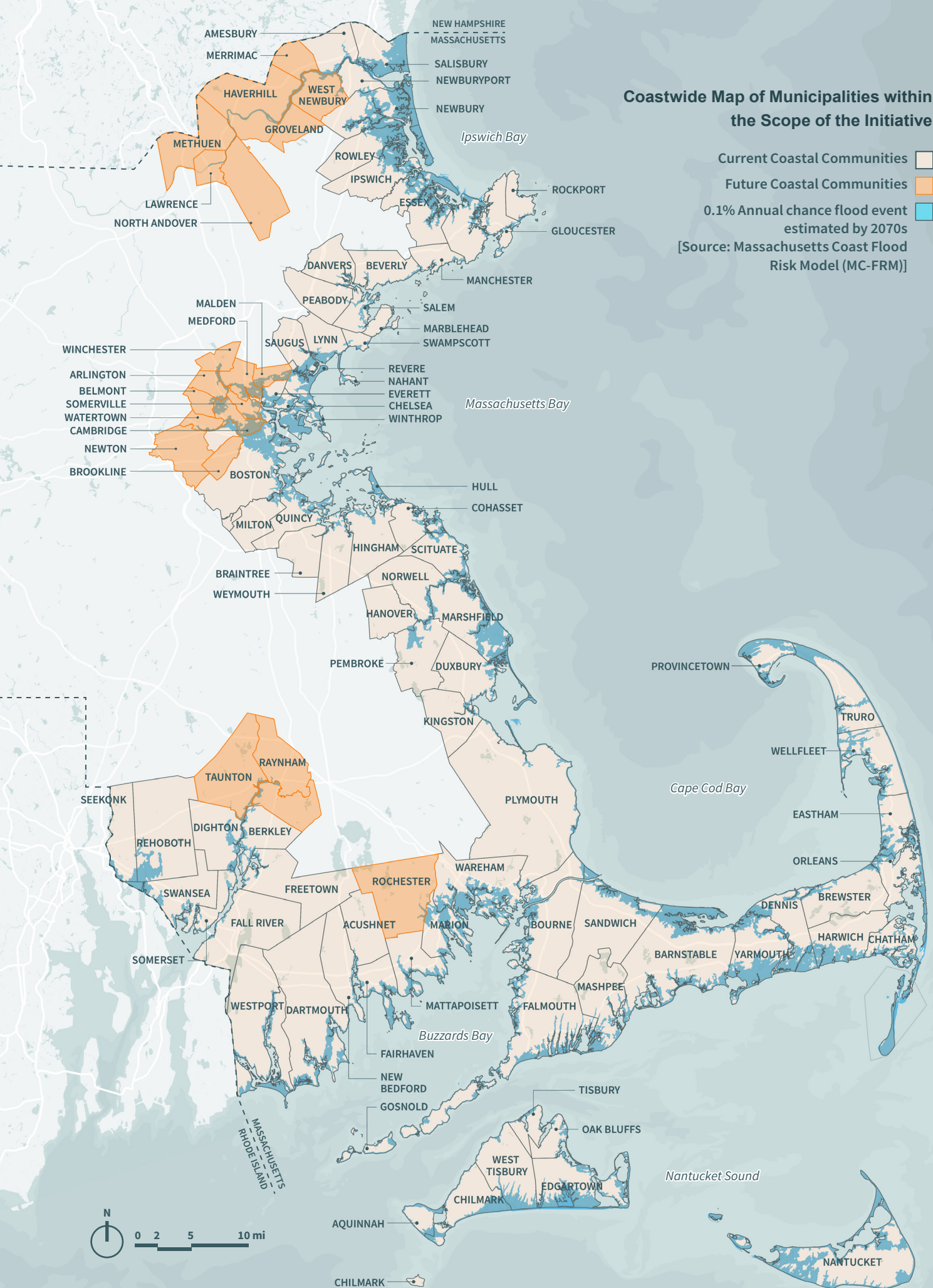
Coastwide Map of Municipalities within the Scope of the Initiative

Current Coastal Communities

Future Coastal Communities

0.1% Annual chance flood event
estimated by 2070s

[Source: Massachusetts Coast Flood
Risk Model (MC-FRM)]



A Framework for Coastal Resilience

Goals for a Resilient Coast

ResilientCoasts aims to protect, restore, and responsibly manage the diverse coastal resources along our shorelines and to guide resilience efforts in communities to ensure that both our natural and built environments can thrive in the face of climate impacts.

GOAL A

Improve human health and safety

GOAL B

Protect and enhance the value of natural and cultural resources

GOAL C

Increase resilience of built infrastructure

GOAL D

Strengthen the coastal economy

GOAL E

Advance equity and environmental justice

GOAL F

Support the capacity of coastal communities

This plan represents an important milestone in advancing the Commonwealth's broader resilience strategy. ResilientCoasts assesses both near- and long-term vulnerability to coastal hazards, establishes a baseline for the state's efforts to build coastal resilience statewide, and sets the course for what we must do to further adapt and protect our coast.

While it will not be possible to completely eliminate all coastal risks, they can be significantly reduced. Massachusetts needs bold, innovative solutions that are also equitable, actionable, and forward-thinking. Shifting toward long-term resilience requires making smart, and often hard, decisions to ensure a more sustainable and prosperous community and coast for tomorrow and future generations.

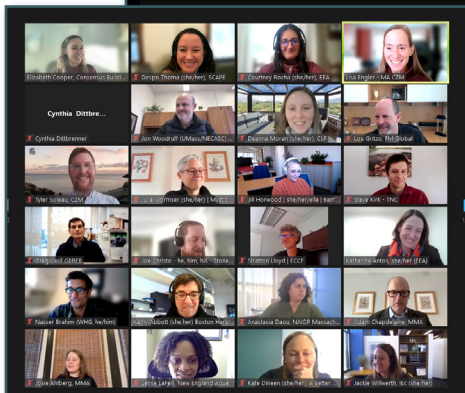
What is "Coastal Resilience"?

The state defines coastal resilience as "the capacity of coastal systems and communities to anticipate, prepare for, respond to, and recover from environmental challenges, particularly those related to climate change and natural disasters." Coastal resilience may look different across Massachusetts communities and regions depending on their unique vulnerabilities and exposures.

More than **65** hours of stakeholder engagement

6 public meetings across **3** waves of engagement

30 focus groups, community consultations, and external task force meetings



47 internal working group members from **18** state agencies

42 external task force members from **27** organizations

Over **190** survey respondents across **2** online public surveys



How to Use this Plan

The vision, goals, and guiding principles outlined in this plan lay the foundation for coastal resilience at the state and local level and should inform private efforts as well. In addition, the plan includes the following key components shown to the right.

How the information in this plan is used may vary depending on the end user, including local and state governments and tribal nations regional planning agencies and organizations, residents, businesses, private property owners, nonprofit and community-based organizations, utility companies and other major infrastructure owners, all of whom have a stake in protecting coastal communities.

ResilientCoasts is just one component of the broader statewide approach to resilience. It is embedded within ResilientMass, which is the state's umbrella initiative for climate adaptation and resilience programs, policies, and initiatives.

For more information and access to the full plan, visit mass.gov/info-details/resilientcoasts-initiative



ResilientCoasts Plan

Coastal Resilience Districts

CHAPTER 5, P. 64

Establishes 15 districts statewide that provide a basis for convening, collaborating, and prioritizing district-scale coastal resilience measures where appropriate and cost-effective and help facilitate peer-learning among communities.

Near-term Adaptation Areas

CHAPTER 6, P. 118

Identifies areas with high concentrations of vulnerability where near-term coastal flood risk (between now and the 2030s) intersects with people and housing, built infrastructure, and economic resources. These areas demonstrate the variability in near-term vulnerability across the coast and can help inform prioritization of resources and intervention.

Coastal Typologies & Coastal Resilience Measures

CHAPTER 7, P. 140

Identifies seven key coastal typologies, representing common coastal environments in Massachusetts, and provides guidance on selecting resilience measures in different locations. Coastal typologies are cross-referenced with a shortlist of key coastal resilience measures based on suitability, cost, difficulty, and other considerations.

State-led Coastal Resilience Strategies

CHAPTER 8, P. 230

Proposes 10 state-led strategies for coastal resilience and near, medium, and long-term state agency actions to undertake strategies and ensure a whole-of-government approach to implementation of the plan.

INTEGRATED
INTO

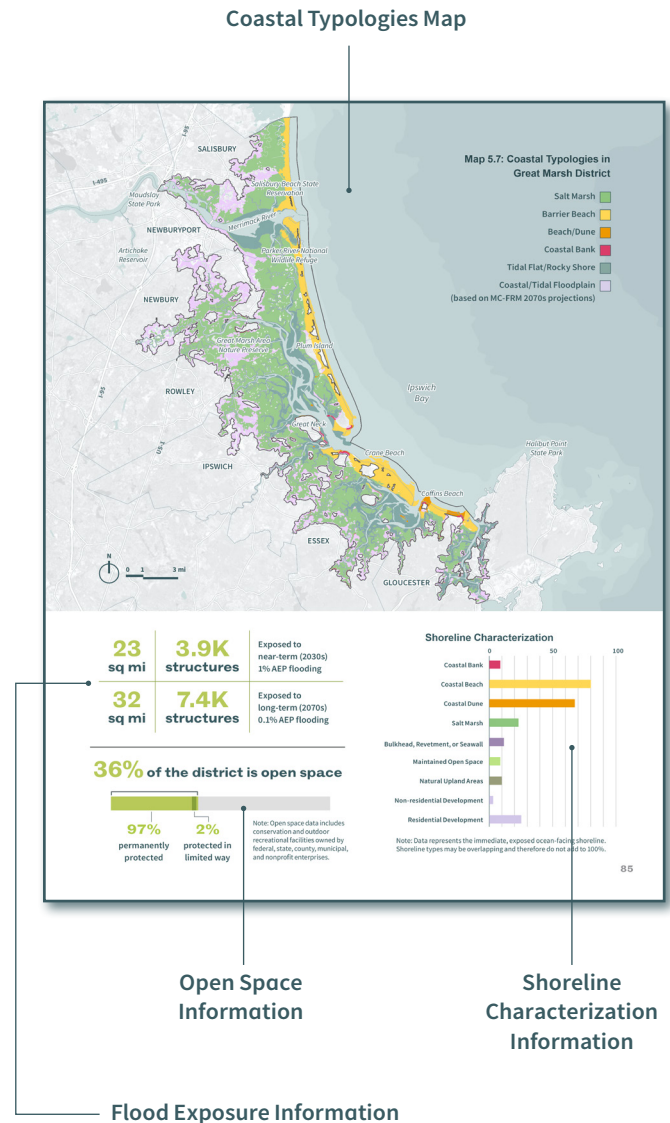
Coastal Resilience Districts

ResilientCoasts establishes 15 Coastal Resilience Districts (CRDs) statewide. CRDs are areas of the Massachusetts coast that currently experience or are expected to experience risk from sea level rise, storm surge, and coastal erosion over the next 50 years. They group together areas that share common characteristics like geomorphology, natural environment, built infrastructure, population and development character, and coastal hazards.

CRDs provide a spatial scale that can support more cost-efficient and effective coastal resilience by leveraging cross-jurisdictional partnerships and capacity to achieve greater impact. CRDs are not regulatory in nature. Rather, the near-term focus of CRDs is to facilitate district-scale and regional prioritization and implementation of coastal resilience projects. CRDs can also be helpful for cross-municipal data sharing, risk assessment, prioritization, and tracking progress on coastal resilience.

Not all coastal hazards require district-scale measures. Smaller-scale interventions will continue to be needed in coordination with larger projects. However, CRDs can help coordinate even smaller scale interventions to avoid redundancies and conflicts across municipalities.

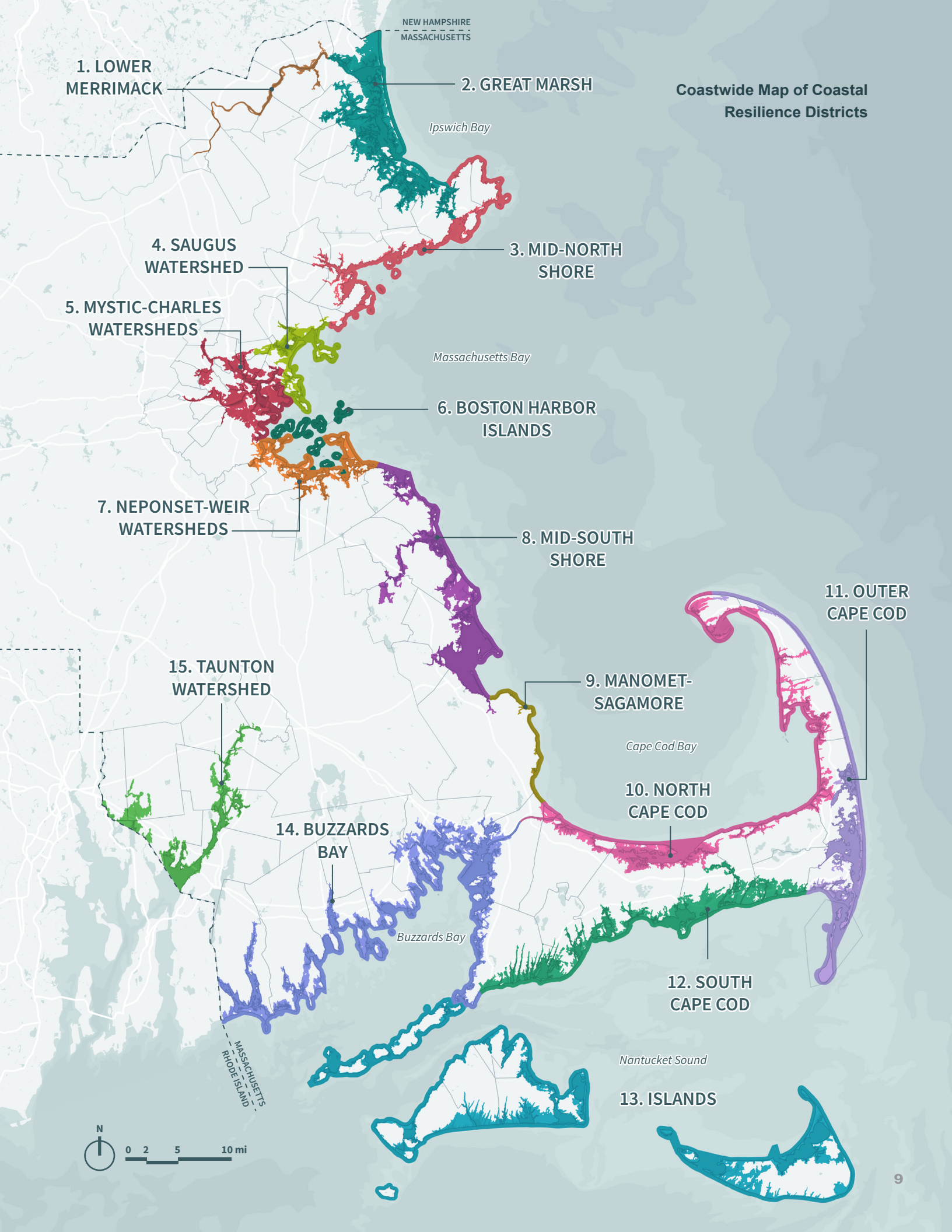
For each district:



For more information, go to:

Coastal Resilience Districts

CHAPTER 5, p. 64

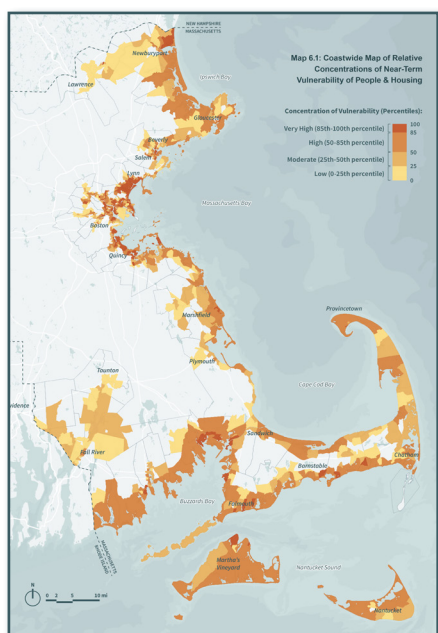


Coastwide Map of Coastal Resilience Districts

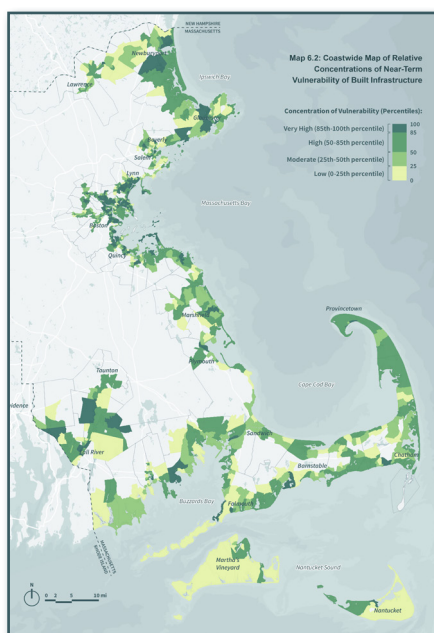
Near-Term Adaptation Areas

Near-Term Adaptation Areas are places within Coastal Resilience Districts with high concentrations of (1) people and housing, (2) built infrastructure, and/or (3) economic resources exposed to near-term coastal flooding¹. These areas can help inform, not dictate, prioritization of limited resources to implement coastal resilience measures where they are most urgently needed. They can also help communities understand how their vulnerability compares coastwide. The focus on near-term implementation will be in concert with, and not at the expense of, recommended long-term coastwide planning and policies.

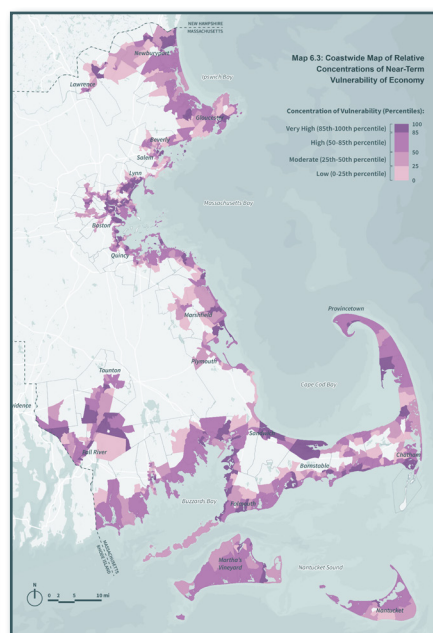
Near-Term Adaptation Areas were identified for each sector by mapping composite vulnerability scores across all Census Block Groups exposed to near-term coastal flooding. Composite scores were ranked coastwide and categorized into Low, Moderate, High, and Very High Concentrations of vulnerability. In addition, a cross-sector analysis identified areas with the highest concentration of vulnerability across 1, 2, or 3 sectors coastwide.



People and Housing indicators include number of people, including Environmental Justice populations, exposed to coastal flooding; estimated damages to residential structures exposed to coastal flooding; and the number of deed-restricted affordable housing units exposed to coastal flooding.

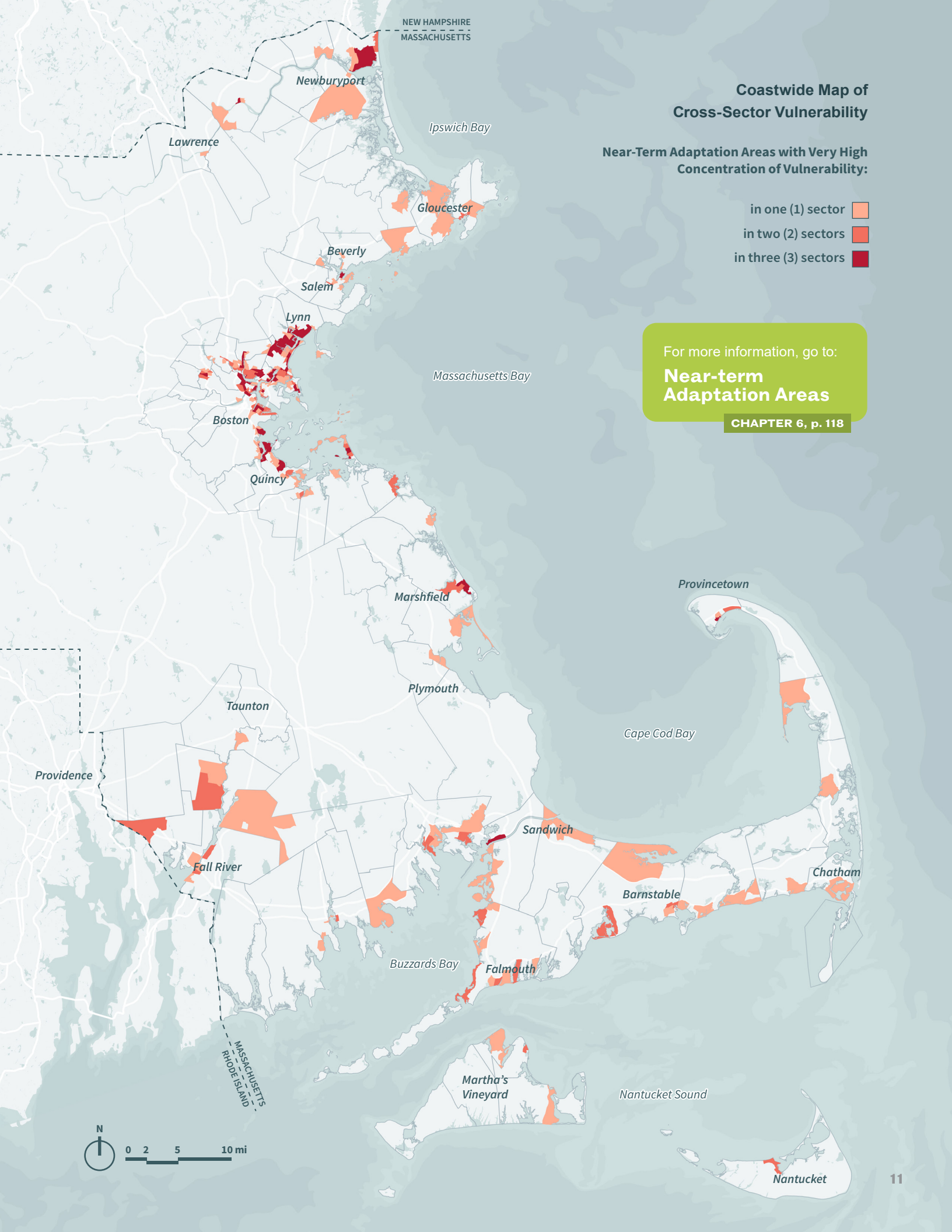


Built Infrastructure indicators include exposure of roadways to coastal flooding and extreme high tides; exposure of public transportation facilities, critical utilities (wastewater treatment, electrical substations, etc.), and public services and facilities (police, fire, hospital, health centers, etc.) to coastal flooding.



Economy indicators include coastal flood exposure of commercial and industrial employment locations; commercial and industrial structures themselves (i.e., estimated damages from coastal flooding); Designated Port Areas, working waterfronts, and active freight rail; and roadways vulnerable to disruption from extreme high tides.

¹ Based on the Massachusetts Coast Flood Risk Model 2030 1% annual chance flood extent.



Coastwide Map of Cross-Sector Vulnerability

Near-Term Adaptation Areas with Very High Concentration of Vulnerability:

- in one (1) sector
- in two (2) sectors
- in three (3) sectors

For more information, go to:
Near-term Adaptation Areas
CHAPTER 6, p. 118

Adapting to Coastal Hazards

Spanning over 1,500 miles, the Massachusetts coastline is both diverse and highly vulnerable to coastal hazards. Achieving coastal resilience is complex and there is no one-size-fits-all approach. However, understanding the coastal context – including types of coastal environments and their unique characteristics and vulnerabilities – can help inform the selection of coastal resilience measures.

While Coastal Resilience Districts and Near-Term Adaptation Areas can help identify **where** coastal resilience is needed, coastal typologies help inform **what type** of resilience measures are most suitable in different parts of the coast.

Coastal Typologies

Coastal typologies represent different types of coastal landforms and environments, natural and man-made, that exist and repeat across the coast. Identifying these typologies, their unique characteristics, risks, and management challenges, provides a framework for evaluating the suitability of different coastal resilience measures.

These coastal typologies are not an exhaustive list of coastal environments in Massachusetts but represent a common and relevant subset, primarily along the immediate shoreline and within the floodplain where the highest risks for coastal hazards coincide with vulnerable development.

The coastal typologies identified in the ResilientCoasts Plan include:



SALT MARSHES



**COASTAL BEACHES /
DUNES**



BARRIER BEACHES



COASTAL BANKS



TIDAL RIVER FLOODPLAIN



COASTAL FLOODPLAIN



**PORTS & WORKING
WATERFRONTS**

Coastal Resilience Measures

Numerous resilience measures can be implemented to address coastal hazards, ranging from site and building-level measures to community and regional-scale interventions. Each scale of implementation involves a variety of potential partners including federal, state, and local governments and private property owners.

The coastal resilience measures considered in the ResilientCoasts Plan can be grouped into one or more of the following five types: **Avoid, Restore, Accommodate, Protect, Retreat**.

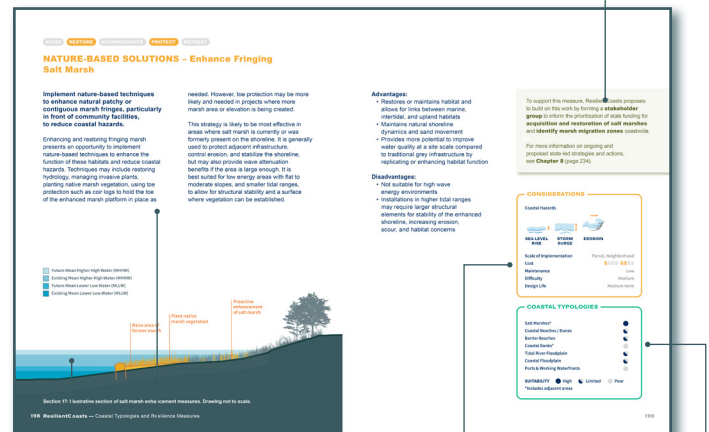
In many cases, a single coastal resilience measure can be categorized as more than one of the types above. Understanding the different types of measures and what they aim to achieve, as well as the benefit of combining measures to achieve complementary outcomes, can help maximize impact.

Each coastal resilience measure is ranked based on its suitability across coastal typologies. Rankings are on a qualitative scale from “poor” to “limited” to “high.” A poor suitability ranking indicates a measure is unlikely to be effective (or in some cases prohibited) while a limited suitability ranking indicates a measure may be effective but is highly site- and circumstance-specific. A high suitability ranking indicates a measure is likely to be effective in a coastal typology and should be considered.

In all cases, suitability rankings merely serve as a guide for evaluating resilience measures and further site-specific analysis is required to identify the most effective measures.

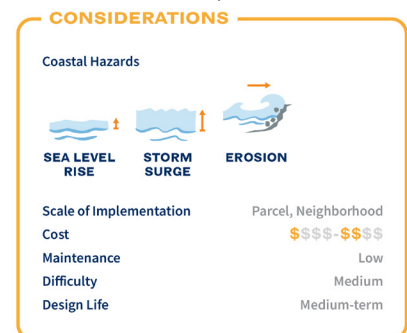
For each resilience measure:

Related state-led actions



Illustrative Section

Description, Advantages and Disadvantages



For more information, go to:

Coastal Typologies & Resilience Measures

CHAPTER 7, p. 140

Coastal Typologies and Resilience Measures Suitability Matrix

List of Coastal Resilience Measures

Zoning and Regulations	Land Use Management	AVOID	RETREAT
	Transfer of Development Rights	AVOID	RETREAT
New Building Standards	Build to Design Flood Elevation	ACCOMMODATE	
Building Retrofits	Wet Floodproofing	ACCOMMODATE	
	Dry Floodproofing	PROTECT	
	Elevate on Piers or Pilings	ACCOMMODATE	
Voluntary Acquisition	Relocate People and Housing	RESTORE	RETREAT
Road Infrastructure	Elevate and Right-Size Infrastructure	ACCOMMODATE	
	Relocate or Reroute	RESTORE	RETREAT
Critical Public Infrastructure	Elevate	ACCOMMODATE	
	Relocate	RESTORE	RETREAT
	Harden / Floodproof	PROTECT	
Land Protection	Protect Natural Resource Migration Pathways and Enhance Buffers	RESTORE	RETREAT
	Waterfront Parks and Open Spaces	ACCOMMODATE	RETREAT
Nature-Based Solutions	Beach and Dune Restoration	RESTORE	PROTECT
	Bank Stabilization	RESTORE	PROTECT
	Enhance Fringing Salt Marsh	RESTORE	PROTECT
	Cobble Berms	RESTORE	PROTECT
	Other Restoration and Enhancement	RESTORE	RETREAT
Hybrid Solutions	Floodwalls and Berms	PROTECT	
Coastal Engineering Structures	Retrofit and Redesign Seawalls	PROTECT	
	Retrofit and Redesign Breakwaters	PROTECT	
	Retrofit and Redesign Revetments	PROTECT	



State Leadership on Coastal Resilience

The scale and complexity of coastal vulnerability necessitates state leadership. The state can help navigate jurisdictional complexity, objectively evaluate and prioritize projects and funding needs across coastal regions, secure and allocate limited resources, and provide technical assistance and capacity-building for local implementation. Most importantly, the state can lead by example and proactively embed coastal resilience into state regulations, policies, investments, and decision making to reduce, adapt and avoid exposure to coastal hazards.

Bringing a statewide lens to coastal resilience can also help address our coastal challenges more holistically, integrating state priorities and initiatives designed to address larger scale trends that place additional pressure on coastal communities. Statewide issues like housing, transportation, environmental justice, the marine economy, and insurance all intersect with efforts to make our coast more resilient. A comprehensive statewide approach can help stabilize local economies, housing and insurance markets; protect critical natural and built infrastructure; and avoid losses and more expensive costs later.

While the Commonwealth strives to increase every community's resilience to coastal hazards and the impacts of climate change, there will ultimately be hard conversations about where and when to move people and infrastructure out of harm's way. These conversations can be made easier with state leadership, ongoing partnership with coastal communities, and a framework for understanding where communities are most vulnerable and where risk reduction can have the greatest collective impact.

State-led Strategies

In addition to partnering with and continuing to support the work of communities locally and regionally on coastal resilience, the Commonwealth can take steps to achieve coastwide resilience by embedding the ResilientCoasts framework across state government through its research, planning, policies, regulations and investments.

To achieve the Commonwealth vision for coastal resilience, the following ten state-led strategies have been identified:

1 – Identify and invest in district- and regional-scale projects and partnerships, tailored where necessary to region-specific needs and circumstances.

↳ The state proposes **7** actions under this strategy (see p. 236)

2 – Increase the resilience of new and re-development by integrating best available data on current and future coastal hazards.

↳ The state proposes **11** actions under this strategy (see p. 238)

3 – Require state investments to be informed by future climate conditions and avoid increasing unnecessary physical and financial exposure to coastal hazards.

↳ The state proposes **7** actions under this strategy (see p. 240)

4 – Acknowledge the fiscal realities of addressing coastal hazards by prioritizing resilience actions that have the highest impact and maximize long-term risk reduction.

↳ The state proposes **4** actions under this strategy (see p. 242)

5 – Support communities in identifying and reducing or eliminating physical and financial risks to people, buildings, and infrastructure and educate residents and property owners about risks.

↳ The state proposes **10** actions under this strategy (see p. 244)

6 – Build the science and evidence base for effective coastal resilience projects and techniques and facilitate use of best practices.

↳ The state proposes **7** actions under this strategy (see p. 246)

7 – Invest in protection, restoration, enhancement, and/or management of natural and cultural resources and public access to the shoreline.

↳ The state proposes **6** actions under this strategy (see p. 248)

8 – Invest in emergency preparedness and response based on current and future coastal hazards and ensure new and existing critical infrastructure can withstand coastal impacts to provide safe and reliable services to residents before, during, and/or after storms.

↳ The state proposes **5** actions under this strategy (see p. 250)

9 – Support and incentivize voluntary relocation of people, infrastructure, and other assets in areas that are currently or projected to be subject to repetitive flooding, inundation, erosion, and/or shoreline migration.

↳ The state proposes **7** actions under this strategy (see p. 252)

10 – Support a thriving coastal economy by facilitating and investing in the resilience of water-dependent industries, businesses, and recreational resources where appropriate.

↳ The state proposes **6** actions under this strategy (see p. 254)

For more information, go to:

State-led Coastal Resilience Strategies

CHAPTER 8, P. 230

What's Next?

The Commonwealth is committed to building on the ResilientCoasts Plan by sustaining public outreach and engagement, working directly with coastal communities and local stakeholders, expanding engagement with Tribal nations, and deploying state resources to support the needs and priorities outlined in the plan.

The ResilientCoasts Plan includes:

- A clear, consistent, equitable, and comprehensive framework for coastal resilience statewide including vision, principles, goals, indicators, and metrics for tracking success.
- A baseline for identifying and evaluating challenges and opportunities for coastal resilience both statewide and for distinct coastal regions.
- An initial data-driven approach to identifying areas for regional collaboration on coastal resilience (Coastal Resilience Districts), as well as areas with near-term concentrations of coastal flood risk to people, housing, infrastructure, and economic resources (Near-Term Adaptation Areas).
- Place-based guidance for key coastal typologies on the suitability of coastal resilience measures.
- A synthesis of feedback from coastal stakeholders about coastal resilience priorities and other on-the-ground knowledge, including where state leadership is most needed.
- Identification of existing gaps in technical resources and data, capacity, and funding that will need to be addressed to achieve success.
- State-led strategies to achieve coastal resilience including actions that can help support and accelerate local coastal resilience efforts while ensuring that the Commonwealth leads by example.

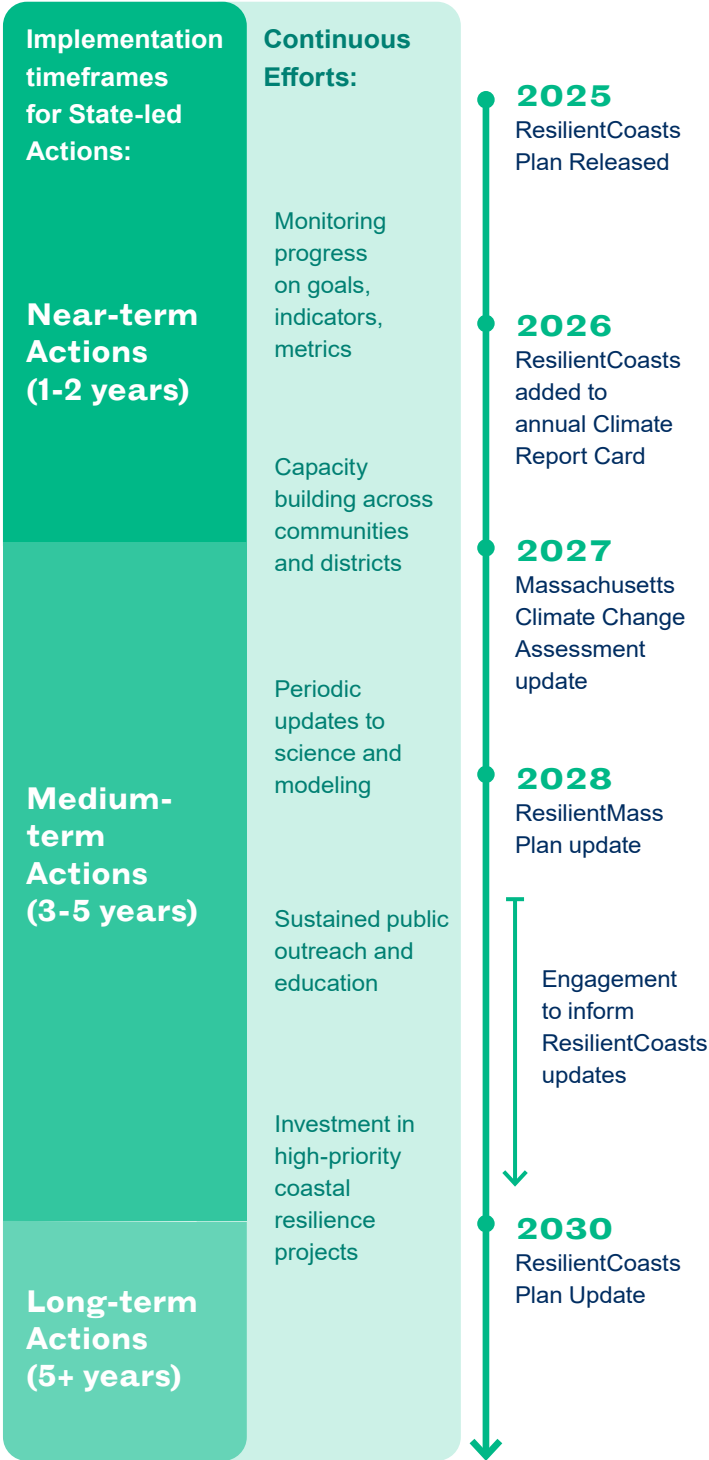
Because of the dynamic nature of coastal hazards and climate change, the state will need to be nimble in implementing ResilientCoasts. Forthcoming updates to the Massachusetts Coast Flood Risk Model, the Massachusetts Climate Change Assessment, and the ResilientMass Plan will help inform any adjustments to the implementation strategy or priorities. The ResilientCoasts Plan will be updated in 2030 and then as needed, and more interim progress reports will help transparently track progress on implementation efforts.

Next Steps

Future phases of ResilientCoasts will focus on implementation efforts, including support for design, permitting, and construction of coastal resilience projects and carrying out state-led strategies and actions, including regulatory, policy, and funding mechanisms.

In addition, ResilientCoasts will continue to prioritize inclusive and accessible community outreach and engagement, support for capacity-building and regional collaboration, and the development of technical resources and data to support coastal resilience at local, regional, and coastwide scales.

For more information and access to the full plan, visit mass.gov/info-details/resilientcoasts-initiative





ResilientCoasts Initiative

mass.gov