This document was approved by the NBEP Steering Committee on September 18, 2025. It has not yet been approved by EPA.

NARRAGANSETT BAY ESTUARY PROGRAM

WATER
WILDLIFE
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2025 Revision to the Comprehensive Conservation and Management Plan for the Narragansett Bay Region

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The NBEP Comprehensive Conservation and Management Plan (CCMP) was first adopted in 1992, then updated in 2012. This 2025 CCMP Revision was funded by agreement CE00A00967 awarded by the USEPA to Roger Williams University in partnership with the Narragansett Bay Estuary Program. Mentions of trade names, commercial products, or causes do not constitute endorsement or recommendation for use.

Suggested citation: Narragansett Bay Estuary Program. 2025. Water, Wildlife, Way of Life: CCMP Revision 2025. Revision to the Narragansett Bay Comprehensive Conservation and Management Plan created under the National Estuary Program. Providence, R.I.

Preface

This 2025 Revision to the Comprehensive Conservation and Management Plan (CCMP) for the Narragansett Bay region is a ten-year blueprint for collaborative action among partners of the Narragansett Bay Estuary Program (NBEP) to sustain and restore Narragansett Bay, Little Narragansett Bay, the Coastal Salt Ponds, and their watersheds in Rhode Island (RI), Massachusetts (MA), and Connecticut (CT), hereafter "Narragansett Bay region." The estuaries, rivers, streams, and watersheds of the Narragansett Bay region are home to diverse and vibrant habitats, wildlife, and human communities. This CCMP Revision aims to build upon conservation successes while addressing legacy and emerging threats to this beautiful landscape and its inhabitants.

NBEP is a catalyst for scientific inquiry and collective action to investigate, document, restore, and protect water quality, wildlife, and quality of life in the Narragansett Bay region. Since NBEP's last CCMP Update (NBEP 2012), NBEP has intentionally broadened its geographic and organizational focus to emerge as a partnership-based, service-oriented organization rooted in science and dedicated to action throughout the 2,000 square mile Narragansett Bay region. The 113 actions in the 2012 CCMP have been consolidated into 24 priority opportunities for collaborative work. All 24 Actions arose from an intensive five-year period of input from NBEP committee members and other partners. Each Action has been carefully considered through four strategic lenses: regionalism, connectivity, resiliency, and fairness. In highlighting these strategic lenses, NBEP strives to acknowledge and center the Narragansett Bay region's long, shared history of industrialization and habitat fragmentation that set the stage for current challenges. At the same time, NBEP looks to the strategic lenses for inspiration to rightfully restore a landscape that has provided so much to its residents, and to capitalize on the region's strengths and opportunities to shape a lasting future for our water, wildlife, and ways of life.

2025 CCMP Revision Framework



Acknowledgements

The Narragansett Bay Estuary Program Steering, Executive, and Science Advisory Committees provide invaluable guidance, energy, and expertise for all collaborative endeavors, including this CCMP Revision. Thank you.

NBEP Staff (2025): Danielle Moore, Jennifer Rogers, Mariel Sorlien, Courtney Schmidt, and Darcy Young.

Thank you to the former NBEP staff members who shaped the process of this CCMP Revision: Julia Bancroft, Mike Gerel, and Julia Twitchell.

Facilitators: Coastwise Partners

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Figure 1. Narragansett Bay Estuary Program Watersheds

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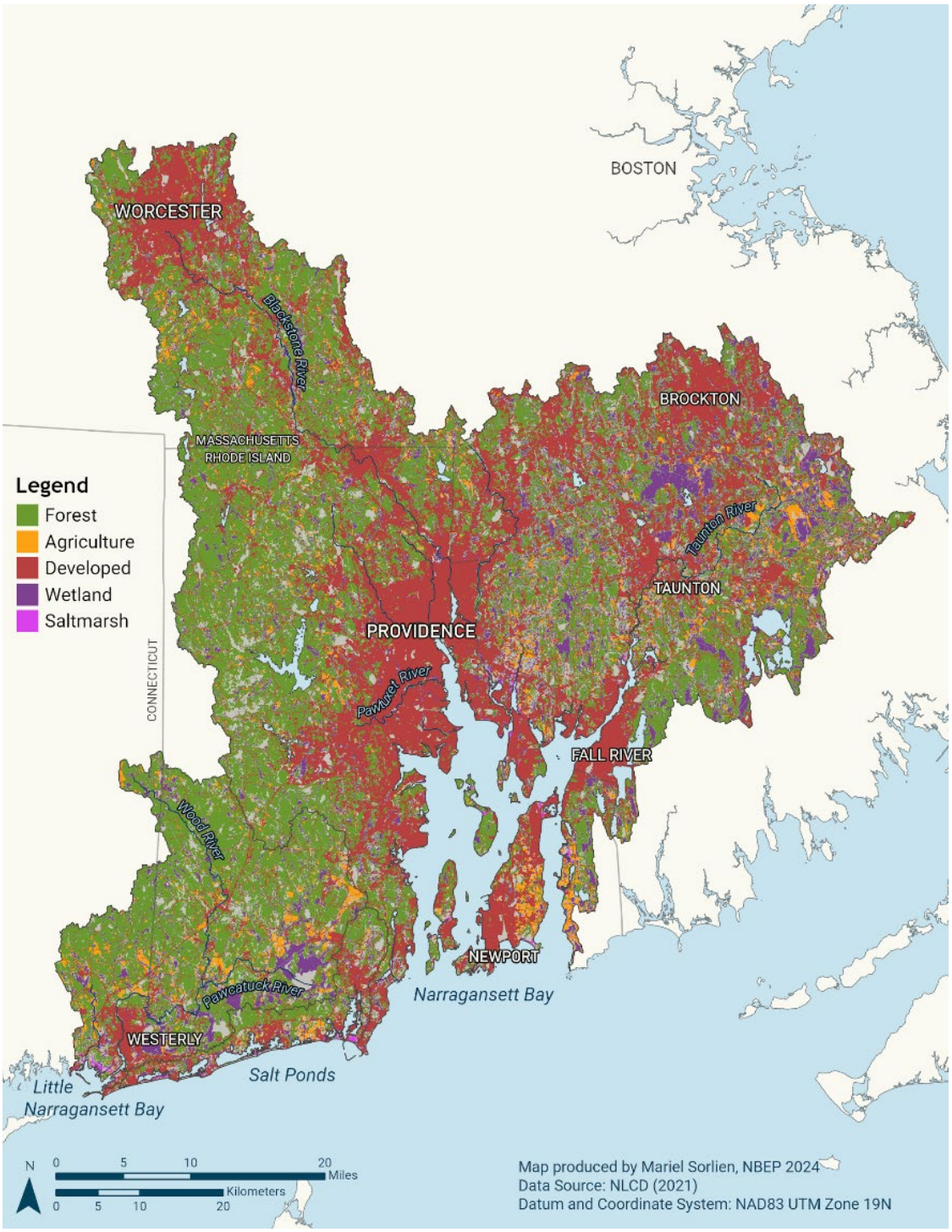


Figure 2. Land uses (2021) in the Narragansett Bay region.

About the Narragansett Bay Region

The Narragansett Bay region spans over 2,000 square miles of land comprising the watersheds of Narragansett Bay, Little Narragansett Bay, and the Coastal Salt Ponds. This landscape unites two million people across 113 cities and towns in Massachusetts, Rhode Island, and Connecticut. A mosaic of urban and suburban lands is surrounded by forested landscapes and networks of rivers and streams. Reaching inland more than 50 miles, the region's watersheds have over 4,000 miles of rivers and streams and over 40,000 acres of lakes and ponds. Salty shores stretch along 700 miles of dunes, beaches, and rocky coasts. The region hosts diverse habitats, including roughly 4,300 acres of salt marsh habitat and 875 acres of seagrass habitat, that sustain wildlife, support regional economies, and provide recreational opportunities.

Narragansett Bay Watershed

The Narragansett Bay watershed spans 1,705 square miles across Rhode Island and Massachusetts and includes the major tributaries of the Blackstone River, Taunton River, and Pawtuxet River that flow into the 196 square mile bay. In Narragansett Bay, salt marshes and seagrasses have declined considerably from historical extents. Fish communities are transitioning toward seasonal and mid-Atlantic species as Bay water temperatures rise. Storms have eroded Bay shorelines. Upland in the watershed, development pressure is a major stressor, causing loss of forested and wetland habitats, impacting wildlife and the health of inland and coastal waters. The watershed is fourteen percent impervious cover and half of rivers and streams are unhealthy for fish and wildlife due to excess nutrients, oxygen depletion, and other parameters (NBEP 2017). Thousands of barriers, including dams and improperly sized culverts, not only block migration for important diadromous fish populations, but also increase flood risk. These impacts are felt particularly in the urban areas of Providence, Worcester, Fall River, and Woonsocket, where increasingly intense rainfall events flood roads, homes, and businesses. Decades of efforts have dramatically reduced nutrient and bacteria pollution in the Bay, yet half of the estuarine waters are still unhealthy for fish and other aquatic life, with stormwater pollution driving the majority of impairments (NBEP 2017).

Little Narragansett Bay Watershed

The Little Narragansett Bay watershed spans 317 square miles across western Rhode Island and southeastern Connecticut and includes the major tributaries of the Wood River and Pawcatuck River that flow into a 4.8 square mile estuary. Compared to the Narragansett Bay watershed, the Little Narragansett Bay watershed has one-fifth the population density and is more heavily forested and protected with conservation lands. The Barn Island Wildlife Management Area—the largest managed coastal habitat area in Connecticut—protects substantial areas of salt

marsh, deciduous forest, and avian habitat. Only five percent of the watershed is impervious cover and over seventy percent of the assessed streams and rivers are fit for aquatic life (NBEP 2017). Increasingly, the major watershed stressor is development-driven changes in land use. Water quality impacts tend to be concentrated near these expanding developed areas. Within the bay proper, seagrasses remain scarce and shellfishing is prohibited due to water quality concerns.

Coastal Salt Ponds Watersheds

The Coastal Salt Ponds watersheds span 56 square miles along the southern coast of Rhode Island, running from Point Judith in the east to Little Narragansett Bay in the west. The Rhode Island Coastal Salt Ponds—Judith Pond, Potter's Pond, Cards Pond, Trustom Pond, Greenhill Pond, Ninigret Pond, Quonochontaug Pond, Winnapaug Pond, and Maschaug Pond—function as coastal estuarine lagoons connected to the ocean by inlets or breachways through barrier beaches. The ponds are shallow and brackish, which make them valuable as fish and shellfish nurseries but also susceptible to eutrophication and bacterial loading. Each pond has a unique identity and supports iconic wildlife and coastal habitats as well as many important commercial and recreational activities, including aquaculture. Pond assessments show 85% are fit for aquatic wildlife and 100% are fit for recreation (NBEP 2017). The long stretches of adjacent sandy beaches draw locals and visitors alike, making them important recreational and economic resources. Population size and development have grown across the salt ponds region in the last twenty years, though the population density is still only half that of the Narragansett Bay watershed. Rising sea levels and altered hydrology are major stressors for these unique coastal salt pond habitats causing erosion and subsidence that outpace marsh accretion.

About NBEP

NBEP is a catalyst for scientific inquiry and collective action to restore and protect water quality, wildlife, and quality of life in the Narragansett Bay region, including Narragansett Bay, Little Narragansett Bay, the Coastal Salt Ponds, and their watersheds. NBEP envisions clean water and habitat to sustain all who live, work and play in the Narragansett Bay region. Founded in 1987, NBEP is one of 28 National Estuary Programs created by §320 of the United States Clean Water Act. Hosted by Roger Williams University (RWU), with a staff of five and governed by a 28-member Steering Committee, NBEP is the only partner-led organization pursuing place-based conservation across the three-state Narragansett Bay region of Rhode Island, Massachusetts, and Connecticut.

Management Conference

NBEP's shared governance structure, consisting of dedicated staff and interns along with three volunteer Standing Committees, ensures that open discussion, cooperation, consensus-building, and collaborative decision-making among diverse partners advances the CCMP and mission.

Three Standing Committees—Steering Committee, Executive Committee, and Science Advisory Committee—include partners that represent the States in the region, the US Environmental Protection Agency (EPA) and other interested Federal agencies, local governments, interstate or regional entities, nonprofit conservation organizations, educational institutions, general public, and the host institution (Table 1). As NBEP's host institution, Roger Williams University administers program funding and provides fiscal and program oversight. Each committee aspires to include a broad representation of interests that reflect the geographic, economic, and cultural diversity of the region.

- **The Steering Committee** is NBEP's primary governing body and assists the EPA, Host Institution, and NBEP Executive Director with setting the direction for NBEP. The Steering Committee of 28 members serves as a forum for open discussion, consensus building, and collaborative partner decision-making to advance implementation of the NBEP CCMP and mission.
- **The Executive Committee** is a designated subset of eight members of the Steering Committee that offers counsel on major decisions facing the NBEP Executive Director, Steering Committee, or program.
- **The Science Advisory Committee** provides a forum for NBEP and its partners to examine, discuss, synthesize, and share scientific findings to facilitate integration of science with management decisions, and offers guidance to ensure the scientific integrity of NBEP's work.

NBEP Standing Committee Members (as of August 2025)

Executive Committee
Chair Caitlin Chaffee, Chief, Narragansett Bay National Estuarine Research Reserve
Vice Chair David Monti, Journalist, Recreational Fisherman, Charter Captain, No Fluke Fishing Charters
Richard Carey, Director, Watershed Planning Program, Massachusetts Department of Environmental Protection
Topher Hamblett, Executive Director, Save The Bay
Susan Kiernan, Administrator, Office of Water Resources, Rhode Island Department of Environmental Management
Regina Lyons, Chief, Ocean and Coastal Protection Section, U.S. Environmental Protection Agency – Region 1

E. Heidi Ricci, Director of Policy and Advocacy, Mass Audubon
Peter Wong, Director, Office of Research and Sponsored Programs, Roger Williams University
Steering Committee (*Executive Committee Member)
Chair Caitlin Chaffee*, Chief, Narragansett Bay National Estuarine Research Reserve
Vice Chair David Monti*, Journalist, Recreational Fisherman, Charter Captain, No Fluke Fishing Charters
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Walter Berry, Representative, Rhode Island Rivers Council
Joe Callahan, President, Taunton River Watershed Alliance
Richard Carey*, Director, Watershed Planning Program, Massachusetts Department of Environmental Protection
Stefanie Covino, Executive Director, Blackstone Watershed Collaborative
Richard Friesner, Director of Water Quality Programs, New England Interstate Water Pollution Control Commission
Ben Greenstein, Public Member
Sam Haines, South Coastal Regional Coordinator, Massachusetts Office of Coastal Zone Management
Allison Hamel, Principal Environmental Scientist, Rhode Island Department of Transportation
Robert Johnston, Professor of Economics and Director, George Perkins Marsh Institute, Clark University
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NBEP’s Evolution

Over the past 10 years, NBEP intentionally built upon its identity as a funder of research and restoration to emerge as a more collaborative, interdisciplinary, and nimble body that provides a range of services and financial support to projects that respond to local needs and scientific findings across the Narragansett Bay region. To make this transition, NBEP leveraged partnerships to fully acknowledge issues and opportunities throughout the entire watershed and associated estuaries with a key focus on engagement with partners in Massachusetts. NBEP

conducted deep relationship-building through hundreds of one-on-one meetings with new partners to expand participation in decision-making and understand how NBEP's services could fill needs. Since 2018, NBEP's Steering Committee has added new representation from fishing, health, transportation, non-governmental organizations, and the general public while retaining a nearly balanced membership across Rhode Island and Massachusetts. NBEP's committee meetings, working groups, and funded projects function as collaboration hubs for these partners to work on common issues and opportunities outside of regular geopolitical, organizational, and cultural boundaries. As of the publication of this 2025 CCMP Revision, NBEP has solidified an organizational niche as a collaborative and partnership-based organization with a service-oriented and science-based approach to addressing complex environmental issues.

NBEP's Services

Guided by science and the shared will of the partnership, NBEP pursues lasting solutions to the region's interrelated environmental challenges of urbanization, pollution, and a shifting baseline of environmental conditions to improve wildlife habitat and water quality. NBEP catalyzes collective action across geopolitical boundaries by providing collaborative planning services, science synthesis and communication tools, and project funding (Figure 3).

NBEP's Guiding Principles

- Be bold and maximize sustainable benefits
- Integrate and communicate best-available science for management decisions
- Build regional collaboration as a neutral convener of varying perspectives
- Secure and leverage the unique geopolitical identity of the Narragansett Bay region
- Support locally-driven capacity and priorities
- Focus on storytelling with people and places that demonstrate the importance of conservation
- Be of service to partners

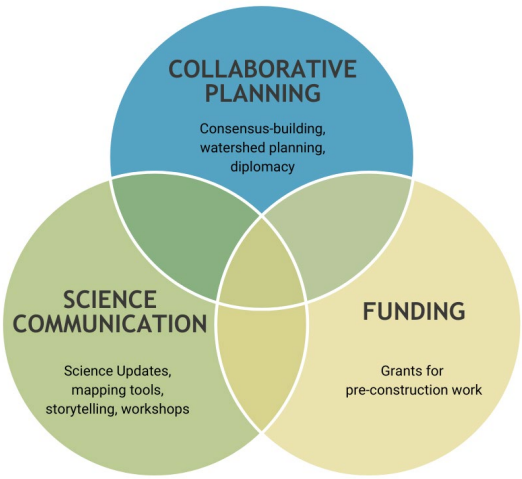


Figure 3. NBEP Services

Collaborative Planning

NBEP pursues independent convening, planning, and consensus-building among diverse groups of partners and communities to address shared issues and opportunities. Key examples of NBEP's collaborative planning work include:

- The *Blackstone Needs Assessment* project, in which NBEP convened Blackstone River Watershed interests to explore local needs, develop the Blackstone River Watershed Needs Assessment Report (NBEP 2021a), and establish a local coordinating organization to lead implementation of the report. As of 2025, the Blackstone Watershed Collaborative is an independent nonprofit organization operating as an impact network to promote learning and coordinate action to solve complex watershed issues that no one organization could solve on its own. This work also provided a replicable model for creating the pre-conditions necessary to advance paired ecosystem and community health in other large and complex watersheds in the Narragansett Bay region.
- The *Lower Blackstone Fish Passage Project*, in which NBEP led partners to reinvigorate progress on efforts to establish diadromous fish passage across four dams on the lower Blackstone River in Pawtucket, Rhode Island. In 2022, NBEP transitioned to a funder role and now supports the capacity of lead partners to continue convening, advocacy, and planning work on the largest fish passage project in the Narragansett Bay watershed with over $500,000 of NBEP's Infrastructure Investment and Jobs Act funds allocated to date.
- Science Working Groups that convene partners to investigate and respond to ongoing and emerging topics, including:
    - Salt Marsh Restoration, Assessment, and Monitoring Program (RAMP): Established in 2020 to formalize a decades-long cooperation between multiple federal, state, local, non-profit, and academic agencies to restore, assess, and monitor salt marshes throughout Rhode Island.
    - Social Science Working Group: Established in 2020 to advance the integration of current social science into environmental decision-making in the Narragansett Bay region.
    - Fishermen's Ecological Knowledge Working Group: Established in 2021 to create a collaborative multidisciplinary team to assess how best to integrate fishermen's observations into existing ecological monitoring frameworks.
    - Seaweed Ecology and Assessment Collaborative (SEAC-RI): Established in 2024 to understand the role macroalgae plays in the ecosystem and how it impacts seagrasses, oyster beds, and other habitats throughout the region.
    - Submerged Aquatic Vegetation Working Group: Established in 2020 and revitalized in 2025 to advance seagrass monitoring and restoration in Rhode Island waters.
    - Coastal Urban Waters Research Collaborative: Established in 2024 to provide cross-state collaboration and coordination to understand ecosystem change in

urban coastal waters informing resource management, resilience, and habitat improvement.

Science Synthesis and Communication

NBEP provides scientific data analysis and communication using innovative storytelling and open-source web application tools to investigate complex socioenvironmental topics. NBEP serves as a hub for information-sharing tools such as:

- 2017 State of Narragansett Bay and its Watershed Report: This technical report, co-authored by NBEP and partners, describes 24 environmental and socioeconomic condition and stressor indicators that assess Narragansett Bay and its watershed (NBEP 2017). Since publication, NBEP has updated numerous indicators with more recent data, added new focus areas to existing indicators, and expanded indicators to cover the entire Narragansett Bay region to include the Rhode Island Coastal Ponds, Little Narragansett Bay, and their respective watersheds (See Appendix A).
- A publicly-accessible GIS Data Hub that facilitates data-sharing and hosts interactive maps and StoryMaps to dive into complex topics, including:
    - How Do We Use Our Coasts? StoryMap (NBEP 2021): NBEP, alongside partners at US EPA, used anonymized cell phone visitation data to assess usage of public coastal access sites.
    - Hundred Acre Cove Septic Viewer and Stormwater Infrastructure Dashboard (Save The Bay 2021a): NBEP, in partnership with Save The Bay, created GIS tools to inform actions to better protect water quality in Hundred Acre Cove in the tidal Barrington River.
    - Clean Water and Quahogs StoryMap (NBEP 2022): NBEP created an interactive tool to explain and celebrate the conditional opening of 1,900 acres of the lower Providence River for shellfishing for the first time in 75 years.
    - Into the Woods: Solar in the Forest StoryMap (NBEP 2024): NBEP created a tool to visualize the number and location of ground-mounted solar projects in the Narragansett Bay region and assess how much undeveloped land has been lost to solar development across the region and at subwatershed scales.
- Open-source data visualization tools:
    - WQDashboard (2025): NBEP built a web tool using the Shiny application for R to enable local watershed groups to display water quality data on their websites. As of 2025, the tool has been adopted by the Blackstone River Coalition and the Salt Ponds Coalition.

- MarshMap (2025): At the request of the Salt Marsh RAMP Working Group, NBEP built a tool that displays information about salt marsh restoration and monitoring projects in Rhode Island.

Project Funding

NBEP provides watershed project funding that helps build a pipeline of future projects that restore and sustain the natural environment. Funding supports research, staff capacity, and project planning steps, including studies, assessments, and engineering design. NBEP's far-reaching outreach to partners between 2019–2021 identified a lack of local capacity in state agencies, municipalities, and non-governmental organizations as the single biggest barrier to new project development in the Narragansett Bay region. In response, NBEP developed a nine-step Project Development Process (Figure 4) that aims to communicate the importance of often-underfunded pre-project development steps, from engagement to design and planning. As a result of this outreach and the significant influx of Infrastructure and Jobs Act funds beginning in 2022, NBEP cemented its niche as a funder of pre-construction engagement and planning. While the sunset of Infrastructure Investment and Jobs Act funds will impact NBEP's ability to support project development, this CCMP Revision lays the foundation for work to secure alternative sustainable funding sources.

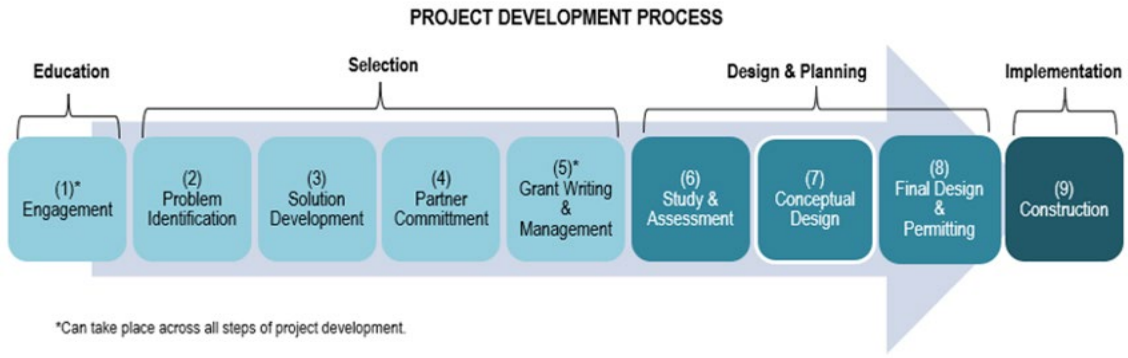


Figure 4. NBEP Project Development Process.

Since 2019, NBEP has granted over $5 million to priority restoration, research, and community engagement projects (Figure 5), including:

- Green Infrastructure Grants (2021, 2022): NBEP awarded $953,988 in §320 funds for stormwater planning projects that align natural and engineering processes to improve water quality and reduce flooding while offering a range of co-benefits, including resilience to increasing rainfall intensity, wildlife habitat, public health, and other socioeconomic and community enhancements.
- Capacity-Building Grants (2022, 2023): NBEP awarded over $1 million in §320 and Infrastructure Investment and Jobs Act funds to support staff capacity within seven partner organizations. To date, recipients have more than doubled the amount awarded to them by NBEP in additional grant leverage. The early results of this grant program demonstrate the power of supporting people and organizations that already have relationships and agency to push projects forward.

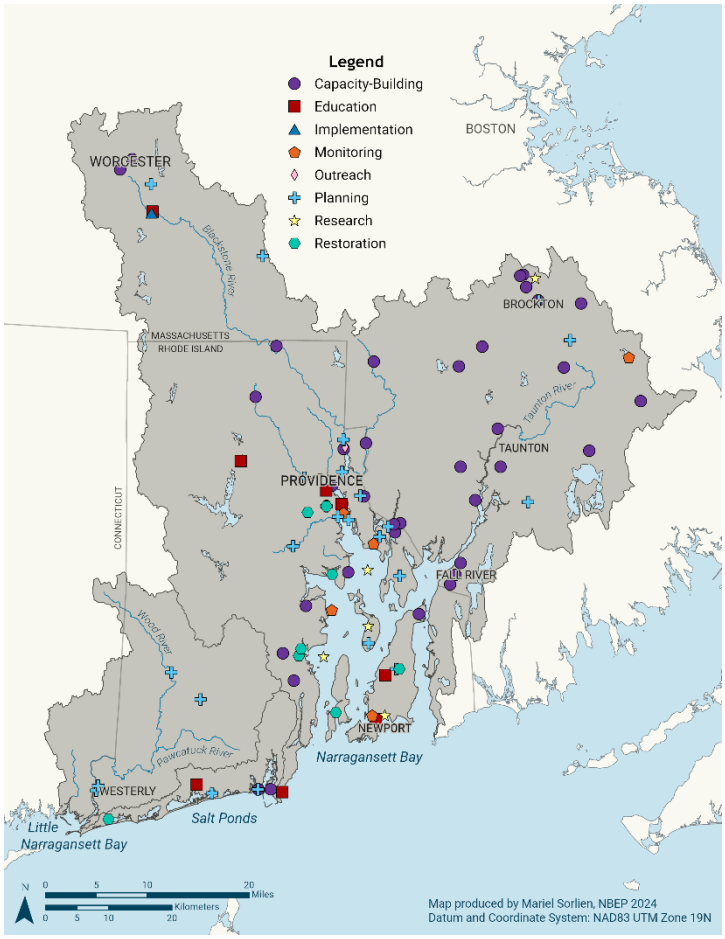


Figure 5. Projects funded by NBEP, 2012– 2024.

- Habitat Restoration and Public Access Grants (2023): NBEP awarded $748,822 in Infrastructure Investment and Jobs Act funds for seven planning projects to improve watershed habitats and public access to those habitats. Project benefits include improving marsh resilience and creating more waterfront public recreational access points while restoring coastal habitat and improving flood resilience. Grants help fund the critical early pre-construction phases of project planning and design.
- Public Outreach and Education Grants (2021–2025): NBEP awarded $167,086 in §320 funds for eleven outreach and education projects seeking to meaningfully involve watershed residents in restoration. From school programs, to work-force development, to volunteer programs and boater outreach, these grants help partners directly educate and engage the public on key watershed issues.

- Aquatic Habitat Connectivity Grants (2022, 2024, 2025): NBEP awarded over $2.25 million in Infrastructure Investment and Jobs Act funds for capacity-building and planning projects that seek to remove barriers to aquatic organism passage, including dam removals, culvert upgrades, and fish passage structures. These projects help support important fisheries and better protect communities from flooding.

About the CCMP Vision and Strategy

This 2025 CCMP Revision is a regional call to action for shared efforts that can measurably improve the region's water quality, wildlife, and quality of life over the next decade. Rather than a comprehensive list of the many ongoing initiatives that will benefit the region's estuaries and watersheds, this 2025 CCMP Revision contains a targeted set of priority Actions for collaborative work among NBEP staff, organizations represented on NBEP's committees, and other partners throughout the watershed. The list of priority Actions was crafted using a cooperative process that reflects best available science.

Partner Engagement for Revising the CCMP

NBEP's first CCMP was adopted in 1992, then updated in 2012 (NBEP 2012). In 2019, NBEP began work on this 10-year Revision. The program sought, obtained, and responded to broad input from scientists, resource managers, and environmental advocates through:

- 17 meetings attended by 150 individuals
- two public surveys with 369 responses
- 30 formal presentations and hundreds of one-on-one meetings
- a dedicated website providing public access to planning materials and meeting invitations

NBEP's process focused on priority actions that NBEP and its partners have the expertise and agency to complete within ten years, rather than long lists of aspirational actions. A crosswalk of the status of 2012 CCMP Actions versus 2025 CCMP Actions highlights the more focused approach (Appendix C).

Strategic Lenses for Action

Actions in this 2025 CCMP Revision reflect four cross-cutting issues important to the partnership:

Regionalism

Actions leverage the partnership's unique geopolitical identity as the Narragansett Bay region to build regional partnerships for collaboration and cross-boundary coordination.

Since the publication of the 2012 CCMP, several interstate watershed groups focused on the Taunton, Blackstone, and Wood-Pawcatuck watersheds have gained strength, visibility, and agency to pursue priorities at watershed scales. The SNEP Network, which provides technical assistance services to communities throughout Southern New England, emerged in 2019 as a crucial support and networking tool for communities seeking assistance with watershed planning. NBEP and partners will build upon these strengths to continue providing services to Massachusetts and Rhode Island partners while seeking to establish new partnerships with communities and organizations in the Little Narragansett Bay watershed in Connecticut.

Connectivity

Actions reflect the importance of connection—people to people, people to natural spaces, watersheds to estuaries, and wildlife to their habitats—by protecting access, removing barriers, and facilitating dialogue.

Habitat connectivity is a prime focus area for NBEP over the next ten years. Priorities include facilitating and funding progress on reconnecting rivers and streams from their headwaters to their receiving estuaries and connecting coastal marshes to uplands to facilitate marsh migration with rising seas. Local watershed groups have gained capacity in recent years and are in good position to continue driving connectivity projects that respond specifically to needs in their watersheds. Regional salt marsh working groups, including the Salt Marsh RAMP and the Massachusetts Ecosystem Climate Adaptation Network (Mass ECAN) Salt Marsh Working Group, have collaboratively pioneered techniques for restoring and reconnecting subsiding and drowning marshes and are working together to coordinate restoration and monitoring of large projects.

Resiliency

Actions are responsive and resilient to extreme weather events, including more intense precipitation events, storm surge intensification, and higher sea levels. These impacts exacerbate coastal and rain-driven flooding while eroding coastlines, riverbanks, and marshes.

States in the Narragansett Bay region are taking lead roles in planning and funding projects to increase the region's resilience. The Massachusetts Municipal Vulnerability Preparedness (MVP) Program, first piloted in the Taunton River watershed, was established statewide in 2017 and has since 2018 provided over $15M to communities in the Massachusetts portion of the Narragansett Bay region to increase their resiliency through vulnerability assessments and

project planning. Rhode Island's Municipal Resilience Program (MRP) has granted over $18M to cities and towns between 2020–2024 to complete municipal-driven workshop processes and implement priority projects.

Fairness

Actions strive to deliver fair distribution of benefits.

Since the publication of the 2012 CCMP, NBEP and partners have worked to plan for fairer distribution of environmental programs and benefits. For example, NBEP has intentionally invited more Massachusetts representatives to participate in its committees and working groups. As a result, NBEP has supported more projects and organizations in the region's tributaries and watersheds in addition to projects in Narragansett Bay proper. Furthermore, NBEP has worked to engage new partners through grant programs, innovative outreach and convening, and research initiatives that elevate fishers and shellfishers, Tribes, and grassroots organizations.

CCMP Framework for Action

With partner consensus, NBEP set four major Goals for People, Water, Habitat, and Public Spaces. Goals are supported by four Action Plans with a hierarchy of 12 Objectives and 24 Actions for achieving those goals (Appendix B).

2025 CCMP Revision Strategy by Action Plan

PEOPLE READY TO ACT	WATER QUALITY IMPROVEMENT	HABITAT PROTECTION AND RESTORATION	PUBLIC SPACES ACCESSIBLE TO ALL
VISION: Informed and engaged partners are empowered to implement the CCMP.	VISION: Waters support healthy ecosystems and communities by meeting their designated uses, including healthy fish and wildlife habitat, drinking water supply, fishing, shellfish harvesting, and recreation.	VISION: Resilient and connected landscapes and waterways support healthy habitats and wildlife and provide people with ecosystem services like clean air and water, flood protection, recreation, and sustainable harvest.	VISION: All communities enjoy their right to safe access to nature.
GOAL: Provide foundational knowledge, capacity, and drivers for CCMP implementation.	GOAL: Improve water quality to support healthy ecosystems and communities.	GOAL: Restore and protect habitats to support wildlife and people.	GOAL: Ensure all communities realize long-term benefits of healthy watersheds.
OBJECTIVE 1: Increase meaningful and useful partner and public engagement.	OBJECTIVE 1: Improve collection and use of water quality data for decision-making.	OBJECTIVE 1: Improve collection and use of habitat data for decision-making.	OBJECTIVE 1: Increase managed public access to nature.
OBJECTIVE 2: Improve access to and use of information to improve ecosystem management and public understanding.	OBJECTIVE 2: Reduce pollution from stormwater runoff.	OBJECTIVE 2: Improve habitat resilience.	OBJECTIVE 2: Improve communication about environmental health hazards.

OBJECTIVE 3: Accelerate CCMP implementation by supporting efforts to increase regional cooperation.	OBJECTVIE 3: Reduce pollution from wastewater discharges, onsite wastewater systems, and combined sewer overflows.	OBJECTIVE 3: Improve habitat connectivity and function.	
	OBJECTIVE 4: Reduce trash and marine debris pollution.		

Anatomy of an Action Brief

- **Action Description and Statement of Need** – what partners and NBEP staff will do and why
- **Potential Projects** – specific actionable tasks needed to implement the action plan
- **Outputs** – products or services resulting from the action
- **Outcomes** – system changes expected from completing the action
- **State of the Watershed Indicators** – metrics by which change will be measured
- **Role of NBEP** – specifies the service(s) that NBEP staff will provide: convene, synthesize and communicate science, fund capacity and projects
- **Implementing Partners** – organizations that can lead or assist with action implementation due to their statutory authority, expertise, and anticipated work activities
- **Location** – specific watershed location, if any, where the action will be directed
- **Timeline for Initiation** – time frames for initiating the action: ongoing (initiated before 2025), short-term (1–3 years 2025–2028), medium-term (4–6 years 2029–2031), long-term (7–10 years 2032–2035)
- **Estimated Costs** – costs for all partners over 10 years estimated at five levels (2024 dollars):
  $10K–500K (NBEP staff time, capacity-building and outreach grants)
  $500K–1M (convene partners, support research/modeling projects)
  $1M–5M (develop and implement regional plans)
  $5M–10M (project plans - designs and permits)
  $10M+ (infrastructure and restoration construction)
- **Potential Funding Sources** – organizations or grants with potential to fund projects

Supporting Documents

Implementation of the CCMP Strategy is supported by several overarching NBEP guidance documents:

- *The State of Narragansett Bay and Its Watershed* (2017, to be updated 2027) details the status and trends for a suite of 24 stressor and condition indicators and provides insights into the ecosystem health and resilience of the Narragansett Bay region.
- *NBEP Research Plan* (2024) created the Urban Waters Research Collaborative and guides NBEP's scientific program, including setting targets for funding research to implement the CCMP.

- *NBEP Engagement Plan* (to be adopted by 2028) will specify guiding principles and strategies to convene and activate partners and key audiences on priority environmental issues and promote a regional identity.
- *NBEP Habitat Restoration Plan* (to be adopted by 2028) will outline opportunities to protect and restore key watershed and estuarine habitats.
- *NBEP Finance Plan* (to be adopted by 2028) will describe the strategy for NBEP's long-term financial sustainability as well as catalyze fundraising and investments for projects that implement the CCMP.

People Ready to Act Action Plan

Vision	Informed and engaged partners are empowered to implement the CCMP.
Goal	Provide foundational knowledge, capacity, and drivers for CCMP implementation.

Priority Opportunities and Challenges

As a catalyst for scientific inquiry and collective action, NBEP provides foundational knowledge, capacity, and drivers for people to act. NBEP fulfills its roles by convening partners, synthesizing and communicating science, funding capacity and projects, and voicing support across three objectives to advance engagement, information and tracking, and regional cooperation.

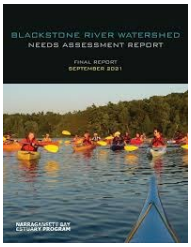
Engagement

Implementation of the NBEP CCMP requires informed, engaged, and empowered partners contributing collectively to shared goals. NBEP will build on its track record as a neutral convener and "honest broker" by developing a regional Engagement Plan to prioritize and focus NBEP's engagement with partners and priority audiences (Action: People-1.1).

Information and Tracking

NBEP consistently tracks and reports on the status and trends of ecological conditions of greatest concern for management and public interest. Monitoring, research, data synthesis, and modeling are necessary to ensure that NBEP's reporting is based on the best available science.

Public Engagement Highlight: Blackstone River Watershed Needs Assessment Report



NBEP convened a broad group of Blackstone River Watershed interests between 2019 and 2021 to explore local needs. The resulting Blackstone River Watershed Needs Assessment Report (NBEP 2021a) describes high-priority needs and 20 recommended actions. The first recommendation in the assessment, creation of the Blackstone Watershed Collaborative and hiring of a manager to oversee it, was accomplished in 2021 with NBEP funding. The Blackstone Watershed Collaborative has to date leveraged over $1M in other funding sources to continue its operation and support of small organizations. This project enabled the Blackstone River to join Narragansett Bay's other major tributary, the Taunton River, in having an up-to-date plan and coordinating organization to lead its implementation.

In 2024, NBEP and partners developed a Research Plan to coordinate and foster research necessary to better understand ecosystem change, improve aquatic habitats, and advance work on environmental indicators. Implementation of the NBEP Research Plan (Action: People-1.2) will increase information and understanding to inform, guide, and evaluate management actions. Advancing and increasing use of integrated ecosystem data synthesis and modeling tools (Action: People-2.2) will better equip scientists and managers to make decisions and better understand the complex interactions between water quality, ecosystems, and socioeconomic indicators.

In 2003, NBEP and partners developed a suite of environmental indicators for Narragansett Bay and its watershed (NBEP 2003). In 2017, the list was reviewed and expanded to 24 stressor and condition indicators that underlie ecosystem and socioeconomic health (NBEP 2017). Since then, indicators have been updated with new data and focus areas (Appendix A). There is a continued need to refine and improve metrics of existing indicators and develop new environmental and socioeconomic indicators to address priority management issues that may arise (Action: People-2.3).

Information and Tracking Highlight: Narragansett Bay Watershed Economy Report



The Narragansett Bay Watershed Economy Report (Uchida *et al*. 2019) was a collaborative effort that identified 13 key sectors that rely on the watershed's natural capital and the cumulative economic impact of those sectors ($14B, 2016 dollars).

NBEP strives to communicate effectively with partners and the broader interested public by developing accurate, understandable, and accessible science communication products for different user groups (Action: People-2.1). Data visualizations and dashboards are effective tools to display information about environmental status and trends. Narrative stories, GIS StoryMaps, and digestible fact sheets also translate complex science for broad readership and encourage further inquiry. Information provided in clear, accessible formats can assist resource managers, non-governmental organizations, decision-makers, and others to better understand stressors affecting ecosystem health and to identify how environmental conditions are changing and impacting communities. These communications are foundational for building

public support for action and informing management decisions, including strategic investment in protection and restoration.

Regional Cooperation

The Narragansett Bay region requires more funding for conservation, restoration, and resilience projects—and more staff capacity for project development and maintenance—to implement CCMP goals and objectives. Development of the NBEP Finance Plan will ensure NBEP secures sufficient funding to provide its core services and increase funding for CCMP priority projects within the framework of its nine-step Project Development Process (Action: People-3.1).

Once the status and trends of key environmental and socioeconomic indicators are determined, the community must reach consensus on measurable targets for those indicators that equate to a desired future condition (Action: People-3.2).

Resiliency Considerations

Higher sea levels, warmer water temperatures, and more intense precipitation and storm surge events will create additional challenges for managing natural, built, and socioeconomic systems in the Narragansett Bay region. Empowering partners and communities with the agency and tools to engage on issues related to regional vulnerability, adaptation, and mitigation are key to expanding resilience. Actions in the People Ready to Act Action Plan develop tools designed to empower partners and communities to take proactive action, advocate for decisions, understand the latest science, and identify management strategies that sustain multiple benefits across various time scales and uncertainties.

Governance Highlight: Massachusetts Division of Ecological Restoration Expansion

COMMONWEALTH OF MASSACHUSETTS
Division *of* Ecological Restoration
Invested in Nature & Community

The Massachusetts Division of Ecological Restoration (MA DER) was established in 2009 as part of the Massachusetts Department of Fish and Game under the Executive Office of Energy and Environmental Affairs to bring attention, momentum, and capacity to river and wetland restoration. Since then, MA DER and partners have completed more than 160 restoration projects, with over 80 active projects currently underway. Today, MA DER operates three branches (Capacity Building, Habitat Restoration, and Technical Services) and multiple funding programs that support local organizations and project development to improve habitat, reduce flooding, and improve water quality and public safety.

People Ready to Act Objectives and Actions

Providing foundational knowledge, capacity, and drivers for people to act is central to building capacity within the region to protect and restore water and habitat quality, fish and wildlife, and quality of life. The People Ready to Act Action Plan incorporates a suite of interconnected actions to improve regional knowledge, coordination, effectiveness, and capacity to better protect and restore the Narragansett Bay region.

Objectives	**Actions**
People-1. Increase meaningful and useful partner and public engagement.	*Engagement Plan*: Develop and implement the NBEP Engagement Plan to convene and activate partners to implement priority CCMP actions.
	Research Plan: Implement the NBEP Research Plan and Coastal Urban Waters Research Collaborative.
People-2. Improve access to and use of information to improve ecosystem management and public understanding.	*Science Communication Tools*: Develop compelling open-source data visualizations, stories, and dashboards.
	Ecosystem Modeling: Support, improve, and create efficiencies for integrated ecosystem models and decision-support tools that foster effective resource management.
	Indicators: Develop and update indicators to track environmental and socioeconomic trends.
People-3. Accelerate CCMP implementation by supporting efforts to increase regional cooperation.	*Finance Plan*: Develop the NBEP Finance Plan to catalyze fundraising and investments for projects that implement the CCMP.
	Regional Targets: Establish shared regional ecosystem targets with public reporting systems to track progress.

Action People-1.1: Engagement Plan

Full Action Statement: Develop and implement the NBEP Engagement Plan to convene and activate partners to implement priority CCMP actions.

Action Description and Statement of Need

This Action will develop a coordinated and collaborative NBEP Engagement Plan to guide NBEP's convening services and partnership-building activities. The Engagement Plan will include work to articulate and promote a unique identity for the Narragansett Bay region that highlights specific CCMP implementation opportunities and challenges within the broader southern New England context (see Finance Plan Action: People-3.1).

Successful implementation of the NBEP CCMP requires an informed, engaged, and empowered community of partners making choices and taking actions that increase environmental health and resilience. Coproduction of knowledge and management solutions can build trust among resource users and managers and provide deeper understandings and diverse perspectives about what the people of the Narragansett Bay region value most about the environment. NBEP seeks to energize effective partnerships to implement CCMP actions and develop a strategic framework of networks and services to support partner needs for targeted engagement throughout the watershed.

NBEP will lead the development and regular update of the Engagement Plan to describe, prioritize, coordinate, and drive NBEP's convening, outreach, education, and communication activities necessary to implement the CCMP and promote a unique regional identity. The Engagement Plan will guide meaningful collaboration with people and communities most impacted by pressing environmental issues, such as nonprofits, tribes, municipalities, academic researchers, community leaders, businesses, and more. It will also facilitate delivery of responsive, research-based outreach programs focused on priority topics.

The Engagement Plan will coordinate and amplify ongoing efforts and identify opportunities and gaps that can be met by existing or new programs and funding mechanisms. It will also broaden engagement approaches historically limited by organizational or political boundaries to address issues at environmentally meaningful watershed scales. The Engagement Plan will prioritize, focus, and empower engagement efforts to optimize collaboration and support for implementing CCMP objectives and actions. This coordinated approach will inspire new collaborations among existing programs, reinforce existing partnerships, and optimize messaging effectiveness.

Implementing the Engagement Plan requires NBEP to continue hosting quarterly Executive and Steering Committee meetings, biannual Science Advisory Committee meetings, and subject-specific subcommittees and working groups as needed. NBEP will also host topic-specific events, including the Annual Science Event, and offer convening services for partner-led workshops, committees, or meetings to implement partner strategic plans, workplans, or equivalent planning documents that align with the CCMP and the Engagement Plan. NBEP will regularly update the Engagement Plan to adapt to changing conditions in the environment and needs of the people in the region.

Potential Projects

- Convene NBEP partners and other organizations to advance connections, knowledge, and solutions at local and regional scales.
- Convene partners to inventory and coordinate needs for education and outreach programs.
- Convene partners to explore avenues to establish and promote a unique identity for the Narragansett Bay region to support funding requests and public engagement.
- Conduct NBEP Science Events.
- Review existing local and state plans (*e.g.,* Wildlife Action Plans, Nonpoint Source Pollution Management Plans) and compile lists of recommended policy topics that have potential for bi-state or interjurisdictional interest; then, obtain Steering Committee consensus on priority topics, next steps, and appropriate outputs.
- Establish a regular schedule of communications with elected and appointed leaders at local, state, and federal levels to share NBEP and partner activities, accomplishments, and benefits.

Outputs

- NBEP Engagement Plan and regular updates
- Annual funding opportunities intended specifically for watershed outreach and education that implement the CCMP in the Narragansett Bay region
- Events to promote engagement with priority science, preservation, and restoration issues and opportunities
- Working group meetings
- Reports on select policy topics

Outcomes

- NBEP decisions, services, and projects that are responsive to current needs
- Improved partner coordination for CCMP implementation at various scales (*e.g.,* watershed, state, interstate)

- Increased NBEP and partner ownership of progress toward CCMP goals and objectives
- Public support for and participation in CCMP implementation
- Adoption of policy changes that advance CCMP goals and objectives

Indicators

All indicators

NBEP role

Convene, Fund capacity and projects

Implementing Partners

Steering Committee, other agencies and non-governmental organizations

Location

Narragansett Bay region, with priority areas to be determined during development and biannual update of the Engagement Plan

Timeline for initiation

2025

Estimated costs/potential funding sources

$1M–5M (NBEP staff time to develop Engagement Plan; annual RFPs for outreach and education activities)

NBEP 320/SNEP; NOAA B-WET, EPA, private foundations

Action People-1.2: Research Plan

Full Action Statement: Implement the NBEP Research Plan and Coastal Urban Waters Research Collaborative.

Action Description and Statement of Need

This Action will implement the NBEP Research Plan (NBEP 2024) to synthesize existing research and, with the guidance of the Science Advisory Committee, prioritize new topics for NBEP investment and identify key knowledge gaps.

The Research Plan unites the scientific interests of NBEP partners to meet the research needs of the CCMP and inform management decisions. Implementation of the Research Plan will:

- Further develop metrics and update indicators of environmental and socioeconomic conditions (Action: People-2.3)
- Support, improve, and create efficiencies for ecosystem modeling to answer complex questions and improve ecosystem management (Action: People-2.2)
- Create shared ecosystem restoration targets that span boundaries (Action: People-3.2)

The Research Plan responds to NBEP Science Advisory Committee (SAC) priorities, including synthesis of existing data, collection of baseline and new data, analysis and modeling, and information sharing. A new Coastal Urban Waters Research Collaboration, composed of NBEP Science Advisory Committee (SAC) members, researchers, managers, and local experts, will focus on the region's coastal urban sub-watersheds Hydrologic Unit Code 12 (HUC12). The initial focus is on the Providence-Seekonk Rivers, which continue to exhibit water quality concerns including low dissolved oxygen and elevated pathogens. Over the next ten years, as resources allow, NBEP will expand the collaborations into Fall River and the Westerly-Stonington areas.

NBEP will fund implementation of the Research Plan through requests for proposals, direct awards, and contracts.

Potential Projects

- Convene Coastal Urban Waters Research Collaborative focused on the Providence River Estuary, and as time allows, additional focus areas.
- Conduct literature reviews of the three priority coastal urban centers (Providence, Fall River, and Westerly) to identify data resources, seminal papers, and links to other reviews and analyses.
- Compile and improve information sharing on planned and completed research related to the NBEP region.

- Develop requests for proposals or direct awards to implement the Research Plan.

Outputs

- Ongoing meetings of the Coastal Urban Waters Research Collaborative
- Requests for proposals that advance research needs identified in the Research Plan
- Biennial updates to the Research Plan, including evaluations of Plan implementation

Outcomes

- Articulated research needs to advance NBEP priorities
- Enhanced interdisciplinary networks of researchers, managers, and local people

Indicators

All indicators

NBEP role

Convene, Synthesize and communicate science, Fund capacity and projects

Implementing Partners

Science Advisory Committee and other researchers from management agencies, NGOs, and academia

Location

Narragansett Bay region, focusing on the coastal urban sub-watersheds (HUC12 scale)

Timeline for initiation

Ongoing

Estimated costs/potential funding sources

$5M–10M

NBEP 320/SNEP, Rhode Island Sea Grant, NOAA, NSF, private foundations

Action People-2.1: Science Communication Tools

Full Action Statement: Develop compelling open-source data visualizations, stories, and dashboards.

Action Description and Statement of Need

This Action will develop science communication to inform and engage partners and other interested people on estuary and watershed science and restoration.

Synthesizing and communicating estuarine and watershed science is foundational to protecting and restoring water quality and the ecological integrity of the Narragansett Bay region. Too often, science-based information is presented in dense academic literature and government reports, uses language that is not fully understood by non-scientists, and is in a form that is not available or useful to end users with the skills and agency to act. Additionally, information that is freely available may be out of date or incorrect and some information may only be accessible to a small number of people within an organization.

NBEP strives to develop accurate, understandable, accessible, and up-to-date communication tools for groups as diverse as scientists, managers, public officials, educators, and private citizens. NBEP also hosts current and past plans, documents, and datasets in its website's Resource Library and GIS Data Hub. Using data visualizations and dashboards to display environmental status and trends is a simple and elegant way to accurately and broadly communicate information in a timely, accessible fashion. Narrative stories and StoryMaps are also effective tools. Creating these tools using open-source software that is freely available without a commercial license ensures that tools can be widely shared, modified, and accessible to all.

Through its roles to convene and synthesize and communicate science, NBEP will facilitate widespread adoption of open-source tools; collaborate with data developers, partners, and end users to develop tools that respond to current needs; and advertise new tools and develop training sessions for the tools, if necessary.

Potential Projects

- Collaborate with local water quality monitoring groups and other National Estuary Programs to develop water quality dashboards that aid in analyzing and sharing data.
- Create tool(s) to document and showcase habitat restoration projects in the region.
- Build tool(s) to help local organizations prioritize areas for conservation or restoration.
- Collaborate with data developers, NBEP committee experts, and end users to develop tools that respond to current needs.

Outputs

- New tools
- Ongoing maintenance and updates to existing tools

Outcomes

- Greater ability for end users to understand technical issues and be proactive
- Decreased technical debt and shorter, more efficient workflows for local organizations, leading to faster data analysis and availability

Indicators

All indicators

NBEP role

Convene, Synthesize and communicate science

Implementing Partners

Steering Committee, Science Advisory Committee

Location

Narragansett Bay region

Timeline for initiation

Ongoing

Estimated costs/potential funding sources

$10K–500K (NBEP staff time)
NBEP 320/SNEP

Action People-2.2: Ecosystem Modeling and Decision-Support Tools

Full Action Statement: Support, improve, and create efficiencies for integrated ecosystem models and decision-support tools that foster effective resource management.

Action Description and Statement of Need

This Action will advance the development and use of ecosystem modeling and decision-support tools for filling knowledge gaps, informing key management decisions, and setting and tracking progress toward environmental protection and restoration targets.

Significant environmental research and monitoring has occurred in the Narragansett Bay region since at least the 1950s which has fueled multiple modeling efforts to understand how ecosystems respond to pollution drivers and management actions (Humphries *et al.* 2022). Applied models focus on answering key management-related questions related to water quality, food-chain dynamics, fisheries resources, and larger ecosystem-based challenges. Localized needs have been met with models and other tools that support TMDL development and permitting, prioritize restoration projects, and highlight gaps in current monitoring activities.

There has long been a desire for linked hydrodynamic, water quality, and ecosystem-based models to help increase understanding of the impact of system stressors and responsive management actions. Using monitoring data in models can assist in forecasting future conditions, selecting responsive actions, tracking their effectiveness, and adapting as needed. Ecosystem models can be used to compare multiple future ecosystem scenarios and identify management strategies that sustain benefits for ecosystem, people, and economies across various time scales and uncertainties.

The rising and interlaced challenges of nutrient loading, stormwater pollution, and socioeconomic concerns necessitate the revision, update, and creation of models and other decision-support tools to better understand ecosystem health, evaluate management strategies, and help set and track progress against management targets. Further, not all models or tools are in forms that are available or useful to end users. Data visualizations and dashboards are simple and elegant ways to accurately and broadly communicate information to a wide audience of partners and other end users. Creating tools using free open-source software ensures that they can be widely shared, modified, and accessible to all.

NBEP will collaborate with partners to convene interests across state boundaries to coordinate modeling and tool development. Activities could include assessing current modeling and tool-development projects to avoid duplication of efforts, discussing gaps in monitoring needed to accurately develop or update models and tools, and gaining consensus on a preferred pathway to developing a bay-wide water quality model. NBEP will participate on partner-led committees to develop or improve models or tools. NBEP can partially or fully fund development, update, or implementation of open-source models or tools to answer key management questions. NBEP will regularly provide guidance and updates to ensure modeling and tool development aligns with CCMP actions.

Potential Projects

- Convene stakeholders and other experts to review available modeling tools and their limitations.
- Convene partners to build consensus on pathways for development of validated and calibrated bay water quality and ecosystem models to support management and assist in setting restoration targets.
- Collaborate with data developers, NBEP committee experts, and end users to develop technical tools that respond to current needs.
- Develop and/or update natural heritage database models to inform land use decisions.

Outputs

- Assessment of existing water quality and hydrodynamic models, their intended use, and a pathway toward a larger, linked hydrodynamic model
- Assessment of data needs for existing models and tools
- Working group meetings

Outcomes

- More efficient and accurate modeling tools for decision-making and policy
- Broader understanding of available modeling tools and their applicability to resource management
- Ecosystem management that is better informed by modeling and monitoring data

Indicators

All indicators

NBEP role

Convene, Fund capacity and projects

Implementing Partners

RIDEM, MassDEP, URI Coastal Institute, RI Environmental Monitoring Collaborative, Rhode Island Natural History Survey, NBNERR, Mass Audubon, MassWildlife, TNC (RI and MA), ASRI, Salt Ponds Coalition, URI Watershed Watch, Save The Bay, Brown University, URI, EPA-ORD-ACESD

Location

Narragansett Bay region

Timeline for Initiation

2029–2031

Estimated costs/potential funding sources

$5M–10M

NBEP 320/SNEP, National Science Foundation, Foundation Grants, URI Coastal Institute, RIDEM, MassDEP, TNC

Action People-2.3: Indicators

Full Action Statement: Develop and update indicators to track environmental and socioeconomic trends.

Action Description and Statement of Need

This Action calls NBEP and partners to develop and update indicators to track environmental and socioeconomic trends. Stressor indicators provide information about water quality, landscape and chemical processes that can cause changes in the estuaries and their watersheds. Condition indicators provide information about the status and trends of natural ecosystems and human socioeconomic systems, like public health (NBEP 2017).

NBEP convened more than 50 experts from universities, agencies, and organizations in Rhode Island and Massachusetts to develop environmental indicators and evaluate their status and trends. The resulting report identified and analyzed the status and trends of 24 key environmental and socioeconomic indicators (NBEP 2017). The geographic scope of most indicators was limited to Narragansett Bay and its watershed. Since the report's publication, some indicators have been updated and expanded to include the Coastal Salt Ponds and Little Narragansett Bay. In addition, NBEP has refined three indicators to include new information, including Nuisance Flooding (Sea Level), Atmospheric Nitrogen Deposition (Nutrient Loading), and Solar Project Installations in Forests (Land Use) (Appendix A). NBEP continues to work with the Southeast New England Program to align indicator development to improve efficiency and create consistent messaging.

In 2023, NBEP's Social Science Working Group nominated four new socioeconomic indicators for development, including Public Access, Resilient Municipalities, Public Health, and Economy. NBEP will develop and implement Public Access and Resilient Municipalities indicators over the next ten years (NBEP 2023a).

NBEP will lead development, metric refinement, and updates of environmental and socioeconomic indicators as guided by the Research Plan, Science Advisory Committee, Steering Committee, and topical work groups. NBEP will also expand the geographic scope of indicators to include Little Narragansett Bay and Rhode Island Coastal Ponds watersheds. Results will be published as an update to *The State of Narragansett Bay and Its Watershed* report.

Potential Projects

- Develop refined metrics, assess and update existing indicators, and create new environmental and socioeconomic indicators.

- Expand the geographic scope of all indicators to include the Rhode Island Coastal Ponds and Little Narragansett Bay watersheds.
- Update *The State of Narragansett Bay and Its Watershed* report in 2027, emphasizing indicators that facilitate tracking CCMP goals and objectives.

Outputs

- Indicator updates
- New indicators, including socioeconomic indicators
- Update of *The State of Narragansett Bay and Its Watershed* report
- Expanded geographic scope of indicators

Outcomes

- Improved understanding of environmental stressors and conditions in the region
- Improved capacity to track implementation of CCMP Actions
- Improved understanding of human-ecosystem interactions

Indicators

All indicators

NBEP role

Convene, Synthesize and communicate science

Implementing Partners

Science Advisory Committee, Southeast New England Program (SNEP), EPA Region 1, Other researchers

Location

Narragansett Bay region

Timeline for initiation

Ongoing

Estimated costs/potential funding sources

$500K–1M
NBEP 320/SNEP

Action People-3.1: Finance Plan

Full Action Statement: Develop the NBEP Finance Plan to catalyze fundraising and investments for projects that implement the CCMP.

Action Description and Statement of Need

This Action calls NBEP to lead development of a Finance Plan to 1) ensure NBEP secures sufficient funding to provide its core services, 2) guide NBEP's funding decisions on a five to ten-year timescale, and 3) convene efforts to increase funding for priority restoration projects.

In addition to consistent funding through the National Estuary Program, watershed protection efforts in the Narragansett Bay region benefit from an EPA geographic program (the Southeast New England Program (SNEP)) and state funding for conservation, restoration, and resilience projects. Infrastructure Investment and Jobs Act dollars allocated to NBEP and partners between 2022–2025 have provided essential support for staff capacity, project development, and project implementation.

Since 2022, NBEP's staff has grown from two to five full-time employees. This growth has enabled NBEP to increase and diversify services that it provides to partners and other organizations, including convening, science communication, and project funding. With the recent hires of two new positions, Watershed Outreach Manager and Staff Ecologist, NBEP anticipates further diversifying its services to include direct outreach and habitat project implementation. The NBEP Finance Plan will seek to balance NBEP's internal operations requirements with external subawards and contracts to support CCMP implementation.

Due to realized and anticipated reductions in federal investments in conservation efforts over early implementation of this CCMP Revision, it is important for NBEP to develop a targeted strategy for granting subawards and contracts. NBEP will work closely with partners during development of the Finance Plan to identify the highest-priority projects in this CCMP Revision to pursue with external awards within the framework of NBEP's nine-step Project Development Process (Figure 4).

Despite decades of consistent—and in recent years, increased—federal and state financial support for restoration, project funding remains insufficient. The Narragansett Bay region receives roughly one-fifth of the federal dollars per square mile that are received to support comparable project needs in Chesapeake Bay, Puget Sound, Long Island Sound, and Lake Champlain regions. Through development and implementation of its Finance Plan and Engagement Plan (Action: People-1.1), NBEP will convene partners to seek additional funding for water quality and habitat restoration.

Potential Projects

- Convene partners to identify the highest-priority projects in this CCMP Revision to pursue with external awards within the framework of NBEP's nine-step Project Development Process.
- Develop an NBEP Finance Plan and seek approval by the Steering Committee and EPA Region 1.
- Solicit and award funding for staffing, planning, design, and construction of water quality, habitat, and public access projects.

Outputs

- NBEP Finance Plan
- NBEP project funding solicitations
- NBEP project awards
- Funded planning and construction projects

Outcomes

- Increased collaborative and strategic fundraising
- Increased awareness of the cost, value, and importance of conservation, restoration, and resilience efforts in the Narragansett Bay region
- Increased regional staff capacity for project planning, development, implementation, and maintenance
- Increased number of conservation, restoration, and resilience projects in the region
- Improved ecosystem and community health and resilience

Indicators

All indicators

NBEP role

Convene, Fund capacity and projects

Implementing Partners

Steering Committee

Location

Narragansett Bay region

Timeline for initiation

2025–2028

Estimated costs/potential funding sources

$10K–500K

NBEP 320/SNEP

Action People-3.2: Regional Targets

Full Action Statement: Establish shared regional ecosystem targets with public reporting systems to track progress.

Action Description and Statement of Need

This Action calls for NBEP to lead the development of priority regional ecosystem targets for the Narragansett Bay region to motivate collective action.

Effective protection and restoration of water, habitats, fish and wildlife, and quality of life in the Narragansett Bay region depends on 1) understanding the status and trends of key environmental and socioeconomic indicators; 2) establishing measurable targets for those indicators that equate to a desired future condition; and 3) adopting reporting systems to monitor progress and foster additional collaborative work to reach targets.

In 2017, NBEP and partners identified and characterized the status and trends of 24 key stressor and condition indicators underlying the ecosystem health of Narragansett Bay and its communities (NBEP 2017). NBEP and partners will continue to develop indicators (Action: People-2.3) and monitor and model their status and trends (Actions: Water-1.1, Habitat-1.1, and People-2.2).

NBEP will collaborate with partners to develop targets at appropriate scales that define desired future conditions for indicators. Target development will take into consideration existing targets, such as those required by the Clean Water Act to support designated uses of waters, Total Maximum Daily Loads (TMDLs), Special Areas Management Plans (SAMPs), and habitat restoration plans. Targets should encompass topics that NBEP and partners have agency and capacity to advance and ideally derive from metrics that NBEP already measures for State of the Watershed indicators (*e.g.*, habitat acres, pollution reductions, number of public access points).

Potential Projects

- Convene partners to create numeric targets for priority ecosystem and socioeconomic system indicators that span watershed boundaries and authorities.
- Establish reporting systems for tracking progress toward shared targets.

Outputs

- Facilitated meetings
- Numeric targets and reporting system(s) for priority environmental and socioeconomic indicators

Outcomes

- Improved coordination and collaboration among protection and restoration partners
- Increased public awareness of management goals and the effectiveness of actions and investments to attain them

Indicators

All indicators

NBEP role

Convene, Synthesize and communicate science

Implementing Partners

Steering Committee

Location

Narragansett Bay region

Timeline for initiation

2027

Estimated costs/potential funding sources

$500K–1M

NBEP 320/SNEP

Water Quality Improvement Action Plan

Vision	Waters support healthy ecosystems and communities by meeting their designated uses, including healthy fish and wildlife habitat, drinking water supply, fishing, shellfish harvesting, and recreation.
Goal	Improve water quality to support healthy ecosystems and communities.

Priority Opportunities and Challenges

Water quality in Narragansett Bay has improved since 2000. Between 2000–2012, summer nitrogen loadings to Narragansett Bay were reduced by 50 percent due to upgrades to nutrient treatment capacity at Rhode Island and Massachusetts wastewater treatment facilities (WWTFs) that discharge into the upper Narragansett Bay region (RIDEM 2024b). Between 2016–2021, nitrogen loads were reduced by 70–76 percent when compared to pre-nitrogen reduction efforts in the early 2000s.

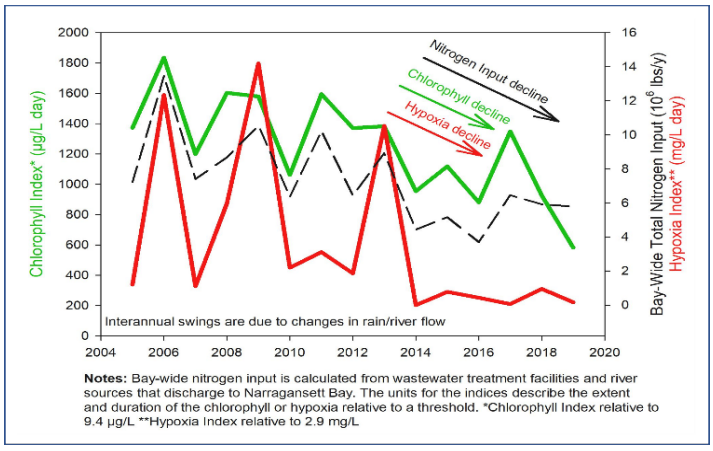


Figure 7. Nitrogen, chlorophyll, and hypoxia trends in Narragansett Bay, 2004-2019.

Decreased nutrient loading from wastewater discharges were associated with reductions in chlorophyll-*a* (excess phytoplankton) and hypoxia (low dissolved oxygen) in the bay (NBEP 2020a, NBEP 2020b, NBEP 2021b) (Figure 7). A more recent analysis of Bay water quality has shown a reduction in the average number of hypoxic days at most stations, excluding the Seekonk River (RIDEM 2024b). Additionally, the Blackstone River was delisted in 2022 for impairments related to low dissolved oxygen.

These favorable trends coincide with a decades-long trend of declining chlorophyll-*a*, driven by increasing bay water temperatures and water column stratification that limits nutrient flux to surface waters (Thibodeau *et al.* 2024). Gains have predominantly been made through management actions to reduce nutrient and pathogen pollution from combined sewer overflows, WWTFs, and onsite wastewater treatment and disposal systems (OWTDS).

Reduced pathogen pollution has supported the recovery of consumable shellfish harvesting areas in the lower Providence River (Figure 8). In 2021, about 1,900 acres of the lower Providence River were conditionally opened to shellfish harvest after 75 years of closure. Water quality improvements from upgrades to WWTFs, urban stormwater retrofitting with redevelopment and new development, and the completion of the Phase One and Two Providence, Pawtucket, and Central Falls Combined Sewer Overflow underground tunnel capture system (see Callout) allowed these new conditionally approved shellfish harvest areas to open to the public. In 2025, the Rhode Island Department of Environmental Management (RIDEM) announced that rain-related shellfish closures have reduced from seven to six days for the Lower Providence River and Greenwich Bay shellfish conditional areas due to further water quality improvements.

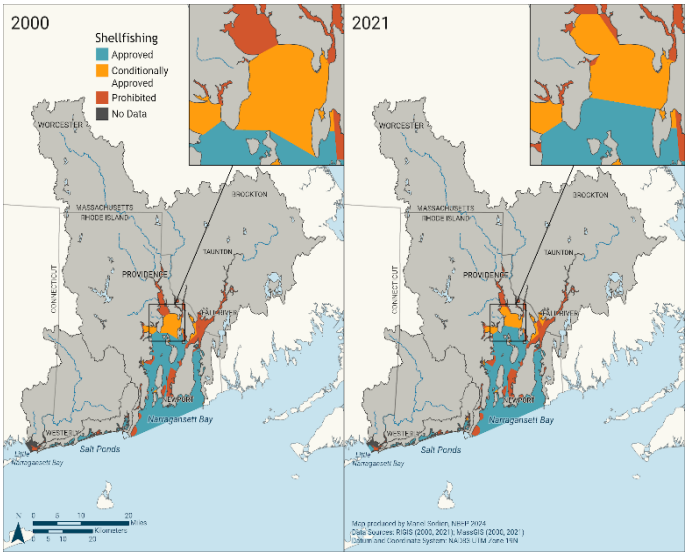


Figure 8. Changes in shellfishing areas in the Narragansett Bay region, 2000-2021. Inset maps show the increase in open and conditionally open areas in the Lower Providence River.

While these and other transformative water quality successes have been achieved, many challenges remain. Nonpoint source pollution continues to degrade area waters with pathogens and nutrients, which negatively impacts shellfish harvesting and recreational uses. Elevated pathogens are the most common cause of impairment in the region's rivers and streams, while low dissolved oxygen is the most common cause in estuarine waters. Across the region, securing sustainable financing for installing and maintaining stormwater best practices remains difficult. Maintaining sewer systems by replacing and upgrading aged and broken infrastructure is similarly taxing. Other pressing water quality management concerns include emerging contaminants, per- and polyfluoroalkyl substances (PFAS), and mercury in fish tissue. Rising sea levels and intensification of precipitation events and storms will interact with and exacerbate the negative effects of anthropogenic stressors on water quality in the Narragansett Bay region, risking the improvements described herein.

Water Quality Improvement Highlight: Restored Waters RI



In 2001, the Narragansett Bay Commission (NBC) started construction on a massive infrastructure project, Restored Waters RI, to build underground tunnels to capture and store stormwater and prevent combined sewer overflows during heavy rainfall. The project also includes green infrastructure, such as rain gardens, that capture stormwater at the surface, and advanced wastewater treatment upgrades, like UV disinfection. The first two phases of the project, a three-mile tunnel under the City of Providence and a network of ancillary pipes, were completed in 2008 and 2015. Together, the Phase One and Two tunnel and pipes capture more than 50% of the combined sewage flows that would have otherwise drained into the Providence River. The third and final stage of the project is a 2.2-mile-long storage tunnel through Pawtucket, Central Falls, and East Providence. Drilling for the tunnel was completed in 2024, and work continues to connect piping, pump stations, and shafts. When complete, the tunnel will store and transport storm-related combined sewer and storm water overflow to Bucklin Point Wastewater Treatment Facility for full treatment before being discharged to Narragansett Bay. NBC predicts that when Phase III is complete, there will be a 93% decrease in storm-related discharge to the Seekonk River.

Stormwater

Untreated stormwater discharges are widespread and a major pollution concern in the Narragansett Bay region. They degrade water and habitat quality and prompt beach and shellfish harvesting area closures (RIDEM 2024b). In addition to nutrient pollution, stormwater conveys sediments, bacteria and viruses, oil and grease, metals, and trash. In addition, there is growing public concern and management attention to issues associated with pharmaceuticals, microplastics and especially “forever chemical” per- and polyfluoroalkyl substances (PFAS) in stormwater. Impacts of these pollutants on the environment and public health are not fully understood and continue to be studied while management programs undertake initial actions to prevent and mitigate their impacts.

About 14 percent of the Narragansett Bay Watershed land cover is comprised of impervious surfaces (NBEP 2017). These areas increase the volume and velocity of stormwater runoff

carrying pollutants into surface waters. Impervious cover rises to a level of concern for water quality impacts when it reaches about 10%, although research has also shown impacts below that benchmark in certain situations (CWP 2003). Impervious cover is expected to increase with population growth and development. In Rhode Island's urban cores of Providence, Pawtucket, and Central Falls, over 60 percent of the land area is impervious (RIDEM 2024a). Already, stormwater discharges have been implicated as significant sources of nutrient and bacterial pollution in a majority of TMDLs in Rhode Island (RIDEM 2024b) and the Blackstone, Taunton, and Narragansett Bay Coastal watersheds in Massachusetts (MassDEP 2024). Increasing stormwater pollution, both in volume and pollutants, will result in more flooding, erosion, sedimentation, water quality degradation, low dissolved oxygen, habitat modification and loss, and impacts to human health.

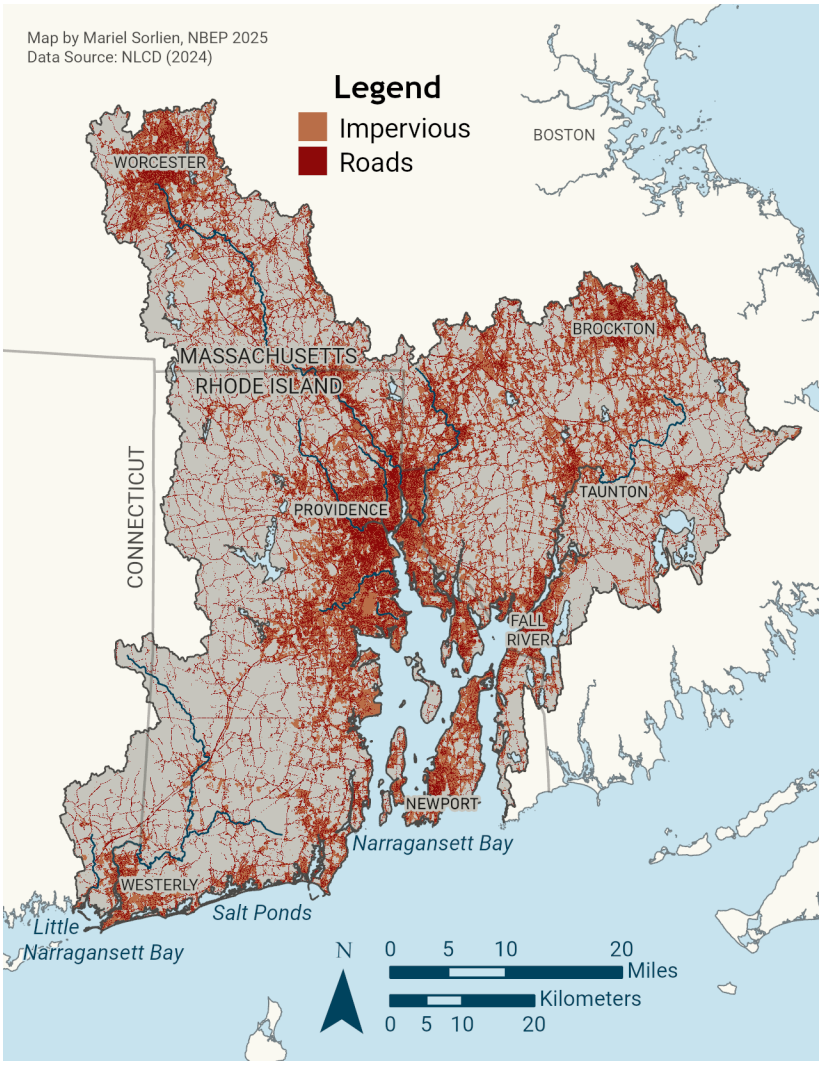


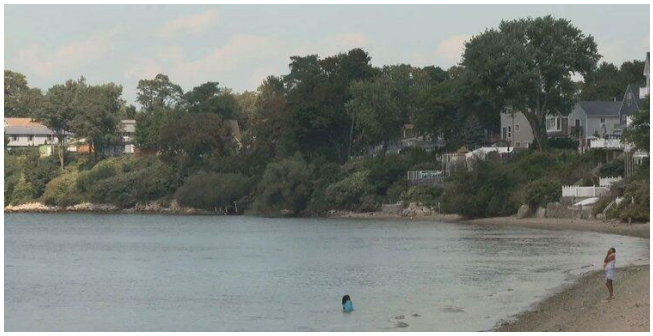
Figure 9: Impervious cover in the Narragansett Bay region (NLCD 2024).

The Narragansett Bay region must embrace strategies to prevent additional pollution from new and re-development (Actions: Water-1.2 and Water-2.1). Many watersheds would further benefit from more effective stormwater management to retrofit urbanized landscapes that were built without effective stormwater treatment (Action: Water-2.2). Municipalities bear much of the responsibility for implementing these Actions as operators of Municipal Separate Storm Sewer Systems (MS4s). MS4 jurisdictions cover about 46% of the land area in the Narragansett Bay region. States and EPA in the Narragansett Bay region require MS4 operators

to obtain permits and implement stormwater management practices that reduce polluted discharges during storm events.

NBEP encourages and supports municipalities to implement low impact development (LID), a comprehensive approach to development or redevelopment that aims to replicate the pre-development natural functions of a site to infiltrate, filter, store, evaporate, and detain rainwater as close to its source as possible. Integrating LID principles in planning for land development and identifying and prioritizing pollution hotspots for retrofitting stormwater infrastructure and other effective BMPs are priority actions (Actions: Water-1.2 and Water-2.2).

Water Quality Improvement Highlight: Future Urban Beach Opening



Beaches at Sabin Point and Crescent Park in East Providence, RI have been closed to swimming for decades due to high levels of pathogens that come from stormwater runoff and discharges from wastewater treatment facilities. With improved water quality in the upper reaches of Narragansett Bay, increased beach monitoring, and projects to reduce localized stormwater pollution, both beaches are on a path to welcoming swimmers once again. Crescent Park, which has a target open date of May 2026, will be the first swimmable beach in the Providence area in many decades.

While agriculture comprises a relatively small percentage of land use in the region's watersheds (4% in the Narragansett Bay and Coastal Ponds watersheds and 5% in the Little Narragansett Bay watershed), poorly-managed farm operations can impact local water quality by contributing pathogens, nutrients, pesticides, sediment, and petroleum wastes to stormwater runoff. NBEP partners work with farms to implement BMPs that reduce water quality impacts (Action: Water-2.2).

While partners work to address wastewater discharges and install stormwater controls that treat polluted runoff across large areas, there are public education and outreach opportunities to further curb stormwater pollution at its sources. Nutrient and bacterial pollutants are released to waterbodies through the public's everyday activities, from pet waste, fertilizer application, and wildlife feeding to improper handling of vessel sewage and deferred septic system maintenance. Enhanced public education campaigns and new public policy controls can

help the public recognize and reduce their contribution of personal pollution (Action: Water-2.1).

Wastewater

Untreated or partially treated wastewater contains pathogens, nutrients, heavy metals, pharmaceuticals, and other contaminants harmful to the environment and public health. There are 19 publicly-owned WWTFs in Rhode Island, 19 in Massachusetts, and one in Connecticut that discharge treated effluent into the Narragansett Bay region. Of these facilities, 11 in Rhode Island and six in Massachusetts have implemented additional technologies to reduce nitrogen loading in effluent. These facilities have achieved significant reductions in nutrient loading to the region's waterways since the publication of NBEP's 2012 CCMP. Continuing to upgrade facilities to remove more pollutants before discharging effluent will continue to yield water quality improvements in the region (Action: Water-3.1). Currently, the Westerly, Rhode Island WWTF has approved design plans for upgrades necessary to reduce nitrogen loading with construction estimated to be completed in 2028. In Massachusetts, many facilities need to have their discharge permits updated, which will provide opportunities to upgrade facilities.

Reducing nutrient and pathogen pollution from underperforming or failing onsite wastewater treatment systems is another priority. About 38 percent of the Narragansett Bay Watershed's residents are served by septic systems and cesspools (Chapter 7 in NBEP 2017). Properly sited and maintained septic systems remove pathogens, but do not effectively remove nitrogen. Cesspools, for the most part, provide no treatment. Onsite systems contribute to nitrogen pollution in coastal waterbodies throughout the Narragansett Bay region, particularly in the Coastal Ponds subregion. Cesspool phaseouts, septic system upgrades for advanced nutrient treatment, increased rates of onsite system maintenance, and centralized sewer service conversions in priority areas are necessary to reduce nitrogen pollution and improve water quality (Action: Water-3.2).

Combined Sewer Overflows

Combined sewer systems, where both wastewater and stormwater flow through the same pipes, are present in several urban areas in the Narragansett Bay region, including in the wastewater systems of the Narragansett Bay Commission (including metropolitan Providence, Pawtucket, and Central Falls), City of Newport, City of Taunton, City of Worcester, and City of Fall River. When the capacity of combined sewer systems is exceeded during rain events, combined sewer overflows (CSOs) discharge partially treated or untreated stormwater and sewage into the environment via permitted outfalls. Inspecting, repairing, or replacing underperforming or failing gray infrastructure remains an important priority as CSO abatement infrastructure work continues (See RestoredWatersRI Callout and Action: Water-3.1). Sewer

separation, retrofitting existing infrastructure, and increasing the use of LID in new development and redevelopment will reduce the volume of stormwater pollution flowing into combined sewer systems, therefore minimizing CSO events (Actions: Water-2.2 and Water-3.1); however, intensifying precipitation will pose challenges by increasing stormwater volumes.

Resiliency Considerations

Higher sea levels and more intense precipitation (Figure 10) and storm surge events will create additional challenges for managing water quality in the Narragansett Bay region. Building resiliency into stormwater best management practices, including overbuilding systems with excess capacity to accommodate projected future sea level and weather conditions, will ensure infrastructure can perform as expected over its design life.

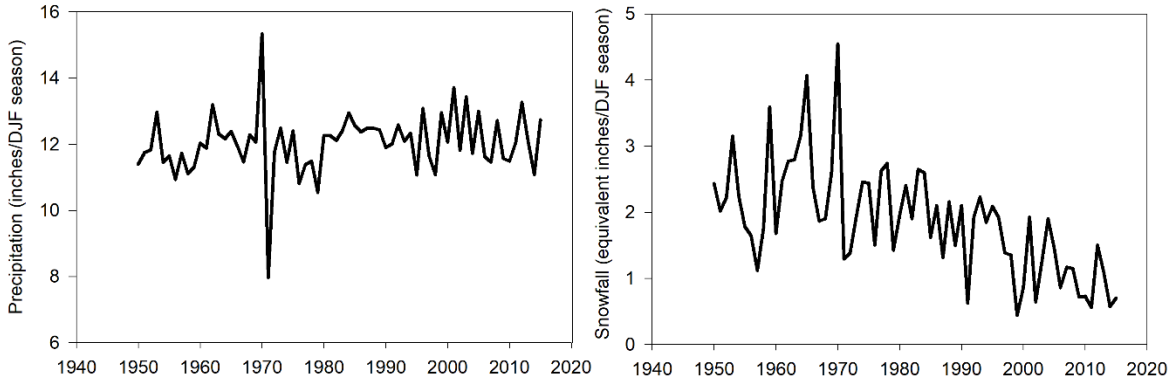


Figure 10. Historic precipitation as rainfall and snowfall, 1950–2020 (NBEP 2024).

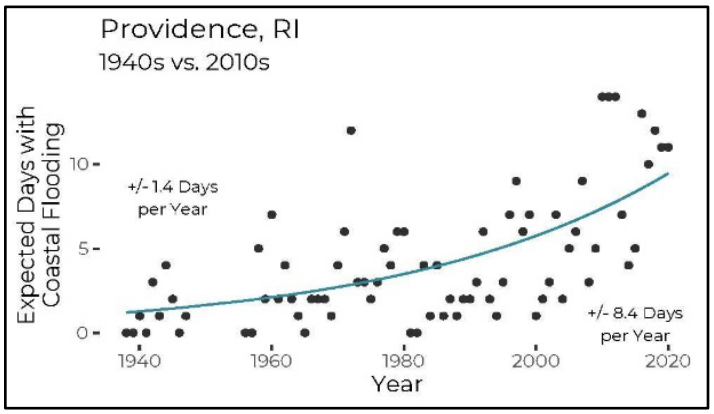


Figure 11. Nuisance (high tide) flooding in Providence, RI, 1940–2020. Courtesy of Curtis Bohlen, Casco Bay Estuary Partnership.

Effects of increased tidal inundation (Figure 11), storm surge, and precipitation intensity will increase the vulnerability of underperforming or failing wastewater infrastructure and create new issues for infrastructure currently performing as designed. In 2017, RIDEM evaluated the

implications of changing environmental conditions on wastewater treatment infrastructure in Rhode Island and suggested adaptive strategies for vulnerable facilities, including hardening, relocation, utilizing readily repairable or replaceable equipment, ensuring redundancy, and wet weather bypass (RIDEM 2017). For septic and other onsite wastewater treatment systems (OWTS), increased flooding and soil saturation from increased rainfall or sea level rise can reduce the treatment effectiveness of the leachfield. Long-term planning for extending central sewer service to areas serviced by OWTS must remain engaged with the latest advances in science and predictive tools to be able to anticipate and mitigate failures in a timely manner. Water quality management strategies must adaptively incorporate resilience measures for extreme weather events into stormwater and wastewater infrastructure design, installation, and maintenance best management practices.

Water Quality Improvement Objectives and Actions

Priorities of the Water Quality Improvement Action Plan include reducing pollution from stormwater runoff, wastewater discharges, onsite wastewater systems, CSOs, and trash and marine debris.

Objectives	Actions
Water-1. Improve collection and use of water quality data for decision-making.	*Water Quality Monitoring:* Support, improve, and create efficiencies for water quality monitoring programs to continue to provide information needed for management decision-making and filling knowledge gaps.
	Land Use and Watershed Planning: Work at multiple scales to assess land use changes and develop plans and tools to protect watersheds.
Water-2. Reduce stormwater pollution.	*Stormwater Guidance and Education*: Update and standardize stormwater design manuals, support stormwater workforce training and capacity-building, and encourage public education and involvement to reduce stormwater pollution.
	Stormwater Retrofits: Support stormwater retrofit opportunities and associated maintenance activities to improve resilience and treatment capacity.
Water-3. Reduce pollution from wastewater discharges, onsite wastewater systems, and combined sewer overflows.	*Centralized Wastewater Infrastructure*: Prioritize and support wastewater treatment facility and combined sewer system infrastructure upgrades to improve treatment of pollutants and increase resilience.
	Onsite Wastewater Systems: Support cesspool phaseouts and onsite system maintenance region-wide, and advanced septic system upgrades or extension of central sewer service in priority areas.
Water-4. Reduce trash and marine debris pollution.	*Trash and Marine Debris*: Prevent and remove aquatic trash and marine debris.

Action Water-1.1: Water Quality Monitoring

Full Action Statement: Support, improve, and create efficiencies for water quality monitoring programs to continue to provide information needed for management decision-making and filling knowledge gaps.

Action Description and Statement of Need

This Action will advance collection and use of water quality monitoring data to enhance management decision-making, track progress towards environmental and human health protection and restoration targets, and fill priority knowledge gaps.

Water quality monitoring is required for states to ensure compliance with federal and state regulations, inform management decisions to protect environmental and human health, and track changes to the ecosystem through time. Water quality monitoring includes water column chemistry (*e.g.,* nutrient concentrations, dissolved oxygen concentration, temperature, salinity, pH) and biological responses to pollution (*e.g.,* chlorophyll-*a* concentrations, bacteria concentrations, or macroinvertebrate abundances).

Monitoring data have been collected by multiple groups since the 1950s, including federal, state, and municipal agencies, non-profits, NGOs, universities, and communities. Many groups receive state funding to provide their data, which are used to build and calibrate models, create decision-support tools, and support restoration and environmental targets. Regionally, these groups work collaboratively to identify gaps in data collection, discuss emergent monitoring technologies, and ensure their data are consistent and useful.

Robust monitoring programs are essential to supporting the Clean Water Act and provide important information for assessing and anticipating the changing vulnerabilities of ecosystems and coastal communities. Development, land use changes, and restoration activities can alter water quality. Monitoring efforts need additional staff capacity and funding to expand to areas that require more attention without compromising data collection in other locations.

NBEP will support statewide monitoring strategy development and collaborate with partners across state boundaries to discuss monitoring activities. Participating on the Rhode Island Environmental Monitoring Collaborative, or other regional initiatives focused on monitoring should be a key activity. Additionally, NBEP may convene topic specific working groups to update methodologies, plan monitoring expansion into new locations, and revise protocols to prioritize efficiency and incorporate new partners.

NBEP will work with partners to develop and update monitoring databases and connect users with data. This could include identifying capacity, funding, and support for existing initiatives, such as the Narragansett Bay Data Portal or Snapshot of the Bay.

Potential Projects

- Facilitate Science Advisory Committee and staff participation on the RI Environmental Monitoring Collaborative to provide multi-state support for cross-boundary monitoring needs including coordinating or standardizing monitoring activities and methods, developing new or expanding current monitoring activities (such as water column chemistry, emerging pollutants, or increased focus on embayments), and ensure that monitoring aligns with management questions and needs.
- Develop and/or update water quality monitoring databases.
- Support expanded water quality monitoring in newly restored areas, such as the Kickemuit River, to establish a scientific basis for considering recreation and shellfish harvesting.
- Facilitate Science Advisory Committee participation in the update to the Rhode Island Statewide Water Monitoring Strategy (2026).
- Support innovations in monitoring strategies that bring efficiencies to and build capacity for data collection; encourage community science programs that help fill priority data gaps.
- Support innovations for funding and staff capacity to continue data collection, analysis, and reporting.

Outputs

- New monitoring protocols or programs for new or expanded monitoring activities
- Appropriately updated water quality databases and Statewide Water Monitoring Strategies

Outcomes

- Enhanced capacity for water quality monitoring throughout the region
- Better coordinated water monitoring activities
- Improved collection and use of water quality information
- Enhanced understanding of monitoring gaps and mechanisms to fill them
- Ecosystem management that is better informed by monitoring

Indicators

All indicators

NBEP role

Convene, Fund capacity and projects

Implementing Partners

RIDEM, MassDEP, URI Coastal Institute, RI Environmental Monitoring Collaborative, NBNERR, TNC (RI and MA), Salt Ponds Coalition, URI Watershed Watch, Save The Bay, Brown University, URI, Narragansett Bay Commission, EPA-ORD-ACESD

Location

Narragansett Bay region

Timeline for initiation

2029–2031

Estimated costs/potential funding sources

$5M–10M

NBEP 320/SNEP, National Science Foundation, Congressionally Directed Spending, Foundation Grants, URI-CI, RIDEM, MassDEP, TNC

Action Water-1.2: Land Use and Watershed Planning

Full Action Statement: Work at multiple scales to assess land use changes and develop plans and tools to protect watersheds.

Action Description and Statement of Need

Rhode Island, Massachusetts, and Connecticut are three of the top five most densely-populated states in the nation. The proportion of developed land in the Narragansett Bay region is increasing at a rapid pace due to trends in development practices including larger lots with single-family homes and increases in single-use areas that separate industrial, business, and civic uses (NBEP 2021c). Impacts from urban sprawl and its associated land use changes include increased pollutants from point and nonpoint sources, alteration of hydrologic processes, such as infiltration, runoff, and stream flows, and impacts to associated habitats, such as wetlands and stream environments. Proactive land use and watershed planning can mitigate negative impacts by managing the use of land and water resources in a comprehensive manner by working at different planning scales.

Each state in the Narragansett Bay region maintains statewide planning documents that outline goals for land use within their borders. These forward-looking plans analyze projected population change, growth of developed land, and assess how to best balance the needs of people with the needs of the environment. The states then allow municipalities to develop local ordinances and bylaws to meet land use goals. As local desires change, or as conflicting uses arise, local ordinances and bylaws may not be aligned with state planning goals. Educating and providing capacity support to local planners can advance the vision of aligning state and municipal goals and plans for ecosystem protection.

Because watersheds extend over political boundaries, watershed planning presents an opportunity to create plans that work on larger scales than individual municipal ordinances or bylaws. Each state supports watershed planning by developing plans for priority watershed areas and by providing assistance to independent groups wishing to develop plans. Watershed areas with published and accepted plans are eligible for implementation funding under Section 319 of the Clean Water Act; therefore, increasing the number of accepted plans is a priority.

As a regional partnership, NBEP supports planning at multiple scales by analyzing and communicating cross-boundary information, convening watershed-scale workgroups to develop tools and recommendations, and providing funding to support capacity-building as well as interstate projects that may not be eligible for state funding.

Potential Projects

- Foster adoption of Low Impact Development (LID) principles in local ordinances and bylaws.
- Support development of Watershed Management Plans and Watershed-Based Plans.
- Promote wider use and integration of existing land use tools and plans.
- Create NBEP Science Updates and web applications to communicate information about impacts of land use change on water quality and wildlife habitats.
- Conduct research and convene partners in workgroups to develop information and tools to inform land use policies for improved watershed management.
- Seek funding to provide ongoing support for regional circuit-rider positions that lend capacity to local planners.

Outputs

- Ten additional watershed plans in Rhode Island (RIDEM 2024a)
- More municipalities codifying Low Impact Development principles
- NBEP Science Updates and tools
- Workgroup products, including information and tools to inform land use policies
- Sustained regional circuit-rider positions at state and regional planning agencies

Outcomes

- More watershed areas eligible for and seeking implementation funds for non-point source pollution projects
- Better integration of land use planning protective of natural resources at various scales

Indicators

Population, Land Use, Impervious Cover, Open Space

NBEP role

Convene, Synthesize and communicate science, Fund capacity and projects

Implementing Partners

RIDEM, MassDEP, RI Division of Statewide Planning, SRPEDD, OCPC, URI Coastal Institute, URI Cooperative Extension, NBNERR, Mass Audubon, ASRI, Save The Bay, SNEP Network, Blackstone Watershed Collaborative

Location

Narragansett Bay region

Timeline for Initiation

2025

Estimated costs/potential funding sources

$10k–500k

NBEP 320/SNEP

Action Water-2.1: Stormwater Guidance and Education

Full Action Statement: Update and standardize stormwater design manuals, support stormwater workforce training and capacity-building, and encourage public education and involvement to reduce stormwater pollution.

Action Description and Statement of Need

This Action will support the necessary preconditions to accelerate the use and maintenance of effective designs for stormwater best management practices and support public education and involvement to reduce stormwater pollution. Specifically, partners will update and standardize stormwater BMP design manuals; support training and education for BMP design, construction, and maintenance; and encourage public involvement in reducing stormwater pollution.

Massachusetts, Rhode Island, and Connecticut maintain stormwater BMP manuals that provide guidance on stormwater management. Connecticut recently updated its manual (CT DEEP 2024). Older manuals for Massachusetts (MassDEP 2008) and Rhode Island (RIDEM 2015) will be updated to incorporate scientific advances, regulatory changes, and newer practices for LID site planning and green infrastructure BMP installation and maintenance.

Workforce education and professional development can encourage and support municipalities to implement and properly maintain stormwater BMPs. The SNEP Network Stormwater Planning Series offers free training and technical assistance to guide communities through the process of developing a conceptual design for a nature-based stormwater retrofit in a selected drainage area. The Providence Stormwater Innovation Center monitors water quality and the effectiveness of stormwater BMPs and teaches and trains others about the successes and failures of BMP design, implementation, maintenance, and lifespan. NBEP funded a project to monitor and evaluate the performance of 25 regional green infrastructure projects and offer critical insights for retrofit or repairs for underperforming projects (Kopp 2023).

NBEP and partners will support work to reduce stormwater pollution through enhanced public education campaigns and new public policies. Regional partners will convene to develop strategies to assist municipalities with pollution reduction program development, implementation, and enforcement, and to design innovative and effective public awareness strategies for adoption by local groups. This action for public pollution mitigation and education also includes support for professional training programs for commercial service providers such as landscapers whose practices have consequences for stormwater quality. Professional training programs, certifications, and registries can also elevate BMPs to industry standard practices.

NBEP will fund stormwater manual updates, trainings, and public education activities. NBEP will also support activities to monitor and evaluate the effectiveness of green infrastructure projects.

Potential Projects

- Update stormwater design and installation manuals for each state, as necessary, including protocols for maintenance, monitoring, and evaluation. NBEP has partnered with RIDEM to secure funding to update the Rhode Island Stormwater Design Manual.
- Support education and professional development to increase municipal and NGO capacities to maintain green infrastructure, nature-based solutions, or other stormwater infrastructure.
- Support public engagement and involvement activities to spread awareness about ways to reduce stormwater pollution.
- Convene partners to review existing plans, identify priority needs for new policies and programs that target stormwater pollution, and seek avenues for policy and program development and adoption.

Outputs

- Updated stormwater manuals
- Educational materials
- Trainings
- Working group meetings
- Studies to understand and improve stormwater BMPs

Outcomes

- Improved water quality
- Reduced flooding
- Improved protection for public health and property
- Expanded use of LID and green infrastructure
- A trained workforce capable of designing, installing, and maintaining stormwater infrastructure, especially LID and green infrastructure
- Increased public awareness about stormwater pollution drivers, consequences, and solutions

Indicators

Precipitation, Impervious Cover, Wastewater Infrastructure, Water Quality Condition for Aquatic Life, Water Quality Condition for Recreation, Marine Beaches, Shellfishing Areas

NBEP role

Fund capacity and projects

Implementing Partners

EPA, RIDEM, MassDEP, Rhode Island Infrastructure Bank, Stormwater Innovation Center, SNEP Network, Conservation Districts, MS4 communities

Location

Tasks will be targeted to specific areas identified by partners as hotspots, especially areas with CSOs and communities with rain-driven flooding issues.

Timeline for initiation

2025–2028

Estimated costs/potential funding sources

$1M–5M

NBEP 320/SNEP, SNEP, MA, RI, MRP, MVP

Action Water-2.2: Stormwater Retrofits and Maintenance

Full Action Statement: Support stormwater retrofit opportunities and associated maintenance activities to improve resilience and treatment capacity.

Action Description and Statement of Need

This Action will support design, construction, and maintenance of stormwater retrofit projects, especially green infrastructure BMPs, that improve water quality, help mitigate flooding, and increase resilience to intensifying precipitation.

Green infrastructure BMP retrofits, which use filtration, infiltration, and evapotranspiration to treat and soak up rainwater where it falls, can deliver environmental, social, and economic benefits beyond stormwater management alone. Retrofits can augment underperforming or failing systems or add additional capacity or lifespan to functioning systems. Examples of common green infrastructure BMPs in urban and suburban environments include bioswales, cisterns and rain barrels, dry wells and infiltration trenches, rain gardens and bioretention, permeable paving, and trees. New technologies and approaches continue to evolve (SNEP and VHB 2022). For example, by using green infrastructure BMP retrofits alongside other water quality improvement actions, the bacterial impairment for recreation use in Greenwich Cove was removed from Rhode Island's 2016 303(d) list of impaired waters. The project featured stormwater catch basin upgrades, street sweeping, sewer main replacement, correcting illicit connections, and connecting a failing septic system to central sewer. Greenwich Cove remains on the Rhode Island 303(d) list for other impairments.

Farms can also implement stormwater BMPs such as manure management, manure retaining systems, conservation buffers, and livestock fencing. In the Narragansett Bay watershed, state Natural Resources Conservation Service (NRCS) offices and conservation districts assist farmers and ranchers with creating conservation plans and implementing beneficial practices.

Ongoing maintenance and monitoring of stormwater infrastructure are essential to ensure optimal performance throughout its lifespan. Neglecting maintenance can lead to infrastructure failure, posing safety risks, degrading water quality, and ultimately requiring more time and resources to repair than regular maintenance would have required. To protect these investments, the region must prioritize sustained maintenance and monitoring. This approach will help extend infrastructure lifespan, reveal its full treatment and retention capacities, clarify the level of effort required for upkeep, and support the development of accurate replacement timelines.

Further, there is a need to develop sustainable financing mechanisms for stormwater project construction, maintenance, and monitoring, especially for overburdened, under-resourced, and under-staffed communities.

NBEP will fund studies and planning efforts that lead to stormwater retrofits, with a focus on green infrastructure opportunities. NBEP will also support projects that lead to greater understanding of stormwater infrastructure maintenance needs. Finally, NBEP will support efforts to develop sustainable financing mechanisms for stormwater management.

Potential Projects

- Support under-resourced and under-staffed communities to design and implement holistic and coordinated landscape-scale approaches to meeting stormwater requirements.
- Fund studies and efforts to develop sustainable financing mechanisms to support more effective stormwater management at state and local levels.
- Support partners to work with farms to develop and implement Conservation Plans that identify BMPs that mitigate stormwater impacts.

Outputs

- Retrofit designs
- Completed retrofit projects
- Stormwater retrofit funding mechanisms

Outcomes

- Water quantity and quality are better managed
- Public health and property are better protected from the impacts of stormwater
- Municipalities have reliable funding pathways for stormwater retrofits and maintenance
- Expanded use of green infrastructure

Indicators

Precipitation, Impervious Cover, Wastewater Infrastructure, Water Quality Condition for Aquatic Life, Water Quality Condition for Recreation, Marine Beaches, Shellfishing Areas

NBEP role

Fund capacity and projects

Implementing Partners

EPA, RIDOT, MassDOT, RIDEM, MassDEP, Narragansett Bay Commission, Stormwater Innovation Center, municipalities, Mass Audubon, Woonasquatucket River Watershed Council, Blackstone Watershed Collaborative, MA EOEEA, Save The Bay, SNEP Network, Conservation Districts

Location

Tasks will be targeted to specific areas identified by analyses or prioritized by partners as pollution or flooding hotspots to maximize co-benefits.

Timeline for initiation

2029–2031

Estimated costs/Potential funding sources

$10M+

NBEP 320/SNEP, NBEP BIL, SNEP, EPA, MRP, MVP, MassDEP CWA Section 604(b) Water Quality Management Planning Grant, MassDEP CWA Section 319 Nonpoint Source Implementation Grant, RIDEM CWA Section 319 Nonpoint Source Implementation Grant, NRCS EQIP

Action Water-3.1: Centralized Wastewater Infrastructure

Full Action Statement: Prioritize and support wastewater treatment facility and combined sewer system infrastructure upgrades to improve treatment of pollutants and increase resilience.

Action Description and Statement of Need

This action supports continued upgrades at WWTFs and their associated infrastructure to improve treatment of pollutants and increase resilience.

Centralized WWTFs are regulated by delegated state National Pollution Discharge Elimination System (NPDES) programs in Rhode Island and Connecticut, and Environmental Protection Agency National Pollutant Discharge Elimination System (EPA NPDES) permits in Massachusetts. Rhode Island and Massachusetts have made strides to improve nutrient treatment at facilities that discharge to Narragansett Bay and its tributaries. Between 2000–2012, summer nitrogen loadings to Narragansett Bay were reduced by 50 percent due to upgrades to nutrient treatment capacity at WWTFs in Rhode Island and Massachusetts. Between 2016–2021, nitrogen loads were reduced by 70–76 percent when compared to pre-nitrogen reduction efforts in the early 2000s (RIDEM 2024b). Further, significant work is ongoing to reduce combined sewer overflows by repairing and replacing sewer infrastructure and constructing large stormwater collection tunnels (see RestoredWatersRI callout).

As of Summer 2025, final design of upgrades to the City of Westerly's wastewater treatment facility, which discharges to the Pawcatuck River, have been completed to meet new reduced nutrient limits in their Rhode Island Pollutant Discharge Elimination System (RIPDES) permit, with construction planned through fall of 2028. Upgrades may also be necessary at previously upgraded facilities to maintain pollution reductions or add treatment for other pollutants, such as contaminants of emerging concern. Upgrades should be prioritized based on permit compliance status, extreme weather impact risk, and other factors. As of 2018, RIDEM has included a resiliency planning condition in wastewater treatment facility RIPDES permits as they are reissued. These planning conditions require that treatment facilities develop a schedule of short- and long-term actions that will be taken to maintain operation and protect key collection and treatment system assets in the event of intensifying weather.

The Water Utility Resilience Program in Massachusetts supports local drinking water and wastewater utilities in their efforts to improve resilience to extreme weather impacts. The Program develops and maintains statewide critical infrastructure maps and service maps to enhance critical infrastructure resilience planning, asset management planning, and adaptation to extreme weather. The ResilientMass Plan (Massachusetts 2023) guides efforts for

wastewater utilities to integrate resilience strategies into their operations, addressing extreme weather, flood potential, and aging infrastructure.

Alongside facility upgrades, continuing efforts are needed to address conveyance infrastructure, which has generally deteriorated over time, leading to increased sanitary sewer overflows. Further, increasing the implementation of low-impact development practices in new and redevelopment is necessary to reduce current and future burdens on treatment infrastructure (Action Water-1.2: Land Use and Watershed Planning).

NBEP will support partners in the implementation of this action. In addition, NBEP can work with partners to track permit compliance at WWTFs to prioritize upgrades.

Potential Projects

- Compile a matrix of WWTFs with estimated pollutant loadings, major infrastructure projects, and track the status of permit compliance and project completion to foster community support and awareness.
- Continue to implement Narragansett Bay Commission's Phase III CSO Project in RI.
- Continue to explore options for expanding the types of projects aligned with the CCMP that might benefit from participation in the Clean Water State Revolving Fund.
- Support CSO operators to implement Long Term Control Plans and associated public outreach campaigns.

Outputs

- Report card identifying permit compliance or changes to pollution loading at WWTFs
- Treatment capacity upgraded/compliance achieved by WWTFs in the region
- Continued implementation of Narragansett Bay Commission Phase III combined sewer overflow project
- Annual WWTF tracking internship maintained for at least five years
- Improved access for municipalities to funding for infrastructure projects

Outcomes

- Greater community awareness and support for wastewater treatment facility infrastructure projects
- Greater Clean Water Act compliance at WWTFs and in receiving waters
- More resilient WWTFs
- Reduced wastewater pollution discharges to waterbodies and improved water quality

Indicators

Precipitation, Sea Level, Population, Impervious Cover, Wastewater Infrastructure, Nutrient Loading, Legacy Contaminants, Emerging Contaminants, Dissolved Oxygen, Chlorophyll, Water Clarity, Water Quality Condition for Aquatic Life, Water Quality Condition for Recreation, Marine Beaches, Shellfishing Areas

NBEP role

Synthesize and communicate science

Implementing Partners

EPA Region 1, Narragansett Bay Commission, Upper Blackstone Clean Water, Blackstone Watershed Collaborative, Taunton River Watershed Alliance, Save The Bay, NEIWPCC, RIDEM, MA EOEEA

Location

Narragansett Bay region

Timeline for initiation

2032–2035

Estimated costs/potential funding sources

$10M+

EPA SNEP, RI and MA Clean Water State Revolving Funds

Action Water-3.2: Onsite Wastewater Systems

Full Action Statement: Support cesspool phaseouts and onsite system maintenance region-wide, and advanced septic system upgrades or extension of central sewer service in priority areas.

Action Description and Statement of Need

About 38 percent of the Narragansett Bay Watershed's residents are served by septic systems and cesspools (Chapter 7 in NBEP 2017). Cesspools are outdated, low-performing onsite wastewater treatment and disposal systems (OWTDS) that are already being phased out in Rhode Island and Massachusetts, although thousands still remain in the Narragansett Bay region. Septic systems can threaten ecosystem and public health when they underperform or fail due to improper use, maintenance, location, or saturated leachfield soils. Residential septic systems have been linked to nitrogen loading (Valiela *et al*. 1992, Cole *et al.* 2006; Reay 2004), micropollutant pollution (Phillips *et al*. 2015), and organic wastewater contaminant pollution (Swarts *et al*. 2006) in coastal bays via transport through groundwater. Further, areas with high septic system density have been shown to contribute more to pathogen loading in waterways compared to areas with low septic density (Sowah *et al*. 2017). Within the Narragansett Bay region, the Coastal Salt Ponds watersheds have been the focus of significant management action to address OWTDS given the known contribution of onsite systems to water quality degradation in this area.

For priority water quality hotspots, OWTDS may be converted to central sewer service or, where sewer service is unavailable, cost prohibitive, or otherwise undesired, traditional systems may be upgraded to advanced treatment systems that deliver enhanced nitrogen removal. Wastewater treatment facility plans should be updated on a regular basis to reflect changing conditions and actual population growth.

Region-wide, efforts are needed to encourage regular inspection, maintenance, and pumping of septic systems. In Rhode Island, municipalities can establish local management programs to encourage or require OWTDS maintenance and Onsite Wastewater Management Plans to meet local needs. As of 2024, 21 towns in Rhode Island have adopted Onsite Wastewater Plans. Approved Plans make towns eligible to apply to the Community Septic System Loan Program for funding to provide interest-free loans for homeowners to fund septic system repairs and upgrades. Over the past 20 years (Spring 2024), 65 loans have been issued to 19 towns totaling 23 million dollars (RIDEM 2024a). RIDEM establishes minimum standards for alternative or experimental OWTDS and requires advanced nitrogen-removing treatment for new and repaired systems in targeted areas, including the Coastal Salt Pond and Narrow River

watersheds. There were 8,537 alternative or experimental treatment components installed in the state as of July 2024. RIDEM cautions that these systems require a greater level of oversight to ensure they operate and perform according to design and desired level of treatment (RIDEM 2024a).

Massachusetts requires new construction in nitrogen-sensitive Natural Resource Areas to install nitrogen-reducing septic system technologies. Others in Natural Resource Areas must upgrade their systems by 2030, unless their town applies for a Watershed Permit to provide other nitrogen-reduction solutions. Currently, there are no Natural Resource Areas in the Narragansett Bay region. Massachusetts offers an OWTDS repair tax credit and the state's Housing Financing Agency offers septic repair loans.

NBEP will fund OWTDS assessments, plans, public outreach, and other projects that build local capacity for improvements.

Potential Projects

- Fund studies to assess the contribution of OWTDS to water pollution where there are gaps in understanding.
- Support efforts to encourage property owners to properly maintain OWTDS, including those operating with advanced treatment technologies.

Outputs

- White papers or other research products that document OWTDS performance in areas that currently lack information
- Cesspool removals
- Advanced treatment systems installed in priority areas

Outcomes

- More OWTDS meet high standards of performance
- More waterways previously impaired by OWTDS pollution meet designated uses

Indicators

Wastewater Infrastructure, Nutrient Loading, Dissolved Oxygen, Chlorophyll, Water Clarity, Water Quality Conditions for Aquatic Life, and Water Quality Conditions for Recreation, Marine Beaches, Shellfishing

NBEP role

Fund capacity and projects, Synthesize and communicate science

Implementing Partners

EPA Region 1, RIDEM, MA EOEEA, MassDEP, NEIWPCC, Save The Bay, URI Cooperative Extension, RI Division of Statewide Planning

Location

Narragansett Bay region

Timeline for initiation

2032–2035

Estimated costs/potential funding sources

$10M+

NBEP 320/SNEP, EPA SNEP, RI and MA Clean Water State Revolving Funds

Action Water-4.1: Trash and Marine Debris

Full Action Statement: Prevent and remove aquatic trash and marine debris.

Action Description and Statement of Need

This Action combines efforts to prevent the creation of trash at its source through education and regulation with its removal through technology and coordinated cleanups. Efforts can capitalize on regional plans to create action on preventing and removing trash and debris. Examples include NOAA's 2024 Southern New England Marine Debris Action Plan and EPA's Trash Free Waters Program.

Aquatic trash and marine debris harm water quality, endanger plants and animals, and degrade waterbodies that support recreation and tourism. Plastic is particularly problematic due to its ubiquitous presence, longevity, and tendency to break into smaller pieces (Fuller and Walsh 2023). Trash can also worsen flooding and disrupt wastewater operations by clogging waterways and infrastructure.

Outreach and education can motivate best practices for retailers and consumers to prevent trash from reaching waterways. Policies and legislation can also help reduce trash at its sources. For example, Connecticut, Rhode Island, and many municipalities in Massachusetts have single-use plastic bag bans. Policies to extend end-user responsibilities like "bottle bills" can facilitate recycling through a cash deposit system. Massachusetts and Connecticut operate bottle deposit systems and efforts are ongoing to establish a system in Rhode Island.

Dozens of organizations champion multifaceted efforts to remove trash and marine debris from the environment. For example, Save The Bay is the Rhode Island state coordinator for Ocean Conservancy's International Coastal Cleanup, which engages partner organizations and volunteers to organize dozens of cleanups and document their findings. In 2024, Rhode Island launched a statewide "Litter-Free Rhode Island" initiative, providing micro-grants to support local cleanup efforts on land and in waterways (RIDEM 2024a). The Commercial Fisheries Research Foundation (CFRF) developed a plan to remove abandoned fishing gear, or "ghost gear," from coastal Rhode Island waters, including Narragansett Bay; in the first two years of plan implementation, fishermen trained to support the project removed over 10,000 pounds of gear. Beyond cleanup efforts, various interception technologies can work around the clock to remove trash, and there may be opportunities to strategically use them to greater benefit in the Narragansett Bay region.

NBEP will fund priority education, planning, and implementation activities.

Potential Projects

- Convene partners to develop materials to inform policies and legislation aimed at reducing aquatic trash and marine debris.
- Conduct regional needs/feasibility assessment for trash collection solutions on outfalls, rivers, and streams, and support funding and capacity to implement priority solutions.

Outputs

- Materials developed to inform policy and legislation solutions to reduce aquatic trash and marine debris
- Needs/feasibility assessment for trash collection solutions on outfalls, rivers, and streams
- More trash collection solutions deployed

Outcomes

- Improved capacity to remove aquatic trash and marine debris
- Reduced volume of aquatic trash and marine debris

Indicators

Impervious Cover, Emerging Contaminants, Water Quality Condition for Aquatic Life, Water Quality Condition for Recreation

NBEP role

Fund capacity and projects, Synthesize and communicate science

Implementing Partners

EPA, NOAA, Save The Bay, Blackstone Watershed Collaborative, Taunton River Watershed Alliance, Commercial Fisheries Research Foundation, URI, RIRC, watershed associations

Location

These actions will take place at specific sites, in neighborhoods, municipalities, watersheds, and local waterbodies.

Timeline for initiation

2029–2031

Estimated costs/potential funding sources

$500K–1M
NBEP 320/SNEP, Municipal, state, EPA Trash-Free Waters, NOAA Marine Debris Program

Habitat Protection and Restoration Action Plan

Vision	Resilient and connected landscapes and waterways support healthy habitats and wildlife and provide people with ecosystem services like clean air and water, flood protection, recreation, and sustainable harvest.
Goal	Restore and protect habitats that support wildlife and people.

Priority Opportunities and Challenges

The Narragansett Bay region, situated in three of the most densely populated states in the nation, is a mosaic of urban and suburban communities surrounded by forested landscapes and a network of rivers and streams. The American Industrial Revolution, which began at Slater Mill on the Blackstone River in the heart of the region over 200 years ago, left a legacy of fragmented habitats and contaminated sediments that remains a heavy influence on human quality of life. Today, extreme weather events interact with legacy problems and ongoing urbanization to create challenging present and future conditions. Yet people and nature persist, and opportunities abound to advance a collective vision of resilient and connected landscapes, waterways, and people.

Habitat conditions vary greatly across the Narragansett Bay region with estuary and watershed conditions generally improving with distance from urban areas. Historically, ecosystems have been fragmented and fish and wildlife migration corridors disconnected by infrastructure built to accommodate the growing human population and industry of the region. More recent suburban sprawl encroaches and impacts forests and coastal wetlands. Changes in precipitation patterns, warming air and water temperatures, and coastal flooding and storms are also degrading habitats.

When ecosystems lose integrity through fragmentation and degradation, they lose their ability to provide essential functions for protecting wildlife, water quality, human well-being, and the regional economy. Across 13 key economic sectors that rely on the Narragansett Bay watershed's natural capital, an estimated $14 billion in combined revenue and expenditures was at stake in 2016. Tourism contributed 73 percent of the total (Uchida *et al.* 2019).

Estuarine Habitats

Since European contact, the region has lost more than half of its salt marshes and seagrasses to pollution, development, and higher sea levels. Roughly 4,300 acres of salt marsh habitat and 875 acres of seagrass habitat remain in the region (NBEP 2017 and NBEP 2023b). While historic seagrass losses resulted mostly from development and disease, ongoing seagrass losses—and lack of restoration successes—are driven by warmer waters and nutrient pollution that

accelerate algal growth and reduce the availability of sunlight necessary for seagrass survival. There is an opportunity to galvanize regional efforts to restore seagrass habitat in the region's estuaries (Action: Habitats-2.3).

Since the early 1900s, industrialization, increased pollution, and the loss of seagrass caused a shift in shellfish communities from scallops to quahogs, which tend to be found in softer sediments. Today, the quahog is Rhode Island's official state shellfish, and quahogging is a treasured local pastime. Overfishing of wild oysters, observed as early as colonial times, and pollution linked to early 1900's industrialization led to declines in natural oyster reefs. With cleaner waters and aquaculture lease management regulations, oyster aquaculture today is a valuable fishery (Rice 2006).

In 2018, the University of Rhode Island completed a third bay-wide survey of benthic habitat quality, advancing a 30-year time series during a time of decreasing nutrient inputs. Results showed improvements in benthic habitats bay-wide, but with less improvement in the bay's uppermost Providence and Seekonk Rivers, Greenwich Bay system, and Allen Harbor, which are closest to pollution sources (Shumchenia and King 2019). NBEP provided funding for the project and developed a StoryMap that describes this complex work (NBEP 2020c). In general, there is a need for additional monitoring and modeling of benthic habitat dynamics (such as macroalgae, wild oysters, and infauna) to advance conservation and restoration (Actions: People-2.2 and Habitat-1.1).

Critical salt marsh habitat is under threat throughout the Narragansett Bay region from higher sea levels and altered hydrology from legacy agriculture and development, which drive salt marsh deterioration and fragmentation by accelerating erosion and subsidence and outpacing salt marsh accretion.

Succotash Marsh Sediment Placement and Sentinel Site Monitoring

Succotash Marsh, a 182-acre salt-marsh system located within Potters and Point Judith Ponds in South Kingstown, Rhode Island, provides an array of habitats that support a wide assemblage of birds, including threatened salt marsh sparrows, as well as commercial aquaculture and recreational opportunities. Sea level rise threatens Succotash Marsh by subjecting it to more frequent flooding, and surrounding development prevents the marsh from migrating upland. This project, led by the Narragansett Bay Estuarine Research Reserve, will complete the planning and design phases of a sediment placement project to improve the resilience of Succotash Marsh and establish a monitoring plan that includes pre-restoration monitoring at both the project site and a control site.

Salt marsh subsidence (especially at creekbanks) is also linked to increased nutrients as added nitrate decreases belowground root growth that leads to soil destabilization (Deegan *et al.* 2012). Many marshes show signs of plant die-off, erosion, and other stresses (August 2019). The coastline is now less resilient to storms and floods due to the loss of salt marsh. Without action, most of RI's remaining coastal wetlands will be displaced or destroyed by the end of this century (CRMC 2015). The saltmarsh sparrow, which only lives and breeds in salt marshes, is currently under review by the US Fish and Wildlife Service for protection as an endangered species. The need is urgent to identify and preserve salt marsh migration corridors and sustain marshes in place (Action: Habitats-3.2).

Salt marsh restoration practitioners are working to buy time for these vulnerable habitats. For example, Save The Bay has pioneered a technique to restore the hydrology of marshes impacted by human impacts from agricultural uses and mosquito ditching through digging shallow creeks or runnels and maintaining a select number of ditch features to facilitate gradual water drainage of impounded water off the marsh surface (Save The Bay 2021b). Impounded water causes vegetation, particularly plants that are adapted to dry conditions at low tide, to become stressed and die, resulting in the marsh surface subsiding. Practitioners also place sediment to elevate degraded marshes to make them more resilient to sea level rise. Both techniques aim to sustain salt marshes and their dependent wildlife species, such as the vulnerable saltmarsh sparrow, in place while conservation of adjacent uplands aims to preserve areas for future inland marsh migration. NBEP supports these and other ongoing salt marsh restoration and monitoring projects with funding and technical assistance through convening the Salt Marsh Restoration, Assessment, and Monitoring Program (RAMP), a cooperation among multiple federal, state, local, non-profit, and academic agencies to restore, assess, and monitor salt marshes throughout Rhode Island.



Figure 12. Coldwater streams in the Narragansett Bay region.

Freshwater Habitats

The Narragansett Bay region has over 4,000 miles of rivers and streams and 40,000 acres

of lakes and ponds. However, many freshwater habitats are impacted by nutrient enrichment, low dissolved oxygen, or other parameters (NBEP 2017).

The region's industrial past has left thousands of dams, impoundments, and other barriers that reduce the connections between freshwater and saltwater systems. There are about 1,000 dams and many times that number of culverts in the Narragansett Bay region. These barriers may not only increase flood risk with increased precipitation, warm waters, and create slow-moving impoundments that harbor invasive aquatic plants, but many also block migration for important diadromous fish populations. By one estimate, every mile of river opened to fish passage can contribute more than $500,000 in economic and social benefits (USFWS 2011).

Regional partners have worked diligently and successfully to remove barriers to aquatic organism passage on the Narragansett Bay region's two Wild and Scenic River networks, the Taunton and the Wood-Pawcatuck (see Callout), as well as on coastal rivers and streams throughout the region. Despite progress, many opportunities remain to capitalize on historic investments to restore and improve freshwater-saltwater connectivity for fish passage, flood resiliency, habitat restoration, and recreation, especially where deteriorating infrastructure can be removed or redesigned for multiple ecological, economic, and social co-benefits. Progress on these complex projects can be accelerated with proactive and collaborative decision-making (Actions: Habitats-2.1 and Habitat-2.2).

Pawcatuck River Fish Passage Projects

Nearly all 34 miles of the Pawcatuck River are open for fish passage for diadromous species such as American shad, alewife, blueback herring, and American eels thanks to several projects constructed over the last fifteen years. Fishways have been completed at Kenyon Mill Dam (Richmond, RI 2013), Upper Shannock/Horseshoe Falls (Richmond, RI 2012), and the Bradford Dam (Bradford, RI 2017). The Lower Shannock Falls Dam (Richmond, RI 2010) and the White Rock Dam (Westerly, RI and Stonington, CT 2015) have been removed.

In 2024, the Town of Westerly and partners won funding from NOAA to implement fish passage or dam removal at the Potter Hill Dam, the last fish passage barrier on the mainstem of the Pawcatuck River. The work will provide access to more than 3,000 acres of spawning habitat and 120 miles of stream habitat for river herring and other migratory fish.

Looking to headwater streams, in 2022, NBEP provided IIJA funds to the Wood-Pawcatuck Watershed Association (WPWA) to develop a cold-water stream restoration plan. WPWA completed the plan in 2024 and now seeks to implement the eight highest-priority projects identified in the plan.

For example, while water quality in the Blackstone River has dramatically improved, significant barriers to fish passage remain. The Lower Blackstone Fish Passage Project aims to reinvigorate progress on establishing diadromous fish passage across four dams on the lower Blackstone River in Pawtucket, RI. Fish passage past the four dams would deliver a wide range of important benefits, including opening 206 acres of spawning nursery habitat, generating over 200,000 adult spawning river herring and 10,000 adult spawning shad per year, creating forage fish for commercial species in the bay, improving connectivity for other species, and enabling greater recreational and cultural enjoyment. NBEP led partners to evaluate past efforts, convene workshops, and conduct interviews and mediation among 22 diverse partners to maximize benefits to ecosystems, hydropower, and heritage. In 2022, NBEP transitioned to a funder role and now supports the capacity of lead partners and a newly-formed Community Advisory Committee to continue convening, advocacy, and planning work on the largest fish passage project in the Narragansett Bay watershed, with over $500,000 of Infrastructure Investment and Jobs Act and Section 320 funds allocated by NBEP to date.

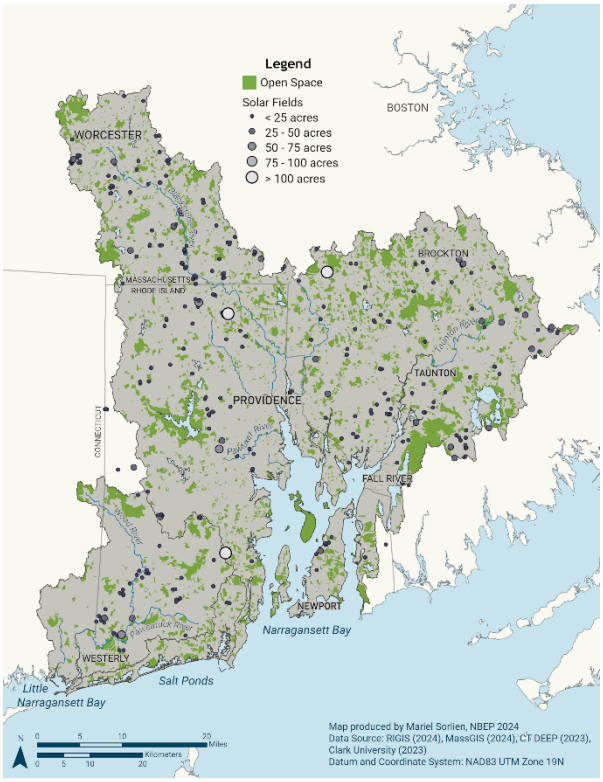


Figure 13. Protected open space and solar arrays in the Narragansett Bay region.

Upland Habitats

The Narragansett Bay region encompasses more than one million acres. About 200,000 acres are protected open space, including natural, agricultural, and recreational lands. More than 260,000 acres in the watershed have been identified as high ecological value, but 185,000 acres of these natural lands remain

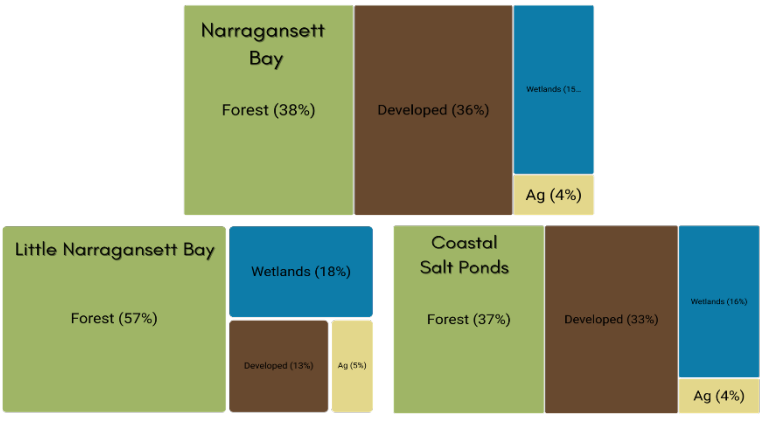


Figure 14. Land use (2021) in Narragansett Bay region watersheds.

unprotected as of NBEP's last regional assessment (Chapter 21 in NBEP 2017). Coastal basins are the most urbanized, ranging from 65 to 85 percent urban lands. Impacts to forests are accelerating as suburban sprawl encroaches. For example, between 2001–2011, the Upper- and Middle-Taunton River Basins lost nine percent and 18 percent of their forest lands, respectively, to new development (NBEP 2017). Clear-cutting forests to build ground-mounted solar photovoltaic arrays is a growing concern, but there are opportunities to develop and implement land use policies to advance and balance habitat and floodplain protection as well as clean energy and housing needs (Figure 12, Manion *et al*. 2023). Development pressure points to the urgent need to proactively protect remaining lands with high ecological integrity.

Resiliency Considerations

Higher sea levels and more intense precipitation and storm surge events will create additional challenges for protecting and restoring natural habitats in the Narragansett Bay region. Restoration and habitat protection plans must continue to prioritize long-term ecosystem adaptation and resilience under changing conditions, rather than simply restoring habitats to some prior state. Understandings of changing environmental conditions must be incorporated into restoration project prioritization, design, implementation, and maintenance. For example, because sea level rise is driving salt marsh deterioration and fragmentation by accelerating and outpacing salt marsh accretion, conservation of upland migration corridors will be necessary for marsh migration.

Warming water temperatures have reduced the number of cold-water river species and have impacted viability of estuarine fish and shellfish communities. Moreover, invasive species are establishing new ranges and outcompeting natives—changing the species compositions and ecosystem services of key estuarine and watershed habitats. Fisheries managers, in particular, will need access to up-to-date data and analyses to be adaptive to new-to-the-region species. Dams, impoundments, culverts, altered streams, and other infrastructure are increasingly vulnerable under altered hydrologic regimes associated with rising sea levels and more intense precipitation and storm surge events that cause flooding. Restoring habitat connectivity for diadromous species provides refuge, increased reproductive opportunity, and resilience to changing water temperature, salinity, and pH.

Habitat Protection and Restoration Objectives and Actions

Protecting and restoring priority habitats in this Action Plan requires creating and updating restoration plans, implementing restoration projects to improve resilience and connectivity, and protecting existing natural lands through land use policy and acquisition. These efforts require coordinated planning and implementation across multiple geographical scales and

political boundaries. Success also requires outreach to local conservation groups and municipalities to support staff capacity and share best practices.

Objectives	Actions
Habitat-1. Improve collection and use of habitat data for decision-making.	*Biodiversity and Habitat Quality Monitoring:* Support, improve, and create efficiencies for monitoring and documenting biodiversity and habitat quality.
Habitat-2. Improve habitat resilience	*Habitat Plans*: Update existing and develop new regional habitat restoration plans and strategies to facilitate cross-boundary projects and address emerging challenges for habitat resilience.
	Habitat Projects: Identify, prioritize, and coordinate partner opportunities and funding to implement habitat restoration projects.
	Benthic Habitat Assessment and Restoration: Assess and restore benthic habitats to support dynamic estuarine ecosystems.
Habitat-3. Restore habitat connectivity and function	*Aquatic Connectivity*: Reconnect freshwater and saltwater systems and improve connectivity within freshwater systems to restore habitats and fisheries.
	Salt Marsh Restoration: Restore coastal wetlands and reconnect with uplands for habitat migration, wildlife, and recreation.

Action Habitat-1.1: Biodiversity and Habitat Quality Monitoring

Full Action Statement: Support, improve, and create efficiencies for monitoring and documenting biodiversity and habitat quality.

Action Description and Statement of Need

This Action will monitor and document the region's biodiversity, habitat quality, and habitat restoration project impacts.

Significant monitoring of the Narragansett Bay region's natural habitats and biodiversity takes place at broad and project-specific scales. Biodiversity and habitat monitoring is integral to understanding the impacts of upland development, restoration efforts, changing water quality, impacts of extreme weather, and socioeconomic pressure on natural resources and biodiversity.

Monitoring has been managed by multiple groups—federal, state, and municipal agencies, non-profits, NGOs, universities, and communities—that collaborate to establish protocols to ensure consistent and useful data are delivered to resource managers, decision-makers, and the public. While many agencies and organizations freely share their data, locating and accessing these data can be challenging. In addition, maintaining funding and capacity (both paid and volunteer) to collect, quality control, evaluate, and publish monitoring data remains a perennial challenge. Integrating existing monitoring data strategically can improve efficiency, highlight spatial or temporal gaps, and inform capacity issues.

Post-restoration monitoring is essential to determine restoration successes and lessons learned, as well as determining the long-term ecosystem resilience capabilities of restored habitats. Challenges such as extreme weather, rising seas, and rising temperatures will impact habitats and restoration project outcomes. Monitoring these changes is important for assessing and anticipating the changing management and restoration needs of ecosystems and coastal communities.

NBEP will convene and collaborate with appropriate partners throughout the region to coordinate or otherwise support habitat and biodiversity monitoring activities to address management questions and needs. Activities could include updating methodologies, expanding monitoring into new locations, and revising protocols to prioritize efficiency and incorporate new partners. NBEP will also work with partners to develop and/or update monitoring databases and connect users with habitat and biodiversity data.

Potential Projects

- Convene interstate interests to coordinate and standardize monitoring activities and methods, including developing new or expanding current monitoring activities (such as seagrass, salt marsh, macroalgae, and cyanobacteria monitoring), and ensure that monitoring aligns with management questions and needs.
- Develop and/or update natural heritage databases for the states as needed, including BORIIS2 and BioMap2.
- Support development of partner-driven habitat and biodiversity monitoring data clearinghouse tools.
- Develop data visualization tools to encourage coordination on restoration projects.
- Support innovations in monitoring strategies that bring efficiencies to and build capacity for data collection and encourage community science programs that help fill priority data gaps.
- Support partners to develop and expand sentinel habitat monitoring sites to explore changes to the habitat with time and under changing conditions.
- Convene and support partners to explore seagrass restoration using seed-dispersal and other techniques.

Outputs

- New monitoring protocols or programs from new or expanded monitoring activities
- Updated natural heritage databases and State Wildlife Action Plans
- Clearinghouse tool connecting users with data
- Data visualization tools highlighting restoration and monitoring efforts
- Working group meetings to convene on priority topics in the watershed
- Reports on select monitoring objectives

Outcomes

- Coordinated and efficient monitoring activities
- Improved collection and use of natural heritage information
- Enhanced understanding of ecosystem monitoring gaps and mechanisms to fill them
- Increased understanding of characteristics and changes in the Narragansett Bay region over time
- Ecosystem management that is better informed by monitoring

Indicators

All indicators

NBEP role

Convene, Fund capacity and projects

Implementing Partners

RIDEM, MassDEP, URI Coastal Institute, RI Environmental Monitoring Collaborative, RINHS, NBNERR, Mass Audubon, MassWildlife, TNC (RI and MA), ASRI, Salt Ponds Coalition, URI Watershed Watch, Save The Bay, Brown University, URI, EPA-ORD-ACESD, EPA Region 1

Location

Narragansett Bay region

Timeline for initiation

2029–2031

Estimated costs/potential funding sources

$1M–5M

NBEP 320/SNEP, National Science Foundation, Congressionally Directed Spending, Foundation Grants, URI-CI, RIDEM, MassDEP, TNC

Action Habitat-2.1: Habitat Plans

Full Action Statement: Update existing and develop new regional habitat restoration plans and strategies to facilitate cross-boundary projects and address emerging challenges for habitat resilience.

Action Description and Statement of Need

This Action will update existing and publish new regional plans for freshwater and estuarine habitat restoration. 'Plans' refers broadly to strategies, designs, assessments, and protocols that apply from an ecosystem to a habitat location. Restoration plans have been developed for salt marshes, shellfish, coastal ponds, reefs, rivers, and forests. Seagrass and oyster restoration planning, along with broader aquaculture oversight, are underway locally and in the greater New England region.

Many existing plans were developed more than a decade ago and need to be updated to reflect a regional approach to emerging challenges for habitat resilience. Some are confined by geopolitical boundaries and may lack specific implementation details necessary to ensure responsive projects. Opportunities exist to improve cross-state and other regional coordination, collaboration, and information sharing about habitat restoration, land use planning, and biodiversity conservation (Stevens *et al.* 2023).

Involvement of watershed-based organizations, land trusts, commercial aquaculture organizations, and other experts working at the local scale is also important for establishing watershed and estuarine habitat restoration priorities. Local and regional collaboration ensures that priorities can be guided by partners most familiar with local issues and supported by partners who are experienced with working at larger scales.

NBEP will convene partners to share restoration expertise and emerging best practices, coordinate habitat planning efforts, and prioritize restoration projects across institutional and state boundaries, with a goal of developing the NBEP Habitat Restoration Plan by 2028. NBEP will also assist to leverage resources with projects like the Blackstone Needs Assessment (2019–2021), the Blackstone Fish Passage Project (2021–current), and the Salt Marsh Restoration, Assessment and Monitoring Program (RAMP) (2022–current). NBEP will help fund partner and community outreach, efforts to update planning documents, and research to fill knowledge gaps.

Potential Projects

- Develop the NBEP Habitat Restoration Plan.
- Update Rhode Island Anadromous Fish Restoration Plan.

- Update existing restoration strategies to include updated data, information, and completed projects.
- Develop a Narragansett Bay region salt marsh restoration strategy or update the Rhode Island Coastal Wetland Restoration Strategy to include the upper part of Narragansett Bay in Massachusetts and portions of Little Narragansett Bay in Connecticut, where useful. Strategy should highlight areas where marsh migration is possible and should be supported.
- Support the development and implementation of the Rhode Island Shellfish Restoration and Enhancement Plan.
- Develop a Narragansett Bay and/or broader regional submerged aquatic vegetation restoration plan that reviews restoration strategies that have been tried in Narragansett Bay to date, including current seed-based restoration strategies, and assesses whether recent water quality improvements could improve restoration success. This restoration plan should also include new data collected on flowering phenology and seed collection and seed transfer guidance.
- Expand and update Sea Level Affecting Marsh Migration (SLAMM) models to include the Palmer and Runnins Rivers and other areas of MA, CT, and RI that were not covered in state models.
- Pursue or expand state level management plans for lakes and ponds, inclusive of invasive species and educational outreach to boaters.
- Develop plans and actions to protect cold-water streams and rivers, or specific endangered and/or threatened freshwater species, such as native brook trout.

Outputs

- NBEP Habitat Restoration Plan
- RI Shellfish Restoration and Enhancement Plan
- A multi-state salt marsh restoration strategy
- At least one regional submerged aquatic vegetation restoration strategy
- Updated freshwater restoration and conservation plans and protocols
- Coordinated meetings among habitat restoration practitioners
- Expanded SLAMM to cover entire region seamlessly

Outcomes

- Increased coordination on habitat restoration priorities, techniques, and projects across boundaries
- Shared habitat restoration goals, objectives, and targets
- Better designed and more impactful estuarine restoration projects
- Healthier and more sustainable estuarine habitat

- Increased coordination on freshwater restoration priorities, techniques, and projects across institutional and state boundaries
- Shared plans for achieving freshwater restoration goals, objectives, and targets

Indicators

Sea Level Rise, Nutrient Loading, DO, Chlorophyll, Water Clarity, Benthic Habitat, Seagrasses, Salt Marsh, Aquatic Life Use, Estuarine Fish Use, Recreation Use, Open Space, Marine Beaches, Shell Fishing Areas, Land Use, Impervious Surface, Stream Invertebrates, Coldwater Fish

NBEP role

Convene, Synthesize and communicate science, Fund capacity and projects

Implementing Partners

EPA Region 1, NBNERR, MassDEP, MA DER, MA CZM, Mass Wildlife, Massachusetts DCR, RIDEM, CRMC, URI CRC, RISG, Mass ECAN, RINHS, Mass Audubon, Blackstone Watershed Collaborative

Location

Narragansett Bay region

Timeline for initiation

2029–2031

Estimated costs/potential funding sources

$5M–10M

State Funds, NBEP 320/SNEP, EPA SNEP

Action Habitat-2.2: Habitat Projects

Full Action Statement: Identify, prioritize, and coordinate partner opportunities and funding to implement habitat restoration projects.

Action Description and Statement of Need

This action will enhance regional coordination and implementation of habitat restoration projects. Priority habitats for restoration include salt marshes, seagrass beds, tidal shorelines, rivers, riparian shorelines, floodplains, wetlands, ponds, and lakes. Restoration projects are designed to improve water quality, natural water flow and sediment regimes, and health of native freshwater and marine life. Habitat restoration also supports resilience by increasing flood protection from storms and higher sea levels. Restored and resilient habitats improve community access and health and economic prospects for commercially important harvests.

Habitat restoration in the region has generally been opportunistic, with practitioners implementing projects as they arise when willing landowners, staff capacity, and funding align. Salt marsh practitioners participating in the Salt Marsh RAMP have made significant progress on collaboratively prioritizing restorations based on condition, value, and migration potential; this coordination can serve as a model for other habitat types. NBEP will continue to support or fund smaller projects, but this action will accelerate coordinated and holistic efforts directed at system or sub-watershed scale improvements. Recovery of ecological systems and natural processes in a degraded watershed requires restoration at the appropriate scale (Whol *et al.* 2015).

NBEP will maintain priority restoration project databases and coordinate funding opportunities for priority projects through existing federal sources like EPA and NOAA, and state sources like the RI Coastal and Estuarine Habitat Restoration Program and Trust and the MA Coastal Resilience Grant Program.

NBEP will also coordinate outreach and project support to local watershed or lake and pond associations to help implement restoration projects. These groups are local experts in providing outreach and education to their communities and many are ready to partner and collaborate on habitat restoration projects.

Potential Projects

- Coordinate among groups pursuing priority habitat assessment, planning, and restoration in the greater Narragansett Bay region.
- Maintain priority project lists for major estuarine, riverine, and riparian habitat types/ecosystems in the Narragansett Bay region.

- Support states, municipalities, and local NGOs with planning, project identification, and prioritization.
- Maintain a resource library of Quality Assurance Project Plans (QAPPs) and other project documents as a resource for practitioner reference.

Outputs

- Coordination meetings and tools for groups pursuing restorations in the same areas
- Annually updated list of priority estuarine and freshwater restoration projects
- Additional fully funded requests for proposals for freshwater and estuarine habitat projects
- Additional completed restoration projects from approved restoration plans.
- Education and invasive species removal events and programs

Outcomes

- Accelerated system or sub-watershed scale habitat improvements
- Activated and coordinated local partners in restoration and outreach projects
- More engaged watershed or pond groups with more members
- More estuarine and freshwater systems meet both habitat and recreational use standards and sustain healthy wildlife and human use

Indicators

Sea Level Rise, Nutrient Loading, DO, Chlorophyll, Water Clarity, Benthic Habitat, Seagrasses, Salt Marsh, Aquatic Life Use, Estuarine Fish Use, Recreation Use, Open Space, Marine Beaches, Shell Fishing Areas, Land Use, Impervious Surface, Stream Invertebrates, Coldwater Fish

NBEP role

Convene, Synthesize and communicate science

Implementing Partners

EPA Region 1, Save The Bay, TNC-RI, TNC-MA, Mass Audubon, WRWC, Old Colony Planning Council, MA DER, NBNERR, RIDEM, RINHS, MA EOEEA, SRPEDD, RI Saltwater Anglers Association

Location

Narragansett Bay region

Timeline for initiation

2025–2028

Estimated costs/potential funding sources

$10M+

NBEP 320/SNEP, NBEP BIL, EPA SNEP, MA DER, NOAA, NFWF, USDOT, USDOE, RIDEM, MassDOT, Private Foundations

Action Habitat-2.3: Benthic Habitat Assessment and Restoration

Full Action Statement: Assess and restore benthic habitats to support dynamic estuarine ecosystems.

Action Description and Statement of Need

This Action will assess and accelerate restoration activities for key estuarine benthic habitats. The seagrasses, hard-bottom habitats, and other benthos that exist on the bottom of the estuarine waters of Narragansett Bay, Little Narragansett Bay, and the Coastal Salt Ponds support diverse ecosystems, aquaculture, fisheries, and recreation. Understanding how these habitats have changed under shifting conditions, including improved water quality conditions, warmer water temperatures, and higher water levels, is key to advancing restoration activities.

Sediment Profile Images (SPI) throughout Narragansett Bay show improvements in benthic habitats between 2008 and 2018 due to the reduction of nutrients loading from WWTFs (NBEP 2020). Sled cameras have also shown changes in the organisms living on top of the sediments in the upper portions of the Bay. Partners should consider prioritizing follow-up benthic assessments during the 10-year life of this CCMP Revision.

Two types of seagrasses exist in the Narragansett Bay region: eelgrass (*Zostera marina*) and widgeon grass (*Ruppia maritima*). Water pollution, a wasting disease outbreak in the 1930s, the Hurricane of 1938, and coastal development caused severe damage to seagrass beds. Where once eelgrass was found as far north as Providence, eelgrass currently thrives only in the lower bay, the Coastal Salt Ponds, and the outer parts of Little Narragansett Bay (NBEP 2023). Eelgrass extent has increased with the improvement of water quality, especially in the West Passage. However, eelgrass extent has declined in the Coastal Ponds and shallow embayments likely due to high water temperatures stressing the plants (NBEP 2023). Also of note is a persistent bed of widgeon grass in Greenwich Bay which provides some hope that eelgrass may return to the upper bay (NBEP 2023).

Artificial reefs have long been used as restoration techniques to improve the attraction and production of key marine species, including lobsters, shellfish, sea bass and other sport fish, thus improving recreational and economic opportunities. In 2019, RIDEM and TNC-RI installed a series of “reef balls”, artificial reef structures in the Providence River near East Providence to enhance fish communities. Since then, RIDEM and TNC-RI have continued monitoring the fish communities in the area. URI is researching the possibility of adding artificial reefs off the south shore of Rhode Island to protect the region from storms and to enhance habitat including lobster rearing and kelp production.

Renewed interest in these habitats, including federal funding to support seagrass research, continued SPI analysis (NBEP 2020), the formation of the Seaweed Ecology and Assessment Collaborative, and continued fish community monitoring highlights the need to understand the variety of stressors that impact benthic habitats. NBEP can synthesize what has been done to assess and restore these habitats and analyze the data collected to inform policy decisions and future management actions, including restoration.

NBEP will continue to convene and coordinate partners across state and institutional boundaries to coordinate and share knowledge, practices, and outcomes of assessing and restoring benthic habitats.

Potential Projects

- Synthesize past and ongoing regional seagrass restoration efforts including methodologies used, success of restoration efforts, locations, etc. This synthesis should assess if these techniques could be more successful with current, improved water quality.
- Update seagrass site suitability models or indices (Detenbeck & Rego 2015). Ensure such models include environmental variables of interest including water quality, sediment type and quality. Focus should be given to shallow water habitats to ensure data coverage is of sufficient resolution for a model.
- Update monitoring protocols to modernize approaches to tiered seagrass monitoring, include widgeon grass, and develop sentinel seagrass monitoring sites. Sentinel sites should focus on how habitats respond to stress, establishing baselines for restoration, and include an area currently covered with widgeon grass to assess any potential transition from widgeon grass to eelgrass.
- Establish long-term goals for benthic habitat monitoring, including the use of sediment profile imaging, sled-cameras, gliders, and autonomous underwater vehicles.
- Update 2018 benthic sediment profile imaging (SPI) for Narragansett Bay. Expand SPI to other areas of the region (Salt Ponds and Little Narragansett Bay) and new sites of interest, including shallow water portions of the coastal ponds. SPI can provide an assessment of benthic habitat quality trends, particularly in the upper part of the Bay due to improved water quality.
- Update benthic sled camera monitoring in the Providence River Estuary.
- Synthesize artificial reef work that has been completed throughout the bay assessing the method and materials used, and if the reef has improved fish habitat in the area. Use this synthesis to develop an artificial reef plan to guide future work to focus on both habitat creation and resilience in high-erosion areas.

- Implement the Macroalgae Monitoring Protocol developed by SEAC-RI to understand the seasonal abundance/distribution of drift and attached algae, habitat impacts from drift algae, and changes to algae due to stress.
- Explore using dredged materials to restore areas of exposed sediment containing high concentrations of contaminants.

Outputs

- White papers synthesizing seagrass and artificial reef restoration efforts
- Updated Seagrass Site Suitability models
- Updated seagrass, macroalgae, and benthic habitat monitoring protocols
- Updated and expanded SPI analysis

Outcomes

- Activated and coordinated local partners in assessment and restoration projects
- Increased number of benthic habitat restoration projects
- More acres of benthic habitats restored
- Increased number of artificial reefs

Indicators

Nutrient Loading, Seagrasses, Benthic Habitats, Water Clarity, Estuarine Fish Communities

NBEP role

Convene, Synthesize and communicate science, Fund capacity and projects

Implementing Partners

NBNERR, RIDEM, Save The Bay, Massachusetts DMF, EPA Region 1, Narragansett Bay Commission, TNC-RI

Location

Benthic estuarine and tidal habitats throughout the Narragansett Bay region

Timeline for initiation

2025–2035

Estimated costs/potential funding sources

$5M–10M

NEP 320/SNEP, NBEP BIL, EPA SNEP

Action Habitat-3.1: Aquatic Connectivity

Full Action Statement: Reconnect freshwater and saltwater systems and improve connectivity within freshwater systems to restore habitats and fisheries.

Action Description and Statement of Need

This Action will accelerate planning and implementation of projects that improve and restore connectivity within freshwater systems and between freshwater and saltwater systems, such as removing dams and impoundments, replacing culverts, creating fish passageways, naturalizing river channels, and restoring tidal connections. These projects will improve safety, instream water quality and hydrology, wildlife habitat, and cultural and recreational opportunities. To deliver ecosystem benefits, structural improvements should be accompanied by system or sub-watershed scale improvements to reduce stormwater, nutrients, and contaminants (CCMP Water Quality Improvement Action Plan, Bernhardt and Palmer 2011, Wohl *et al.* 2015).

Many dams and undersized culverts were not built to accommodate more intense storms and nuisance flooding, therefore posing significant threats if they fail (NBEP 2021e). Furthermore, abundances of diadromous forage fishes for commercially important fisheries like herring, shad, and eel have declined due to being cut off from spawning habitats. The extent of local cold-water fisheries like brook trout in watershed headwaters are limited by lack of adequate localized habitat connectivity. Resident fish, invertebrates and other aquatic life are also impacted negatively.

Efforts to remove barriers to address safety concerns, improve fishery habitat, and address flood risk from undersized infrastructure have increased significantly over the last decade. For example, from 2010 to 2017, seven dams were removed from the Pawcatuck River and replaced with nature-like rock fishways to allow fish to move 20 miles upstream to historical spawning areas. Remaining restoration priorities include extending passage on the Pawcatuck River with a focus on cold-water streams in the upper watershed, removing barriers in tributaries of the Taunton River, and establishing fish passage between the Blackstone River and Narragansett Bay for the first time since the Industrial Revolution. In 2019, partners convened to reignite planning for the Lower Blackstone Fish Passage Project to achieve fish passage over the four lowest dams on the river.

Despite progress, many challenges face restoration practitioners. Chief among these is the cost of implementing a project from start to finish—often over $1 million to achieve design, permitting, and construction on a single road culvert. With thousands of undersized culverts and remnant dams across the watershed, there is a clear need to realize efficiencies in design and permitting steps to make any meaningful progress toward connectivity goals. Also

important is the presence of contaminated sediments in the region's river systems, particularly those that have seen industrial use like the Blackstone River. The possible threat of contaminated sediments often stops dam removal projects before they even begin, yet current information about sediment quality in the region's rivers is nonexistent or difficult to find. A comprehensive effort to document information about sediment quality and fill information gaps where needed would accelerate restoration efforts.

NBEP will convene workgroups to share information, identify and prioritize projects, realize efficiencies to accelerate projects, support work to better understand sediment quality in the region's rivers, and maintain priority project databases. NBEP will also help fund community outreach and project planning for priority dam removal, culvert replacement, and fish passage projects.

Potential Projects

- Identify and prioritize opportunities to restore diadromous fish and to address high-hazard barriers; develop site-specific information and tools to assist decision-making, including cost-benefit analyses.
- Conduct a comprehensive assessment of sediment contamination in the Blackstone River and its tributaries, as well as other rivers and streams with widespread sediment contamination concerns, to inform dam removal efforts.
- Partner with federal, state, and local agencies, officials, and indigenous communities to secure funding for large connectivity construction projects, including Lower Blackstone and other high priority areas.
- Conduct training opportunities to assess culverts and dams for safety, resilience to heavy precipitation events, and aquatic connectivity restoration opportunities.
- Incorporate North Atlantic Aquatic Connectivity Collaborative (NAACC) connectivity data into decision-making processes for culvert replacements.
- Engage communities in connectivity efforts to understand community priorities, provide information about common concerns like toxic sediments, water quality, water level changes, and organize support for connectivity projects.
- Work with Dam Safety offices to incorporate potential alternatives into dam emergency scenarios that account for connectivity restoration opportunities.

Outputs

- Working group meetings
- Updated Rhode Island Anadromous Fish Restoration Plan
- A prioritized list of connectivity needs for the six major basins in the region
- Additional connectivity project designs completed

- Outreach materials to support community engagement about ecosystem changes and post-dam removal, including water level changes, toxic sediments, and water quality

Outcomes

- Reconnection of miles of river and acres of habitat
- Return of diadromous fish to river systems

Indicators

Temperature, Precipitation, Sea Level Rise, Stream Invertebrates, Aquatic Life Use General, Recreation Use, Coldwater Fisheries

NBEP role

Convene, Synthesize and communicate science, Fund capacity and projects

Implementing Partners

EPA, The Nature Conservancy in Rhode Island, Blackstone Watershed Collaborative, Save The Bay, Mass Audubon, Woonasquatucket River Watershed Council, RIRC, SRPEDD, RIDEM, RIDOT, MA EOEEA, MA DER, Narragansett Indian Tribe, Hassanamisco Nipmuc Band, Blackstone River Watershed Council, RI Saltwater Anglers Association

Location

Narragansett Bay region

Timeline for initiation

2032–2035

Estimated costs/potential funding sources

$10M+

NBEP 320/SNEP, NBEP IIJA, EPA SNEP, NOAA, NFWF, USDOT, USDOE, RIDEM, MA DER, MADOT, FEMA, Private Foundations

Action Habitat-3.2: Salt Marsh Restoration

Full Action Statement: Restore coastal wetlands and reconnect with uplands for habitat migration, wildlife, and recreation.

Action Description and Statement of Need

This Action will accelerate salt marsh restoration using techniques to restore marsh hydrology and upland connectivity and ensure resilience of these habitats and their associated wildlife to sea level rise. Sustaining salt marshes involves a variety of techniques to restore and enhance subsiding marshes and to conserve adjacent uplands for marshes to migrate inland as sea levels rise (McKown *et al.* 2024).

The natural hydrology of tidal marshes has been impacted by agriculture, mosquito ditching, and other infrastructure that prevents water from draining from the marsh after rains and high tides. Impounded water causes native marsh plants adapted to drier conditions at low tide to die, resulting in subsidence of the marsh surface (Pappal and Kahl 2022). Locally-pioneered restoration techniques involve digging shallow creeks or runnels to facilitate gradual water drainage and placing sediment to elevate degraded marshes to make them more resilient to sea level rise (Save The Bay 2021b). These techniques have been used in several Rhode Island locations, including Succotash Marsh in South Kingstown where NBEP is funding the planning and design phases of a project managed by the Narragansett Bay National Estuarine Research Reserve.

Accelerating sea level rise is outpacing natural salt marsh accretion, causing marshes to erode and drown in place (Kutcher *et al.* 2018). Marshes can migrate inland onto low-lying areas, but this process may be impeded by built structures, invasive species, or steep topography, among other barriers (Burman *et al*. 2024). MA DER is funding tidal restriction prioritization and field assessment work in the Massachusetts portion of the Narragansett Bay region to identify priority barriers to marsh migration and aquatic connectivity. Partners must identify opportunities to conserve adjacent uplands in densely populated and urbanized areas for future inland marsh migration. Because most properties adjacent to salt marshes are privately owned, managed migration will involve a variety of land use changes, including land acquisition, redevelopment planning, rolling easements, and setback and buffer definitions. Proactive community engagement is therefore a crucial aspect of salt marsh resilience planning and implementation.

NBEP will continue to convene and coordinate partners across state and institutional boundaries to coordinate and share knowledge, practices, and outcomes of saltmarsh

restoration projects in the Salt Marsh RAMP workgroup. NBEP will fund capacity for community outreach, planning, and implementation, and support partners by seeking external funding.

Potential Projects

- Sustain marshes in place with a suite of hydrology restoration techniques to address legacy human impacts.
- Accelerate work to elevate priority subsiding marshes using sediment placement techniques.
- Explore beneficial use of dredged material to help marshes keep up with rising seas or to restore areas of exposed sediment with high concentrations of contaminants.
- Facilitate marsh migration through land conservation and managed retreat through land acquisition, redevelopment planning, rolling easements, setbacks, and buffer definitions.
- Deliver ongoing one-on-one technical assistance to municipal parks and land use programs.
- Identify tidal restriction restoration opportunities in concert with other restoration techniques.
- Maintain the Salt Marsh RAMP workgroup project tool, MarshMap, and expand the tool to include Massachusetts and Connecticut projects.

Outputs

- Coordinated meetings for groups pursuing saltmarsh restoration
- Annually updated list of priority saltmarsh restoration projects
- New land use policy strategies adopted to accommodate marsh migration

Outcomes

- Federal, regional, state, NGO, and local partners coordinate to plan and implement restoration projects
- Increased number of marsh restoration, enhancement, and marsh migration facilitation projects
- More acres of saltmarsh restored

Indicators

Sea Level, Land Use, Salt Marsh, Open Space

NBEP role

Convene, Synthesize and communicate science, Fund capacity and projects

Implementing Partners

EPA, NBNERR, RIDEM, Save The Bay, MA DER, NOAA, CRMC, USFWS, Mass Audubon

Location

Coastal and riverine salt marshes

Timeline for initiation

2032–2035

Estimated costs/potential funding sources

$10M+

NBEP 320/SNEP, NBEP BIL, EPA SNEP, MA DER

Public Spaces Accessible to All Action Plan

Vision	All communities can enjoy their right to safe, quality access to nature.
Goal	Ensure all communities realize long-term benefits of healthy watersheds.

Priority Opportunities and Challenges

Surveys, public bonds, and spending habits repeatedly show that quality access to nature is a priority for residents and visitors alike. Visits to natural areas by residents and tourists generate billions of dollars and support hundreds of thousands of jobs (Uchida *et al.* 2019). Safe access to nature supports health and wellbeing by providing recreational, cultural, and aesthetic amenities. At the same time, it is important to plan and manage access responsibly to avoid negatively impacting these special places.

Public Support for Conservation Financing

Over the last decade, public support for financing environmental improvement remains strong across the region. Rhode Island's first Green Bond was approved by voters in 2016, showing overwhelming public support for investments in water quality, land cleanup, farmland, recreational facilities, open space, and resiliency. Since 2016, Rhode Island voters have approved four bond series totaling $206.3 million for a wide variety of environmental projects. In Massachusetts, the Community Preservation Act (CPA) of 2000 allows communities to conduct a referendum to add a small surcharge on local property taxes. When combined with matching funds from the statewide Community Preservation Trust Fund, this dedicated fund is used to build and rehabilitate parks, playgrounds, and recreational fields, protect open space, support local affordable housing development, and preserve historic buildings and resources. Altogether, 196 Massachusetts cities and towns, including 41 in the Narragansett Bay region, have adopted CPA.

Public Access

The identity of the Narragansett Bay region is shaped by its thousands of miles of rivers and streams and hundreds of miles of salty coastline where hundreds of coastal boat launches, docks, marinas, beaches, rights-of-way, overlooks, and fishing points provide public access (NBEP 2021f). The region also offers an extensive mosaic of forests, parks, preserves, trails, campgrounds, and bikeways. Over 200,000 acres are protected as federal and state parks, wildlife management/conservation areas, and privately protected preserves all open to the public. Thousands of municipal parks, neighborhood pocket parks and playgrounds, ball fields, and urban green spaces add to public outdoor recreational opportunities. Yet, there

remain opportunities to close gaps in regional accessibility to high quality experiences (Twitchell *et al.* 2022) (Action: Public Spaces-1.1).

New access points should be strategically located to reduce disparities in travel time, transportation, parking availability, safety, and mobility (Figure 14) (Action: Public Spaces-1.1). Resilience to storms, responsiveness to carrying capacity, and funding models for long-term maintenance also need to be prioritized in plans and projects to improve access points. Enhancing urban green spaces can simultaneously address resiliency and equity goals. Further clarifying the public's legal rights to access points and ensuring those rights are understood and protected will also help ensure fair access (Action: Public Spaces-1.2).

Public Health

The region is home to over 140 licensed freshwater and marine beaches (NBEP and URI-CI 2014). Additionally, 100,000 acres of estuarine waters are fully or conditionally approved for shellfish harvesting with 3,700 acres opened since 2017 (NBEP 2021d). Water quality improvements in the region's estuaries and rivers have led to safer conditions for recreation (Figure 15), yet public health challenges remain, particularly in freshwater systems and urban areas, where excess nutrients and increasing temperatures drive toxic cyanobacteria blooms.



Figure 15. Waterway rights of way in the Narragansett Bay region with waterway designated uses.

Episodic events, including storms and combined sewer overflows, can render waterways unsafe, requiring temporary closures of saltwater beaches, freshwater access points, and shellfish harvest areas. Contaminated water and shellfish can produce gastrointestinal stress in people, with severe consequences for those who are young elderly, or immunocompromised. Further, legacy contamination like mercury and polychlorinated biphenyls (PCBs) threatens the health of

people who regularly consume finfish they catch (Taylor and Williamson 2017). There are opportunities to better protect public health by continuous improvements to notification systems in the event of sewer overflows, harmful algal blooms, or unsafe fish and shellfish harvest (Action: Public Spaces-2.1).

Resiliency Considerations

Higher sea levels, warmer water temperatures, and more intense precipitation and storm surge events will create additional challenges for providing safe public access to natural areas supporting recreational, cultural, health, and aesthetic uses in the Narragansett Bay region. Warmer water temperatures can increase growth rates of harmful algal blooms, waterborne bacteria and viruses, and aquatic invasive plants, all of which can impede water-based recreation. Intensified precipitation events, in the absence of continued wastewater and stormwater treatment capacity upgrades, may lead to increased polluted discharges and associated recreational and shellfishing closures. Increased public health risks associated with these changes will require additional management and communication efforts. Beaches, riverbanks, lakeshores, and water access infrastructure—like boat launches, piers, and coastal trails—are vulnerable to erosion or total loss due to sea level rise and more intense precipitation and storm surge events. The public's right to access the tidal shoreline is also at risk

Reductions in Marine Beach Closures

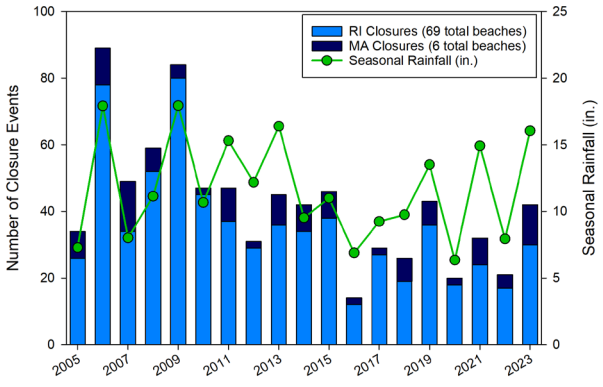


Figure 16. Marine beach closure events and seasonal rainfall in the Narragansett Bay region (updated from NBEP 2017).

Beach closures negatively impact quality of life and tourism. Closures are closely linked to rainfall, as stormwater runoff is a significant source of bacteria to many beaches. Sources of bacteria include discharges of raw sewage from combined sewer overflows (CSOs), failing septic systems, cesspools, and wild and domestic animals. Decades of work to reduce stormwater and wastewater impacts and improve water quality at marine beaches throughout the region has resulted in a notable decrease in beach closures since 2006. However, precipitation models predict a trend of increasingly intense precipitation events that are likely to overwhelm existing infrastructure and contribute to additional beach closures. Additional work is needed to implement solutions that account for future rainfall scenarios, especially in the region's new urban beaches, which are particularly vulnerable to polluted stormwater runoff.

when rising tides put the public's share of the shoreline in conflict with private property or a hardened shoreline. Plans and projects to help maintain and expand access to waterways and natural areas must account for loss of existing access while adopting resilient designs for new and improved access.

Public Spaces Accessible to All Objectives and Actions

This Public Spaces Accessible to All Action Plan focuses attention on multiple fronts: protecting legal access rights, maintaining long-term funding streams for site management, ensuring quality opportunities, and alerting the public about potential exposure to environmental health risks in recreational waters, as well as their role in curbing the environmental pollutants that can exacerbate those risks. This ensures all communities realize the benefits of healthy watersheds, while protecting the environmental integrity of public lands and waters.

Objectives	Actions
Public Spaces-1. Increase managed public access to nature.	*New Public Access*: Assess, prioritize, and support plans and projects to expand public access to waterways, natural areas, and urban green spaces.
	Public Access Protection: Develop policies and awareness campaigns to clarify and ensure legal access to shorelines and inland waterways.
	Public Access Management: Support long-term management and stewardship of parks and public access points through community engagement, policy change, and job creation.
Public Spaces-2. Improve communication about environmental health hazards.	*Environmental Health Alerts*: Develop and publicize education campaigns and public alert and incident reporting systems for environmental health risks.

Action Public Spaces-1.1: New Public Access

Full Action Statement: Assess, prioritize, and support plans and projects to expand public access to waterways, natural areas, and urban green spaces.

Action Description and Statement of Need

This Action will develop science to inform the creation of new public access to waterways, natural areas, and urban green spaces across the region. This information can help inform the design of access points that are resilient to storms, responsive to potential ecological impacts from overuse (NBEP 2021f), and deliver more access through community-centered siting and design.

There are hundreds of natural parks, thousands of urban green spaces, and hundreds of miles of bikeways open to the public; there are hundreds of saltwater access points and thousands for freshwater throughout the region. While most residents in the Narragansett Bay region live within a mile of a waterway and open green space, easy access is still a challenge for some, creating the need to strategically prioritize new and upgraded public access points to these natural amenities.

Hundreds of years of development, industry, and shifting policies have limited access to water and natural lands, sometimes by physical obstruction, sometimes due to polluted waters, sometimes by legal right. Areas with working waterfronts, shoreline armoring, and privatization restrict certain types of use. Rivers and streams have been dammed and completely paved over, hiding and limiting their amenities. Designating new access points or restoring historical access is a challenge as many agencies and departments within state and local governments and often private landowners may be involved (Smith 2023).

Growth and shifts in population centers and recreational preferences also leave gaps in fair access. Travel time, transportation, parking availability, mobility, and non-accessible programming can pose barriers to accessing nature. An individual's financial resources and the quality of the natural amenities near their home may also impact their access. There are measurable regional disparities in access, with race and ethnicity strongly correlated to travel distance to high quality public coastal amenities (Twitchell *et al.* 2022).

NBEP will develop a new Public Access Indicator and publish a public access database with waterway and green space access sites, fund capacity for project planning for new public access, and support non-governmental organizations, local people, and local and state governments to accelerate projects in areas that lack quality access to nature.

Potential Projects

- Create a new State of the Watershed public access indicator that includes access to waterways and natural lands and green spaces and provides decision support for new sites and site improvements.
- Fund and support projects and plans that expand access to nature.
- Complete and implement plans that increase urban green space and tree canopies.

Outputs

- Public Access Indicator
- Plans and projects that expand access to waterways using resilient design features
- Plans and projects that expand access to greenway trails while restoring habitats
- New urban green space plans and projects that provide access to nature

Outcomes

- Increased public access to nature
- Greater access to urban green spaces and improved quality of neighborhoods

Indicators

Sea Level, Population, Land Use, Open Space, Water Quality Conditions for Recreation, Marine Beaches, Shellfishing Areas, Public Access, Impervious Cover

NBEP role

Fund capacity and projects, Synthesize and communicate science

Implementing Partners

RIDEM, MA DER, Massachusetts DCR, National Park Service, Blackstone Watershed Collaborative, RI CRMC, Wood-Pawcatuck Watershed Association, Taunton River Wild and Scenic Stewardship Council, Save The Bay, Groundwork RI, Groundwork Southcoast, MA EOEEA, SRPEDD, NRICD, TNC-RI, Mass Audubon, Blackstone River Watershed Council, Taunton River Watershed Alliance, RI Land Trust Alliance, municipalities, RI Saltwater Anglers Association

Location

Narragansett Bay region with a focus on areas that have fewer high-quality access sites

Timeline for initiation

2025

Estimated costs/potential funding sources

$5M–10M

NBEP 320/SNEP, SNEP, States

Action Public Spaces-1.2: Public Access Protection

Action Statement: Develop policies and awareness campaigns to clarify and ensure legal access to shorelines and inland waterways.

Action Description and Statement of Need

This Action will improve public access to shorelines and waterways by clarifying legal rights and policies for public rights-of-way and access points. Public awareness campaigns will help ensure those rights are understood and protected.

Connecticut, Rhode Island, and Massachusetts guarantee access to the coastal shore through the Public Trust Doctrine, which holds all submerged lands and water in the intertidal zone and waterward in trust for public use, including boating, fishing, swimming, etc. In Rhode Island, the public is guaranteed lateral shoreline access up to 10 feet landward of the noticeable high tide debris line, though there are pending legal actions against the 2023 Shoreline Access Law. In Connecticut, lateral access is up to the mean high tide line. In Massachusetts, the public can only use the shoreline below the low-tide mark and intertidal zone if involved in fishing, birding, hunting, and boating.

Public access to rivers, streams, and lakes is not universally protected. Most waterfront property is privately owned, so perpendicular access to the riverbank is more limited. As with coastal shorelines, without a legal right-of-way, public travel across private property to access the water is trespassing. Further, dams without portage create significant barriers to aquatic recreation.

Sometimes when a property transfers to a new owner, public access is blocked (Smith 2023). Property owners adjacent to rights-of-way and public access paths may discourage use by installing illegal no trespassing signs, no parking signs, physical barriers, or guards. In a 2023 Rhode Island CRMC survey, 41 percent of residents surveyed said they use local rights-of-way less often due to lack of parking, or feeling unsafe, unwelcome, or unsure about allowable use (Smith 2024). And increasingly, public access points are being lost to sea level rise and erosion in the wake of more intense storms.

Inequities exist in public access to the shoreline for mobility-impaired individuals without access to comparable amenities. Further, many urban residents must travel farther for legal access to high quality public coastal amenities (Twitchell *et al.* 2022). In areas with limited access opportunities, loss or damage to access points due to storms and sea level rise further exacerbates inequities.

NBEP will fund capacity to clarify or develop policies and voice support for ensuring fair legal access to waterways, especially inland waterways where access issues have received less attention and scrutiny. NBEP will fund capacity to create informational campaigns to better educate residents and visitors alike on access and threats to access.

Potential Projects

- Create and continue education and awareness campaigns to clarify public/private boundaries on the beach or along freshwater access points, prevent illegal signage, and ensure rights are protected.
- Develop policies that clarify legal rights to the shoreline and inland waterways and otherwise expand access in the region.

Outputs

- Database of public access locations in the region and a new corresponding NBEP Public Access Indicator (NBEP 2023a)
- New information campaigns educating the public on their access rights
- New policies and initiatives to clarify state laws

Outcomes

- Improved public understanding of how to access coastal and inland waters
- Improved public understanding of legal access rights to shorelines and waterways throughout the region
- Clarified state and municipal policies regarding access rights and rules for enforcement

Indicators

Precipitation, Sea Level, Water Quality for Recreation, Marine Beaches, Public Access

NBEP role

Fund capacity and projects, Synthesize and communicate science

Implementing Partners

Save The Bay, URI Coastal Institute, Blackstone Watershed Collaborative, RWU, CRMC, RIDEM, RI Saltwater Anglers Association

Location

Narragansett Bay region

Timeline for initiation

2025–2028

Estimated costs/potential funding sources

$500K–1M

NBEP 320/SNEP, EPA SNEP, States

Action Public Spaces-1.3: Public Access Management

Full Action Statement: Support long-term management and stewardship of public access points through community engagement, policy change, and job creation.

Action Description and Statement of Need

This Action will increase capacity for sustainable management of public access facilities, while improving user experience and accessibility for public enjoyment of the region's natural areas. Target solutions include enhanced volunteer engagement, innovative funding solutions, and workforce development.

Inequities exist across the region in ease of access to high quality nature experiences (Twitchell *et al.* 2022). Site quality factors such as safety, trash, and perceived water quality conditions impact visitor preferences. Beyond routine maintenance, many access points need upgraded infrastructure and amenities to equitably serve visitors and protect the environment. Such upgrades may include parking areas (especially for waterway access points), multilingual signage, Americans with Disabilities (ADA) trails and boat facilities, trash and recycling bins, and restrooms.

A variety of federal, state, municipal, and non-governmental organizations own and manage various public access facilities such as trails, boat launches, campgrounds, beaches, playgrounds, and urban parks. Taxes, entry fees, non-profit memberships, and donations are typical income sources used for maintenance. However, competing needs for limited funds can result in deferred maintenance (NPS 2022), resulting in reduced visitor enjoyment that leads to reduced visitation and revenue. One-time capital grants for park improvements often do not include funding for long-term maintenance. Innovative funding strategies could be pursued to create sustainable funding streams for operation and maintenance to stay ahead of deferred maintenance (Cohen 2015).

Volunteers often provide in-kind stewardship services and develop a sense of ownership of a particular place. To help build further capacity for community-based management support, non-governmental organizations have created workforce training programs like Groundwork Southcoast's Green Team and the Woonasquatucket River Watershed Council's River Rangers to maintain and support ongoing projects and natural spaces.

NBEP will fund capacity to develop robust volunteer recruitment and training, as well as workforce training, for parks and recreation management. NBEP will voice support for development of new policies that support sustainable funding for maintenance and operations.

Potential Projects

- Support long-term maintenance and stewardship of parks and public access points through community engagement, policy change, and job creation.
- Assess and improve amenities at parks and public access points to improve accessibility and increase responsible public use.
- Explore creative maintenance approaches (*e.g.*, local community oversight) and green workforce development.

Outputs

- New amenities and infrastructure to equitably serve visitors and protect the environment
- Long-term management plans and funding mechanisms
- New jobs dedicated to green and blue space management
- Community groups dedicated to maintaining access points in their communities

Outcomes

- Safe, high-quality public access points and green spaces that are resilient and accessible to all
- Increased environmental workforce
- Increased visitor revenue and positive economic impact to areas with well-maintained green and blue space access
- Improved responsible enjoyment of nature by all communities

Indicators

Precipitation, Sea Level, Population, Land Use, Water Quality Conditions for Recreation, Marine Beaches, Public Access, Open Space

NBEP role

Fund capacity and projects, Synthesize and communicate science

Implementing Partners

Groundwork RI, Groundwork Southcoast, Woonasquatucket River Watershed Council, Save The Bay, MA EOEEA, TNC-RI, Mass Audubon, ASRI, RI Land Trust Alliance, RI Saltwater Anglers Association

Location

Narragansett Bay region, with a focus on areas with engaged partners or community groups

Timeline for initiation

2032–2035

Estimated costs/potential funding sources

$5M–10M

States, municipalities, Private foundations

Action Public Spaces-2.1: Environmental Health Alerts

Full Action Statement: Develop and publicize education campaigns and public alert and incident reporting systems for environmental health risks.

Action Description and Statement of Need

This Action will help protect public health by developing and/or publicizing consistent and education campaigns and notification systems to alert resource users to unsafe environmental conditions. Partners will coordinate efforts to design and implement public outreach strategies to target and alert users at the right places, at the right times, and with accurate messaging.

Water quality improvements in the region's estuaries and rivers have led to overall safer conditions for recreation and shellfish harvest (NBEP 2017). However, episodic harmful algal blooms, raw and partially treated sewage spills, and legacy contamination like mercury and PCBs still present threats to public health. In 2024, EPA issued updated recommendations for monitoring contaminants of emerging concern in locally caught freshwater fish. Raising public awareness of these environmental health risks is necessary to protect the health and enjoyment of those using the region's recreational water resources.

Massachusetts and Connecticut, but not Rhode Island, have legal requirements for public notification when untreated sewage flows into State waters. In Rhode Island, the Narragansett Bay Commission operates an online Combined Sewer Overflow (CSO) Alarm Map, as required by their Pollutant Discharge Elimination System (RIPDES) permit. The City of Newport, which has one CSO discharge, does not operate an online overflow notification system. Rhode Island wastewater facilities are required to report sewer system overflows to both RIDEM and EPA, but not to the public. A comprehensive web-based public notification system, mandatory for all types of sewage discharges in Rhode Island, would contribute to public awareness and health protection.

State environmental agencies, some state and local health departments, and environmental organizations coordinate to monitor cyanobacteria blooms and toxins. In recent years, advisories have increased in number and duration (RIDEM 2023). Rhode Island's Department of Environmental Management and Department of Health issue waterbody-specific advisories, usually via signage, as capacity allows.

Legacy contamination of the region's freshwaters makes most freshwater fish unsafe for human consumption (Kamman *et al.* 2005). State Departments of Health provide recommendations for restricting fish consumption, especially for at-risk groups. Both Massachusetts and Rhode Island also issue advisories for specific waterbodies when warranted by available data. Public health

agencies often work with medical providers and fishing license agencies to convey this information. However, given language barriers and lack of access to health providers among some user groups, additional effort is needed to expand outreach about unsafe finfish consumption.

The States have notification systems in the event shellfish are unsafe for harvest—RIDEM Office of Water Resources publicizes shellfish closures in near real-time through web postings, recorded message hotline, press releases, and email. Digital notification systems are more effective than signs or flags and could have even greater reach if distributed in multiple languages.

NBEP will help synthesize and communicate the science of environmental health risks associated with recreational use of local waters, coordinate partners to design shared multilingual education materials on environmental health risks, and fund capacity and projects to develop comprehensive public alert systems for environmental health risks.

Potential Projects

- Increase public awareness of CSO alert systems.
- Create a public notification system for raw and partially treated sewage into Rhode Island waters.
- Coordinate design of shared, consistent multilingual educational materials warning of priority environmental health risks.
- Track WWTF and CSO permits for compliance and notification of violations.

Outputs

- Notification system for raw and partially treated sewage in Rhode Island waters
- New multilingual alert materials for priority public health concerns

Outcomes

- Improved public health
- Increased public awareness of water pollution and contamination problems and causes

Indicators

Shellfishing Areas, Marine Beaches, Legacy Contaminants, Water Quality Conditions for Recreation, Water Quality Conditions for Aquatic Life

NBEP role

Synthesize and communicate science, Fund capacity and projects

Implementing Partners

MassDEP, RIDEM, EPA, RIDOH, Narragansett Bay Commission, Stormwater Innovation Center, URI Watershed Watch, NEIWPCC, RWU, Blackstone Watershed Collaborative, Blackstone River Coalition, Mass Audubon, Taunton River Watershed Alliance, Save The Bay, SRPEDD, MA EOEEA, Mass Rivers, RI Saltwater Anglers Association

Location

Narragansett Bay region, with particular focus on freshwater resources for cyanobacteria and fish consumption alerts

Timeline for initiation

2029–2031

Estimated costs/potential funding sources

$1M–5M

NBEP 320/SNEP, EPA/SNEP, State Funding, Sewage Notification Assistance Grant Program (MassDEP)

Acronyms

ADA	Americans with Disabilities Act
BMP	Best Management Practice
BORIIS2	Biota of Rhode Island Information System 2
CCMP	Comprehensive Conservation and Management Plan
CFRF	Commercial Fisheries Research Foundation
CRC	Coastal Resources Center
CRMC	Rhode Island Coastal Resources Management Council
CSO	Combined Sewer Overflow
CSS	Combined Sewer System
CT	Connecticut
CT DEEP	Connecticut Department of Energy and Environmental Protection
CWA	Clean Water Act
CZM	Coastal Zone Management
DO	Dissolved Oxygen
EPA	U.S. Environmental Protection Agency
EPA NCCA	EPA National Coastal Condition Assessment
EPA NPDES	EPA National Pollution Discharge Elimination System
EPA ORD-ACESD	EPA Office of Research and Development, Atlantic Coastal Environmental Sciences Division
EPA WQX	EPA Water Quality Exchange
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
HAB	Harmful Algal Bloom
HUC12	Hydrologic Unit Code 12
IIJA	Infrastructure Investment and Jobs Act
LID	Low Impact Development
MA	Massachusetts
MA CZM	Massachusetts Office of Coastal Zone Management

MADMF	Massachusetts Division of Marine Fisheries
MassDOT	Massachusetts Department of Transportation
MassECAN	Massachusetts Ecosystem Climate Adaptation Network
MA EOEEA	Massachusetts Executive Office of Energy and Environmental Affairs
MassDEP	Massachusetts Department of Environmental Protection
MA DER	Massachusetts Division of Ecological Restoration
MassWildlife	Massachusetts Division of Fisheries and Wildlife
MRP	Municipal Resilience Program
MS4	Municipal Separate Storm Sewer System
MVP	Municipal Vulnerability Preparedness Program
NAACC	North Atlantic Aquatic Connectivity Collaborative
NBC	Narragansett Bay Commission
NBEP	Narragansett Bay Estuary Program
NBNERR	Narragansett Bay National Estuarine Research Reserve
NEIWPCC	New England Interstate Water Pollution Control Commission
NEP	National Estuary Program
NFWF	National Fish and Wildlife Foundation
NGO	Non-Governmental Organization
NOAA	National Oceanic and Atmospheric Administration
NOAA B-WET	NOAA Bay Watershed Education and Training
NPDES	National Pollutant Discharge Elimination System
NRA	Natural Resource Area
NRCS	National Resource Conservation Service
NRCS EQIP	NRCS Environmental Quality Incentives Program
NRICD	Northern Rhode Island Conservation District
OWTS	Onsite Wastewater Treatment Systems
PCB	Polychlorinated Biphenyl
PFAS	Per- and polyfluoroalkyl substances

RAMP	Restoration, Assessment, and Monitoring Program
RI	Rhode Island
RIDEM	Rhode Island Department of Environmental Management
RIDOT	Rhode Island Department of Transportation
RIEMC	Rhode Island Environmental Monitoring Collaborative
RINHS	Rhode Island Natural History Survey
RIPDES	Rhode Island Point Discharge Elimination System
RIRRC	Rhode Island Resource Recovery Corporation
RWU	Roger Williams University
SAC	NBEP Science Advisory Committee
SAMP	Special Area Management Plan
SLAMM	Sea Level Affecting Marshes Model
SLR	Sea Level Rise
SNEP	Southeast New England Program
SRPEDD	Southeastern Regional Planning and Economic Development District
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
TNC-MA	The Nature Conservancy - Massachusetts
TNC-RI	The Nature Conservancy - Rhode Island
UMass	University of Massachusetts
URI	University of Rhode Island
URI-CI	University of Rhode Island - Coastal Institute
USACE	U.S. Army Corps of Engineers
USDOE	U.S. Department of Education
USDOI	U.S. Department of Interior
USDOT	U.S. Department of Transportation
USFWS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service

USGS	United States Geological Survey
WWTF	Wastewater Treatment Facility

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Appendices

A. NBEP Bay and Watershed Indicators

The following table lists the original 2017 indicators, shows if and how those indicators have been updated since the 2017 publication, and lists new indicators proposed for development during the span of this 2025 CCMP Revision.

Indicator	Type	Published	Watershed
Stressor			
Temperature	Environmental Condition	2017	NB
Precipitation	Environmental Condition	2024	NB
Sea Level (Nuisance Flooding)	Environmental Condition	2017 (2021)	NB (Providence)
Population	Landscape	2017	NB

Land Use (Solar Arrays)	Landscape	2021 (2024)	NB/LNB/CSP
Impervious Cover	Landscape	2017	NB
Wastewater Infrastructure	Landscape	2017	NB
Nutrient Loading (Atmospheric Nitrogen Deposition)	Landscape	2017 (2021)	NB
Legacy Contaminants	Chemical	2017	NB
Emerging Contaminants	Chemical	2017	NB
Condition			
Seagrasses	Bay Ecosystem	2023	NB/LNB/CSP
Salt Marsh	Bay Ecosystem	2017	NB
Benthic Habitat	Bay Ecosystem	2018	NB
Estuarine Fish Communities	Bay Ecosystem	2017	NB
Dissolved Oxygen	Bay Ecosystem	2021	NB
Chlorophyll	Bay Ecosystem	2021	NB
Water Clarity	Bay Ecosystem	2022	NB
Water Quality Conditions for Aquatic Life	Watershed Ecosystem	2017	NB
Stream Invertebrates	Watershed Ecosystem	2017	NB
Freshwater Fish Communities	Watershed Ecosystem	2017	NB
Open Space	Watershed Ecosystem	2017	NB
Aquatic Connectivity	Watershed Ecosystem	*	NB/LNB/CSP
Water Quality Conditions for Recreation	Public Health	2017	NB
Marine Beaches	Public Health	2017	NB
Shellfishing Areas	Public Health	2022	NB/LNB/CSP
Public Access	Social Science	*	
Resilient Municipalities	Social Science	**	
Public Health	Social Science	**	
Economy	Social Science	**	

* In progress
** Proposed
NB Narragansett Bay
LNB Little Narragansett Bay
CSP Coastal Salt Ponds

B. Action Plans at a Glance

ACTION PLAN: People Ready to Act

VISION: Informed and engaged partners are empowered to implement the CCMP.
GOAL: Provide foundational knowledge, capacity, and drivers for CCMP implementation.

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ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
OBJECTIVE 1: Increase meaningful and useful partner and public engagement.			
People 1.1 Engagement Plan: Develop and implement the NBEP Engagement Plan to convene and activate partners to implement priority CCMP actions.	• Convene NBEP partners and other organizations to advance connections, knowledge, and solutions at local and regional scales. • Convene partners to inventory and coordinate needs for education and outreach programs. • Convene partners to explore avenues to establish and promote a unique identity for the Narragansett Bay region to support funding requests and public engagement. • Conduct NBEP Science Events. • Review existing local and state plans (e.g., Wildlife Action Plans, Nonpoint Source Pollution Management Plans) and compile	• NBEP Engagement Plan and regular updates • Annual funding opportunities intended specifically for watershed outreach and education that implement the CCMP in the Narragansett Bay region • Events to promote engagement with priority science, preservation, and restoration issues and opportunities • Working group meetings	• NBEP decisions, services, and projects that are responsive to current needs • Improved partner coordination for CCMP implementation at various scales (e.g., watershed, state, interstate) • Increased NBEP and partner ownership of progress toward CCMP goals and objectives • Public support for and participation in CCMP implementation

ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
	lists of recommended policy topics that have potential for bi-state or interjurisdictional interest; then, obtain Steering Committee consensus on priority topics, next steps, and appropriate outputs. • Establish a regular schedule of communications with elected and appointed leaders at local, state, and federal levels to share NBEP and partner activities, accomplishments, and benefits.	• Reports on select policy topics	• Adoption of policy changes that advance CCMP goals and objectives
People 1.2 Research Plan: Implement the NBEP Research Plan and Coastal Urban Waters Research Collaborative.	• Convene Coastal Urban Waters Research Collaborative focused on the Providence River Estuary, and as time allows, additional focus areas. • Conduct literature reviews of the three priority coastal urban centers (Providence, Fall River, and Westerly) to identify data resources, seminal papers, and links to other reviews and analyses. • Compile and improve information sharing on planned and completed research related to the NBEP region. • Develop requests for proposals or direct awards to implement the Research Plan.	• Ongoing meetings of the Coastal Urban Waters Research Collaborative • Requests for proposals that advance research needs identified in the Research Plan • Biennial updates to the Research Plan, including evaluations of Plan implementation	• Articulated research needs to advance NBEP priorities • Enhanced interdisciplinary networks of researchers, managers, and local people
OBJECTIVE 2: Improve access to and use of information to improve ecosystem management and public understanding.			
People 2.1 Science Communication Tools: Develop compelling open-source data visualizations, stories, and dashboards.	• Collaborate with local water quality monitoring groups and other National Estuary Programs to develop water quality dashboards that aid in analyzing and sharing data.	• New tools • Ongoing maintenance and updates to existing tools	• Greater ability for end users to understand technical issues and take proactive • Decreased technical debt

ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
	• Create tool(s) to document and showcase habitat restoration projects in the region. • Build tool(s) to help local organizations prioritize areas for conservation or restoration. • Collaborate with data developers, NBEP committee experts, and end users to develop tools that respond to current needs.		and shorter, more efficient workflows for local organizations, leading to faster data analysis and availability
People 2.2 Ecosystem Modeling and Decision-Support Tools: Support, improve, and create efficiencies for integrated ecosystem models and decision-support tools that foster effective resource management.	• Convene stakeholders and other experts to review available modeling tools and their limitations. • Convene partners to build consensus on pathways for development of validated and calibrated bay water quality and ecosystem models to support management and assist in setting restoration targets. • Collaborate with data developers, NBEP committee experts, and end users to develop technical tools that respond to current needs. • Develop and/or update natural heritage database models to inform land use decisions.	• Assessment of existing water quality and hydrodynamic models, their intended use, and a pathway toward a larger, linked hydrodynamic model • Assessment of data needs for existing models and tools • Working group meetings	• More efficient and accurate modeling tools for decision-making and policy • Broader understanding of available modeling tools and their applicability to resource management • Ecosystem management that is better informed by modeling and monitoring data
People 2.3 Indicators: Develop and update indicators to track environmental and socioeconomic trends.	• Develop refined metrics, assess and update existing indicators, and create new environmental and socioeconomic indicators. • Expand the geographic scope of all indicators to include the Rhode Island Coastal Ponds and Little Narragansett Bay watersheds. • Update the State of Narragansett Bay and Its Watershed report in 2027, emphasizing indicators that facilitate tracking CCMP goals and objectives.	• Indicator updates • New indicators, including socioeconomic indicators • Update of The State of Narragansett Bay and Its Watershed report • Expanded geographic scope of indicators	• Improved understanding of environmental stressors and conditions in the region • Improved capacity to track implementation of CCMP Actions • Improved understanding of human-ecosystem interactions

ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
OBJECTIVE 3: Accelerate CCMP implementation by supporting efforts to increase regional cooperation.			
People 3.1 Finance Plan: Develop the NBEP Finance Plan to catalyze fundraising and investments for projects that implement the CCMP.	• Convene partners to identify the highest-priority projects in this CCMP Revision to pursue with external awards within the framework of NBEP's 9-step Project Development Process. • Develop an NBEP Finance Plan and seek approval by Steering Committee and EPA Region 1. • Solicit and award funding for staffing, planning, design, and construction of water quality, habitat, and public access projects.	• NBEP Finance Plan • NBEP project funding solicitations • NBEP project awards • Funded planning and construction projects	• Increased collaborative and strategic fundraising • Increased awareness of the cost, value, and importance of conservation, restoration, and resilience efforts in the Narragansett Bay region • Increased regional staff capacity for project planning, development, implementation, and maintenance • Increased number of conservation, restoration, and resilience projects in the region • Improved ecosystem and community health and resilience
People 3.2 Regional Targets: Establish shared regional ecosystem targets with public reporting systems to track progress.	• Convene partners to create numeric targets for priority ecosystem and socioeconomic system indicators that span watershed boundaries and authorities. • Establish reporting systems for tracking progress toward shared targets.	• Facilitated meetings • Numeric targets and reporting system(s) for priority environmental and socioeconomic indicators	• Improved coordination and collaboration among protection and restoration partners • Increased public awareness of management goals and the effectiveness of actions and investments to attain them

People Ready to Act continued

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INDICATORS	NBEP ROLE	IMPLEMENTING PARTNERS	LOCATION	TIMELINE FOR INITIATION	ESTIMATED COST/ POTENTIAL FUNDING SOURCES
OBJECTIVE 1: Increase meaningful and useful partner and public engagement.					
All	Convene, Fund capacity and projects	Steering Committee, other agencies and non-governmental organizations	Narragansett Bay region, with priority areas to be determined during development and biannual update of the Engagement Plan	2025	$1M–5M NBEP 320/SNEP; NOAA B-WET, EPA, private foundations
All	Convene, Synthesize and communicate science, Fund capacity and projects	Science Advisory Committee and other researchers from management agencies, NGOs, and academia	Narragansett Bay region, focusing on the coastal urban sub-watersheds (HUC12 scale)	Ongoing	$5M–10M NBEP 320/SNEP, Rhode Island Sea Grant, NOAA, NSF, private foundations
OBJECTIVE 2: Improve access to and use of information to improve ecosystem management and public understanding.					
All	Convene, Synthesize and communicate science	Steering Committee, Science Advisory Committee	Narragansett Bay region	Ongoing	$10K-500K NBEP 320/SNEP

INDICATORS	NBEP ROLE	IMPLEMENTING PARTNERS	LOCATION	TIMELINE FOR INITIATION	ESTIMATED COST/ POTENTIAL FUNDING SOURCES
All	Convene, Fund capacity and projects	RIDEM, MassDEP, URI Coastal Institute, RI Environmental Monitoring Collaborative, Rhode Island Natural History Survey, NBNERR, Mass Audubon, MassWildlife, TNC (RI and MA), ASRI, Salt Ponds Coalition, URI Watershed Watch, Save The Bay, Brown University, URI, EPA-ORD-ACESD	Narragansett Bay region	2029–2031	$5M–10M NBEP 320/SNEP, National Science Foundation, Foundation Grants, URI Coastal Institute, RIDEM, MassDEP, TNC
All	Convene, Synthesize and communicate science	Science Advisory Committee, Southeast New England Program (SNEP), EPA Region 1, Other researchers	Narragansett Bay region	Ongoing	$500K–1M NBEP 320/SNEP
OBJECTIVE 3: Accelerate CCMP implementation by supporting efforts to increase regional cooperation.					
All	Convene, Fund capacity and projects	Steering Committee	Narragansett Bay region	2025–2028	$10K–500K NBEP 320/SNEP
All	Convene, Synthesize and communicate science	Steering Committee	Narragansett Bay region	2027	$500K–1M NBEP 320/SNEP

Key to Cost (all partners, all costs, over 10 years)	$10k–500k (NBEP staff time) $500k–1M (convene partners, support research/modeling projects) $1M–5M (develop and implement regional plans) $5M–10M (develop project plans, designs and permits) $10M+ (infrastructure and restoration construction)

ACTION PLAN: Water Quality Improvement

VISION: Waters support healthy ecosystems and communities by meeting their designated uses, including healthy fish and wildlife habitat, drinking water supply, fishing, shellfish harvesting, and recreation.
GOAL: Improve water quality to support healthy ecosystems and communities.

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ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
OBJECTIVE 1: Improve collection and use of water quality data for decision-making.			
Water 1.1 Water Quality Monitoring: Support, improve, and create efficiencies for water quality monitoring programs to continue to provide information needed for management decision-making and filling knowledge gaps.	• Facilitate Science Advisory Committee and staff participation on the RI Environmental Monitoring Collaborative to provide multi-state support for cross-boundary monitoring needs including coordinating or standardizing monitoring activities and methods, developing new or expanding current monitoring activities (such as water column chemistry, emerging pollutants, or increased focus on embayments), and ensure that monitoring aligns with management questions and needs. • Develop and/or update water quality monitoring databases. • Support expanded water quality monitoring in newly restored areas, such as	• New monitoring protocols or programs for new or expanded monitoring activities • Appropriately updated water quality databases and Statewide Water Monitoring Strategies	• Enhanced capacity for water quality monitoring throughout the region • Better coordinated water monitoring activities • Improved collection and use of water quality information • Enhanced understanding of monitoring gaps and mechanisms to fill them • Ecosystem management that is better informed by monitoring

ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
	the Kickemuit River, to establish a scientific basis for considering recreation and shellfish harvesting. • Facilitate Science Advisory Committee participation in the update to the Rhode Island Statewide Water Monitoring Strategy (2026). • Support innovations in monitoring strategies that bring efficiencies to and build capacity for data collection; encourage community science programs that help fill priority data gaps. • Support innovations for funding and staff capacity to continue data collection, analysis, and reporting.		
Water 1.2 Land Use and Watershed Planning: Work at multiple scales to assess land use changes and develop plans and tools to protect watersheds.	• Foster adoption of Low Impact Development (LID) principles in local ordinances and bylaws. • Support development of Watershed Management Plans and Watershed-Based Plans. • Promote wider use and integration of existing land use tools and plans. • Create NBEP Science Updates and web applications to communicate information about impacts of land use change on water quality and wildlife habitats. • Conduct research and convene partners in workgroups to develop information and tools to inform land use policies for improved watershed management. • Seek funding to provide ongoing support for regional circuit-rider positions that lend capacity to local planners.	• Ten additional watershed plans in Rhode Island (RIDEM 2024a) • More municipalities codifying Low-Impact Development principles • NBEP Science Updates and tools • Workgroup products, including information and tools to inform land use policies • Sustained regional circuit-rider positions at state and regional planning agencies	• More watershed areas eligible for and seeking implementation funds for non-point source pollution projects • Better integration of land use planning protective of natural resources at various scales

ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
OBJECTIVE 2: Reduce pollution from stormwater runoff.			
Water 2.1 Stormwater Guidance and Education: Update and standardize stormwater design manuals, support stormwater workforce training and capacity-building, and encourage public education and involvement to reduce stormwater pollution.	• Update stormwater design and installation manuals for each state, as necessary, including protocols for maintenance, monitoring, and evaluation. NBEP has partnered with RIDEM to secure funding to update the Rhode Island Stormwater Design Manual. • Support education and professional development to increase municipal and NGO capacities to maintain green infrastructure, nature-based solutions, or other stormwater infrastructure. • Support public engagement and involvement activities to spread awareness about ways to reduce stormwater pollution. • Convene partners to review existing plans, identify priority needs for new policies and programs that target stormwater pollution, and seek avenues for policy and program development and adoption.	• Updated stormwater manuals • Educational materials • Trainings • Working group meetings • Studies to understand and improve stormwater BMPs	• Improved water quality • Reduced flooding • Improved protection for public health and property • Expanded use of LID and green infrastructure • A trained workforce capable of designing, installing, and maintaining stormwater infrastructure, especially LID and green infrastructure • Increased public awareness about stormwater pollution drivers, consequences, and solutions
Water 2.2 Stormwater Retrofits: Support stormwater retrofit opportunities and associated maintenance activities to improve resilience and treatment capacity.	• Support under-resourced and under-staffed communities to design and implement holistic and coordinated landscape-scale approaches to meeting stormwater requirements. • Fund studies and efforts to develop sustainable financing mechanisms to support	• Retrofit designs • Completed retrofit projects • Stormwater retrofit funding mechanisms	• Water quantity and quality are better managed • Public health and property are better protected from the impacts of stormwater • Municipalities have reliable funding pathways

ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
	more effective stormwater management at state and local levels. • Support partners to work with farms to develop and implement Conservation Plans that identify BMPs that mitigate stormwater impacts.		for stormwater retrofits and maintenance • Expanded use of green infrastructure
OBJECTIVE 3: Reduce pollution from wastewater discharges, onsite wastewater systems, and combined sewer overflows.			
Water 3.1 Centralized Wastewater Infrastructure: Prioritize and support wastewater treatment facility and combined sewer system infrastructure upgrades to improve treatment of pollutants and increase resilience.	• Compile a matrix of WWTFs with estimated pollutant loadings, major infrastructure projects, and track the status of permit compliance and project completion to foster community support and awareness. • Continue to implement Narragansett Bay Commission's Phase III CSO Project in RI. • Continue to explore options for expanding the types of projects aligned with the CCMP that might benefit from participation in the Clean Water State Revolving Fund.	• Report card identifying permit compliance or changes to pollution loading at WWTFs • Treatment capacity upgraded/compliance achieved by WWTFs in the region • Continued implementation of Narragansett Bay Commission Phase III combined sewer overflow project • Annual WWTF tracking internship maintained for at least 5 years • Improved access for municipalities to funding for infrastructure projects	• Greater community awareness and support for wastewater treatment facility infrastructure projects • Greater Clean Water Act compliance at WWTFs and in receiving waters • More resilient WWTFs • Reduced wastewater pollution discharges to waterbodies and improved water quality

ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
Water 3.2 Onsite Wastewater Systems: Support cesspool phaseouts and onsite system maintenance region-wide, and advanced septic system upgrades or extension of central sewer service in priority areas.	• Fund studies to assess the contribution of OWTDS to water pollution where there are gaps in understanding. • Support efforts to encourage property owners to properly maintain OWTDS, including those operating with advanced treatment technologies.	• White papers or other research products that document OWTDS performance in areas that currently lack information • Cesspool removals • Advanced treatment systems installed in priority areas	• More OWTDS meet high standards of performance • More waterways previously impaired by OWTDS pollution meet designated uses
OBJECTIVE 4: Reduce trash and marine debris pollution.			
Water 4.1 Trash and Marine Debris: Prevent and remove aquatic trash and marine debris.	• Convene partners to develop materials to inform policies and legislation aimed at reducing aquatic trash and marine debris. • Conduct regional needs/feasibility assessment for trash collection solutions on outfalls, rivers, and streams, and support funding and capacity to implement priority solutions.	• Materials developed to inform policy and legislation solutions to reduce aquatic trash and marine debris • Needs/feasibility assessment for trash collection solutions on outfalls, rivers, and streams • More trash collection solutions deployed	• Improved capacity to remove aquatic trash and marine debris • Reduced volume of aquatic trash and marine debris

Water Quality Improvement continued

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INDICATORS	NBEP ROLE	IMPLEMENTING PARTNERS	LOCATION	TIMELINE FOR INITIATION	ESTIMATED COST/ POTENTIAL FUNDING SOURCES
OBJECTIVE 1: Improve collection and use of water quality data for decision-making.					
All	Convene, Fund capacity and projects	RIDEM, MassDEP, URI Coastal Institute, RI Environmental Monitoring Collaborative, NBNERR, TNC (RI and MA), Salt Ponds Coalition, URI Watershed Watch, Save The Bay, Brown University, URI, Narragansett Bay Commission, EPA-ORD-ACESD	Narragansett Bay region	2029–2031	$5M–10M NBEP 320/SNEP, National Science Foundation, Congressionally Directed Spending, Foundation Grants, URI-CI, RIDEM, MassDEP, TNC
Population, Land Use, Impervious Cover, Open Space	Convene, Synthesize and communicate science, Fund capacity and projects	RIDEM, MassDEP, RI Division of Statewide Planning, SRPEDD, OCPC, URI Coastal Institute, URI Cooperative Extension, NBNERR, Mass Audubon, ASRI, Save The Bay, SNEP Network	Narragansett Bay region	2025	$10k–500k NBEP 320/SNEP

INDICATORS	NBEP ROLE	IMPLEMENTING PARTNERS	LOCATION	TIMELINE FOR INITIATION	ESTIMATED COST/ POTENTIAL FUNDING SOURCES
OBJECTIVE 2: Reduce pollution from stormwater runoff.					
Precipitation, Impervious Cover, Wastewater Infrastructure, Water Quality Condition for Aquatic Life, Water Quality Condition for Recreation, Marine Beaches, Shellfishing Areas	Fund capacity and projects	EPA, RIDEM, MassDEP, Rhode Island Infrastructure Bank, Stormwater Innovation Center, SNEP Network, Conservation Districts, MS4 communities	Tasks will be targeted to specific areas identified by partners as hotspots, especially areas with CSOs and communities with rain-driven flooding issues.	2025–2028	$1M–5M NBEP 320/SNEP, SNEP, MA, RI, MRP, MVP
Precipitation, Impervious Cover, Wastewater Infrastructure, Water Quality Condition for Aquatic Life, Water Quality Condition for Recreation, Marine Beaches, Shellfishing Areas	Fund capacity and projects	EPA, RIDOT, MassDOT, RIDEM, MassDEP, Narragansett Bay Commission, Stormwater Innovation Center, municipalities, Mass Audubon, Woonasquatucket River Watershed Council, Blackstone Watershed Collaborative, MA EOEEA, Save The Bay, SNEP Network, Conservation Districts	Tasks will be targeted to specific areas identified by analyses or prioritized by partners as pollution or flooding hotspots to maximize co-benefits.	2029–2031	$10M+ NBEP 320/SNEP, NBEP BIL, SNEP, EPA, MRP, MVP, MassDEP CWA Section 604(b) Water Quality Management Planning Grant, MassDEP CWA Section 319 Nonpoint Source Implementation Grant, RIDEM CWA Section 319 Nonpoint Source Implementation Grant, NRCS EQIP

INDICATORS	NBEP ROLE	IMPLEMENTING PARTNERS	LOCATION	TIMELINE FOR INITIATION	ESTIMATED COST/ POTENTIAL FUNDING SOURCES
OBJECTIVE 3: Reduce pollution from wastewater discharges, onsite wastewater systems, and combined sewer overflows.					
Precipitation, Sea Level, Population, Impervious Cover, Wastewater Infrastructure, Nutrient Loading, Legacy Contaminants, Emerging Contaminants, Dissolved Oxygen, Chlorophyll, Water Clarity, Water Quality Condition for Aquatic Life, Water Quality Condition for Recreation, Marine Beaches, Shellfishing Areas	Synthesize and communicate science	EPA Region 1, Narragansett Bay Commission, Upper Blackstone Clean Water, Blackstone Watershed Collaborative, Taunton River Watershed Alliance, Save The Bay, NEIWPCC, RIDEM, MA EOEEA	Narragansett Bay region	2032–2035	$10M+ EPA SNEP, RI and MA Clean Water State Revolving Funds
Wastewater Infrastructure, Nutrient Loading, Dissolved Oxygen, Chlorophyll, Water Clarity, Water Quality Conditions for Aquatic Life, and Water Quality Conditions for Recreation, Marine Beaches, Shellfishing	Fund capacity and projects, Synthesize and communicate science	EPA Region 1, RIDEM, MA EOEEA, MassDEP, NEIWPCC, Save The Bay, URI Cooperative Extension, RI Division of Statewide Planning	Narragansett Bay region	2032–2035	$10M+ NBEP 320/SNEP, EPA SNEP, RI and MA Clean Water State Revolving Funds

INDICATORS	NBEP ROLE	IMPLEMENTING PARTNERS	LOCATION	TIMELINE FOR INITIATION	ESTIMATED COST/ POTENTIAL FUNDING SOURCES
OBJECTIVE 4: Reduce trash and marine debris pollution.					
Impervious Cover, Emerging Contaminants, Water Quality Condition for Aquatic Life, Water Quality Condition for Recreation	Fund capacity and projects, Synthesize and communicate science	EPA, NOAA, Save The Bay, Blackstone Watershed Collaborative, Taunton River Watershed Alliance, Commercial Fisheries Research Foundation, URI, RIRC, watershed associations	These actions will take place at specific sites, in neighborhoods, municipalities, watersheds, and local waterbodies.	2029–2031	$500K–1M NBEP 320/SNEP, Municipal, state, EPA Trash-Free Waters, NOAA Marine Debris Program

Key to Cost
(all partners, all costs, over 10 years)

$10k–500k (NBEP staff time)
$500k–1M (convene partners, support research/modeling projects)
$1M–5M (develop and implement regional plans)
$5M–10M (develop project plans, designs and permits)
$10M+ (infrastructure and restoration construction)

ACTION PLAN: Habitat Protection and Restoration

VISION: Resilient and connected landscapes and waterways support healthy habitats and wildlife and provide people with ecosystem services like clean air and water, flood protection, recreation, and sustainable harvest.
GOAL: Restore and protect habitats to support wildlife and people.

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ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
OBJECTIVE 1: Improve collection and use of habitat data for decision-making.			
Habitat 1.1 Biodiversity and Habitat Quality Monitoring: Support, improve, and create efficiencies for monitoring and documenting biodiversity and habitat quality.	• Convene interstate interests to coordinate and standardize monitoring activities and methods, including developing new or expanding current monitoring activities (such as seagrass, salt marsh, macroalgae, and cyanobacteria monitoring), and ensure that monitoring aligns with management questions and needs. • Develop and/or update natural heritage databases for the states as needed, including BORIIS2 and BioMap2. • Support development of partner-driven habitat and biodiversity monitoring data clearinghouse tools. • Develop data visualization tools to encourage coordination on restoration	• New monitoring protocols or programs from new or expanded monitoring activities • Updated natural heritage databases and State Wildlife Action Plans • Clearinghouse tool connecting users with data • Data visualization tools highlighting restoration and monitoring efforts • Working group meetings to convene on priority topics in the watershed	• Coordinated and efficient monitoring activities • Improved collection and use of natural heritage information • Enhanced understanding of ecosystem monitoring gaps and mechanisms to fill them • Increased understanding of characteristics and changes in the Narragansett Bay region over time • Ecosystem management that is better informed by monitoring

ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
	projects. • Support innovations in monitoring strategies that bring efficiencies to and build capacity for data collection and encourage community science programs that help fill priority data gaps. • Support partners to develop and expand sentinel habitat monitoring sites to explore changes to the habitat with time and under changing conditions • Convene and support partners to explore seagrass restoration using seed-dispersal and other techniques.	• Reports on select monitoring objectives	
OBJECTIVE 2: Improve habitat resilience.			
Habitat 2.1 Habitat Plans: Update existing and develop new regional habitat restoration plans and strategies to facilitate cross-boundary projects and address emerging challenges for habitat resilience.	• Update RI Anadromous Fish Restoration Plan. • Update existing restoration strategies to include updated data, information, and completed projects. • Develop a Narragansett Bay region salt marsh restoration strategy or update the RI Coastal Wetland Restoration Strategy to include the upper part of Narragansett Bay in Massachusetts and portions of Little Narragansett Bay in Connecticut, where useful. Strategy should highlight areas where marsh migration is possible and should be supported.	• RI Shellfish Restoration and Enhancement Plan • A multi-state salt marsh restoration strategy • At least one regional submerged aquatic vegetation restoration strategy • Updated freshwater restoration and conservation plans and protocols • Coordinated meetings among habitat restoration	• Increased coordination on habitat restoration priorities, techniques, and projects across boundaries • Shared habitat restoration goals, objectives, and targets • Better designed and more impactful estuarine restoration projects • Healthier and more sustainable estuarine habitat • Increased coordination on

ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
	• Support the development and implementation of the Rhode Island Shellfish Restoration and Enhancement Plan. • Develop a Narragansett Bay and/or broader regional submerged aquatic vegetation restoration plan that reviews restoration strategies that have been tried in Narragansett Bay to date, including current seed-based restoration strategies, and assesses whether recent water quality improvements could improve restoration success. This restoration plan should also include new data being collected on flowering phenology and seed collection and seed transfer guidance. • Expand and update Sea Level Affecting Marsh Migration (SLAMM) models to include the Palmer and Runnins Rivers and other areas of MA, CT, and RI that were not covered in state models. • Pursue or expand state level management plans for lakes and ponds, inclusive of invasive species and educational outreach to boaters. • Develop plans and actions to protect cold-water streams and rivers, or specific endangered and/or threatened freshwater species, such as native brook trout.	practitioners • Expanded SLAMM to cover entire region seamlessly	freshwater restoration priorities, techniques, and projects across institutional and state boundaries • Shared plans for achieving freshwater restoration goals, objectives, and targets
Habitat 2.2 Habitat Projects: Identify, prioritize, and coordinate partner opportunities and funding to implement habitat restoration projects.	• Coordinate among groups pursuing priority habitat assessment, planning, and restoration in the greater Narragansett Bay region. • Maintain priority project lists for major estuarine, riverine, and riparian habitat	• Coordination meetings and tools for groups pursuing restorations in the same areas • Annually updated list of priority estuarine and	• Accelerated system or sub-watershed scale habitat improvements • Activated and coordinated local partners in restoration and outreach projects

ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
	types/ecosystems in the Narragansett Bay region. • Support states, municipalities, and local NGOs with planning, project identification, and prioritization.	freshwater restoration projects • Additional fully funded requests for proposals for freshwater and estuarine habitat projects • Additional completed restoration projects from approved restoration plans. • Education and invasive species removal events and programs	• More engaged watershed or pond groups with more members • More estuarine and freshwater systems meet both habitat and recreational use standards and sustain healthy wildlife and human use
Habitat 2.3 Benthic Habitat Assessment and Restoration: Assess and restore benthic habitats to support dynamic estuarine ecosystems.	• Synthesize past and ongoing regional seagrass restoration efforts including methodologies used, success of restoration efforts, locations, etc. This synthesis should assess if these techniques could be more successful with current, improved water quality. • Update seagrass site suitability models or indices (Detenbeck & Rego 2015). Ensure such models include environmental variables of interest including water quality, sediment type and quality. Focus should be given to shallow water habitats to ensure data coverage is of sufficient resolution for a model. • Update monitoring protocols to modernize approaches to tiered seagrass monitoring, include widgeon grass, and develop sentinel seagrass monitoring sites. Sentinel sites should focus on how habitats respond to stress, establishing baselines for restoration, and include an area currently covered with	• White papers synthesizing seagrass and artificial reef restoration efforts • Updated Seagrass Site Suitability models • Updated seagrass, macroalgae, and benthic habitat monitoring protocols • Updated and expanded SPI analysis	• Activated and coordinated local partners in assessment and restoration projects • Increased number of benthic habitat restoration projects • More acres of benthic sediment habitat restored • Increased number of artificial reefs providing diverse habitat, and recreation and economic benefits • More acres of seagrass restored

ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
	widgeon grass to assess any potential transition from widgeon grass to eelgrass. • Establish long-term goals for benthic habitat monitoring, including the use of sediment profile imaging, sled-cameras, gliders, and autonomous underwater vehicles. • Update 2018 benthic sediment profile imaging (SPI) for Narragansett Bay. Expand SPI to other areas of the region (Salt Ponds and Little Narragansett Bay) and new sites of interest, including shallow water portions of the coastal ponds. SPI can provide an assessment of benthic habitat quality trends, particularly in the upper part of the Bay as a result of improved water quality. • Update benthic sled camera monitoring in the Providence River Estuary. • Synthesize artificial reef work that has been completed throughout the bay assessing the method and materials used, and if the reef has improved fish habitat in the area. Use this synthesis to develop an artificial reef plan to guide future work to focus on both habitat creation and resilience in high-erosion areas. • Implement the Macroalgae Monitoring Protocol developed by SEAC-RI to understand the seasonal abundance/distribution of drift and attached algae, habitat impacts from drift algae, and changes to algae due to stress. • Explore using dredged materials to restore		

ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
	areas of exposed sediment containing high concentrations of contaminants.		
OBJECTIVE 3: Restore habitat connectivity and function.			
Habitat 3.1 Aquatic Connectivity: Reconnect freshwater and saltwater systems and improve connectivity within freshwater systems to restore habitats and fisheries.	• Identify and prioritize opportunities to restore diadromous fish and to address high-hazard barriers; develop site-specific information and tools to assist decision-making, including cost-benefit analyses. • Conduct a comprehensive assessment of sediment contamination in the Blackstone River and its tributaries, as well as other rivers and streams with widespread sediment contamination concerns, to inform dam removal efforts. • Partner with federal, state, and local agencies, officials, and indigenous communities to secure funding for large connectivity construction projects, including Lower Blackstone and other high priority areas. • Conduct training opportunities to assess culverts and dams for safety, resilience to heavy precipitation events, and aquatic connectivity restoration opportunities.	• Working group meetings • Updated Rhode Island Anadromous Fish Restoration Plan • A prioritized list of connectivity needs for the six major basins in the region • Additional connectivity project designs completed • Outreach materials to support community engagement about ecosystem changes and post-dam removal, including water level changes, toxic sediments, and water quality	• Reconnection of miles of river and acres of habitat • Return of diadromous fish to river systems

ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
	• Incorporate North Atlantic Aquatic Connectivity Collaborative (NAACC) connectivity data into decision-making processes for culvert replacements. • Engage communities in connectivity efforts to understand community priorities, provide information about common concerns like toxic sediments, water quality, water level changes, and organize support for connectivity projects. • Work with Dam Safety offices to incorporate potential alternatives into dam emergency scenarios that account for connectivity restoration opportunities.		
Habitat 3.2 Salt Marsh Restoration: Restore coastal wetlands and reconnect with uplands for habitat migration, wildlife, and recreation.	• Sustain marshes in place with a suite of hydrology restoration techniques to address legacy human impacts. • Accelerate work to elevate priority subsiding marshes using sediment placement techniques. • Explore beneficial use of dredged material to help marshes keep up with rising seas or to restore areas of exposed sediment with high concentrations of contaminants. • Facilitate marsh migration through land conservation and managed retreat through land acquisition, redevelopment planning, rolling easements, setbacks, and buffer definitions. • Deliver ongoing one-on-one technical assistance to municipal parks and land use programs. • Identify tidal restriction restoration opportunities in concert with other	• Coordinated meetings for groups pursuing saltmarsh restoration • Annually updated list of priority saltmarsh restoration projects • New land use policy strategies adopted to accommodate marsh migration	• Federal, regional, state, NGO, and local partners coordinate to plan and implement restoration projects • Increased number of marsh restoration, enhancement, and marsh migration facilitation projects • More acres of saltmarsh restored

ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
	restoration techniques. • Maintain the Salt Marsh RAMP workgroup project tool, MarshMap, and expand the tool to include Massachusetts and Connecticut projects.		

Habitat Protection and Restoration continued

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INDICATORS	NBEP ROLE	IMPLEMENTING PARTNERS	LOCATION	TIMELINE FOR INITIATION	ESTIMATED COST/ POTENTIAL FUNDING SOURCES
OBJECTIVE 1: Improve collection and use of habitat data for decision-making.					
All	Convene, Fund capacity and projects	RIDEM, MassDEP, URI Coastal Institute, RI Environmental Monitoring Collaborative, RINHS, NBNERR, Mass Audubon, MassWildlife, TNC (RI and MA), ASRI, Salt Ponds Coalition, URI Watershed Watch, Save The Bay, Brown University, URI, EPA-ORD-ACESD, EPA Region 1	Narragansett Bay region	2029–2031	$1M–5M NBEP 320/SNEP, National Science Foundation, Congressionally Directed Spending, Foundation Grants, URI-CI, RIDEM, MassDEP, TNC
OBJECTIVE 2: Improve habitat resilience.					

INDICATORS	NBEP ROLE	IMPLEMENTING PARTNERS	LOCATION	TIMELINE FOR INITIATION	ESTIMATED COST/ POTENTIAL FUNDING SOURCES
Sea Level Rise, Nutrient Loading, DO, Chlorophyll, Water Clarity, Benthic Habitat, Seagrasses, Salt Marsh, Aquatic Life Use, Estuarine Fish Use, Recreation Use, Open Space, Marine Beaches, Shell Fishing Areas, Land Use, Impervious Surface, Stream Invertebrates, Coldwater Fish	Convene, Synthesize and communicate science, Fund capacity and projects	EPA Region 1, NBNERR, MassDEP, MA DER, MA CZM, Mass Wildlife, Massachusetts DCR, RIDEM, CRMC, URI CRC, RISG, Mass ECAN, RINHS, Mass Audubon, Blackstone Watershed Collaborative	Narragansett Bay region	2029–2031	$5M–10M State Funds, NBEP 320/SNEP, EPA SNEP
Sea Level Rise, Nutrient Loading, DO, Chlorophyll, Water Clarity, Benthic Habitat, Seagrasses, Salt Marsh, Aquatic Life Use, Estuarine Fish Use, Recreation Use, Open Space, Marine Beaches, Shell Fishing Areas, Land Use, Impervious Surface, Stream Invertebrates, Coldwater Fish	Convene, Synthesize and communicate science	EPA Region 1, Save The Bay, TNC-RI, TNC-MA, Mass Audubon, WRWC, Old Colony Planning Council, MA DER, NBNERR, RIDEM, RINHS, MA EOEEA, SRPEDD, RI Saltwater Anglers Association	Narragansett Bay region	2025–2028	$10M+ NBEP 320/SNEP, NBEP BIL, EPA SNEP, Massachusetts DER, NOAA, NFWF, USDOT, USDOE, RIDEM, MassDOT, Private Foundations

INDICATORS	NBEP ROLE	IMPLEMENTING PARTNERS	LOCATION	TIMELINE FOR INITIATION	ESTIMATED COST/ POTENTIAL FUNDING SOURCES
Nutrient Loading, Seagrasses, Benthic Habitats, Water Clarity, Estuarine Fish Communities	Convene, Synthesize and communicate science, Fund capacity and projects	NBNERR, RIDEM, Save The Bay, Massachusetts DMF, EPA Region 1, Narragansett Bay Commission, TNC-RI	Benthic estuarine and tidal habitats throughout the Narragansett Bay region	2025–2028	$5M–10M NEP 320/SNEP, NBEP BIL, EPA SNEP
OBJECTIVE 3: Restore habitat connectivity and function.					
Temperature, Precipitation, Sea Level Rise, Stream Invertebrates, Aquatic Life Use General, Recreation Use, Coldwater Fisheries	Convene, Synthesize and communicate science, Fund capacity and projects	EPA, The Nature Conservancy in Rhode Island, Blackstone Watershed Collaborative, Save The Bay, Mass Audubon, Woonasquatucket River Watershed Council, RIRC, SRPEDD, RIDEM, RIDOT, MA EOEEA, MA DER, Narragansett Indian Tribe, Hassanamisco Nipmuc Band, Blackstone River Watershed Council, RI Saltwater Anglers Association	Narragansett Bay region	2032–2035	$10M+ NBEP 320/SNEP, NBEP IIJA, EPA SNEP, NOAA, NFWF, USDOT, USDOE, RIDEM, MA DER, MADOT, FEMA, Private Foundations

INDICATORS	NBEP ROLE	IMPLEMENTING PARTNERS	LOCATION	TIMELINE FOR INITIATION	ESTIMATED COST/ POTENTIAL FUNDING SOURCES
Sea Level, Land Use, Salt Marsh, Open Space	Convene, Synthesize and communicate science, Fund capacity and projects	EPA, NBNERR, RIDEM, Save The Bay, MA DER, NOAA, CRMC, USFWS, Mass Audubon	Coastal and riverine salt marshes	2032–2035	$10M+ NBEP 320/SNEP, NBEP BIL, EPA SNEP

Key to Cost
(all partners, all costs, over 10 years)

$10k–500k (NBEP staff time)
$500k–1M (convene partners, support research/modeling projects)
$1M–5M (develop and implement regional plans)
$5M–10M (develop project plans, designs and permits)
$10M+ (infrastructure and restoration construction)

ACTION PLAN: Public Spaces Accessible to All

VISION: All communities enjoy their right to safe access to nature.

GOAL: Ensure all communities realize long-term benefits of healthy watersheds.

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ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
OBJECTIVE 1: Increase managed public access to nature.			
Public Spaces 1.1 New Public Access: Assess, prioritize, and support plans and projects to expand public access to waterways, natural areas, and urban green spaces.	• Create a new State of the Watershed public access indicator that includes access to waterways and natural lands and green spaces and provides decision support for new sites and site improvements. • Fund and support projects and plans that expand access to nature. • Complete and implement plans that increase urban green space and tree canopies.	• Public Access Indicator • Plans and projects that expand access to waterways using resilient design features • Plans and projects that expand access to greenway trails while restoring habitats • New urban green space plans and projects that provide access to nature	• Increased public access to nature • Greater access to urban green spaces and improved quality of neighborhoods

ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
Public Spaces 1.2 Public Access Protection: Develop policies and awareness campaigns to clarify and ensure legal access to shorelines and inland waterways.	• Create and continue education and awareness campaigns to clarify public/private boundaries on the beach or along freshwater access points, prevent illegal signage, and ensure rights are protected. • Develop policies that clarify legal rights to the shoreline and inland waterways and otherwise expand access in the region.	• Database of public access locations in the region and a new corresponding NBEP Public Access Indicator (NBEP 2023a) • New information campaigns educating the public on their access rights • New policies and initiatives to clarify state laws	• Improved public understanding of how to access coastal and inland waters • Improved public understanding of legal access rights to shorelines and waterways throughout the region • Clarified state and municipal policies regarding access rights and rules for enforcement
Public Spaces 1.3 Public Access Management: Support long-term management and stewardship of parks and public access points through community engagement, policy change, and job creation.	• Support long-term maintenance and stewardship of parks and public access points through community engagement, policy change, and job creation. • Assess and improve amenities at parks and public access points to improve accessibility and increase responsible public use. • Explore creative maintenance approaches (e.g., local community oversight) and green workforce development.	• New amenities and infrastructure to equitably serve visitors and protect the environment • Long-term management plans and funding mechanisms • New jobs dedicated to green and blue space management • Community groups dedicated to maintaining access points in their communities	• Safe, high-quality public access points and green spaces that are resilient and accessible to all • Increased environmental workforce • Increased visitor revenue and positive economic impact to areas with well-maintained green and blue space access • Improved responsible enjoyment of nature by all communities
OBJECTIVE 2: Improve communication about environmental health hazards.			

ACTION STATEMENT	POTENTIAL PROJECTS	OUTPUTS	OUTCOMES
Public Spaces 2.1 Environmental Health Alerts: Develop and publicize education campaigns and public alert and incident reporting systems for environmental health risks.	• Increase public awareness of CSO alert systems. • Create a public notification system for raw and partially treated sewage into Rhode Island waters. • Coordinate design of shared, consistent multilingual educational materials warning of priority environmental health risks. • Track WWTF and CSO permits for compliance and notification of violations.	• Notification system for raw and partially treated sewage in Rhode Island waters • New multilingual alert materials for priority public health concerns	• Improved public health • Increased public awareness of water pollution and contamination problems and causes

Public Spaces Accessible to All continued

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INDICATORS	NBEP ROLE	IMPLEMENTING PARTNERS	LOCATION	TIMELINE FOR INITIATION	ESTIMATED COST/ POTENTIAL FUNDING SOURCES
OBJECTIVE 1: Increase managed public access to nature.					
Sea Level, Population, Land Use, Open Space, Water Quality Conditions for Recreation, Marine Beaches, Shellfishing Areas, Public Access, Impervious Cover	Fund capacity and projects, Synthesize and communicate science	RIDEM, MA DER, Massachusetts DCR, National Park Service, Blackstone Watershed Collaborative, RI CRMC, Wood-Pawcatuck Watershed Association, Taunton River Wild and Scenic Stewardship Council, Save The Bay, Groundwork RI, Groundwork Southcoast, MA EOEEA, SRPEDD, NRICD, TNC-RI, Mass Audubon, Blackstone Watershed Collaborative, Taunton River Watershed Alliance, RI Land Trust Alliance, municipalities, RI Saltwater Anglers Association	Narragansett Bay region with a focus on areas that have fewer high-quality access sites	2025	$5M–10M NBEP 320/SNEP, SNEP, States

INDICATORS	NBEP ROLE	IMPLEMENTING PARTNERS	LOCATION	TIMELINE FOR INITIATION	ESTIMATED COST/ POTENTIAL FUNDING SOURCES
Precipitation, Sea Level, Water Quality for Recreation, Marine Beaches, Public Access	Fund capacity and projects, Synthesize and communicate science	Save The Bay, URI Coastal Institute, Blackstone Watershed Collaborative, RWU, CRMC, RIDEM, RI Saltwater Anglers Association	Narragansett Bay region	2025–2028	$500K–1M NBEP 320/SNEP, EPA SNEP, States
Precipitation, Sea Level, Population, Land Use, Water Quality Conditions for Recreation, Marine Beaches, Public Access, Open Space	Fund capacity and projects, Synthesize and communicate science	Groundwork RI, Groundwork Southcoast, Woonasquatucket River Watershed Council, Save The Bay, MA EOEEA, TNC-RI, Mass Audubon, ASRI, RI Land Trust Alliance, RI Saltwater Anglers Association	Narragansett Bay region, with a focus on areas with engaged partners or community groups	2032–2035	$5M–10M States, municipalities, Private foundations
OBJECTIVE 2: Improve communication about environmental health hazards.					
Shellfishing Areas, Marine Beaches, Legacy Contaminants, Water Quality Conditions for Recreation, Water Quality Conditions for Aquatic Life	Synthesize and communicate science, Fund capacity and projects	MassDEP, RIDEM, EPA, RIDOH, Narragansett Bay Commission, Stormwater Innovation Center, URI Watershed Watch, NEIWPCC, RWU, Blackstone Watershed Collaborative,	Narragansett Bay region, with particular focus on freshwater resources for cyanobacteria and fish consumption alerts	2029–2031	$1M–5M NBEP 320/SNEP, EPA/SNEP, State Funding, Sewage Notification Assistance Grant Program (MassDEP)

INDICATORS	NBEP ROLE	IMPLEMENTING PARTNERS	LOCATION	TIMELINE FOR INITIATION	ESTIMATED COST/ POTENTIAL FUNDING SOURCES
		Blackstone River Coalition, Mass Audubon, Taunton River Watershed Alliance, Save The Bay, SRPEDD, MA EOEEA, Mass Rivers, RI Saltwater Anglers Association			

Key to Cost
(all partners, all costs, over 10 years)

$10k–500k (NBEP staff time)
$500k–1M (convene partners, support research/modeling projects)
$1M–5M (develop and implement regional plans)
$5M–10M (develop project plans, designs and permits)
$10M+ (infrastructure and restoration construction)

C. Crosswalk of 2012 and 2025 CCMPs

Action/Task	Status of activity	2025 CCMP Status	2025 CCMP Action
1.1.1 Issue and implement revised EPA New England permits for nutrient controls at wastewater treatment facilities (WWTFs) located in Mass. portion of the Blackstone River and Ten Mile River watersheds	Completed	Obsolete	N/A
1.1.2 By 2014, complete upgrades needed to implement nutrient reductions at eleven R.I. WWTFs to achieve 50% reduction in total nitrogen discharges (May to October) from WWTFs discharging into upper Narragansett Bay or its major tributaries (2014)	Completed	Obsolete	N/A
1.1.3 Accelerate the elimination of cesspools by adoption of additional phase out requirements (2014)	Completed	Obsolete	N/A
1.1.4 Reduce the impacts of residential and commercial septic systems on water quality by implementing inspection, maintenance and financial assistance programs, and promoting adoption of more effective treatment technologies	Ongoing	Revised/Updated	Water-3.2: Onsite Wastewater Systems People-3.1: Finance Plan
1.1.5 Pursue changes to state laws that will ensure that properties with onsite wastewater treatment systems in existing service areas will be connected to sewer lines	Obsolete	Obsolete	N/A
1.1.6 Extend sewer service to critical areas with failing onsite waste systems including Island Park (Portsmouth) and areas surrounding Greenwich Bay.	Ongoing	Revised/Updated	Water-3.1: Centralized Wastewater Infrastructure Water-3.2: Onsite Wastewater Systems
1.1.7 Ensure that existing wastewater treatment and conveyance infrastructure is sufficiently maintained on an ongoing basis to detect, reduce instances of, and prevent	Ongoing	Revised/Updated	Water-2.1: Stormwater Guidance and Education Water-2.2: Stormwater Retrofits and Maintenance Water-3.1: Centralized Wastewater Infrastructure

Action/Task	Status of activity	2025 CCMP Status	2025 CCMP Action
Sanitary System Overflows (SSOs) and other system problems			
1.1.8 Determine areas where advanced septic system treatment systems should be required to protect sensitive waters and other resources.	Ongoing	Revised/Updated	Water-3.2: Onsite Wastewater Systems
1.2.1 Provide enhanced funding and technical assistance to municipalities in key areas of stormwater management – operations & maintenance, assessment, illicit detection, stormwater system retrofits, public communications, and financing	Ongoing	Revised/Updated	Water-2.1: Stormwater Guidance and Education Water-2.2: Stormwater Retrofits and Maintenance
1.2.2 Prioritize retrofitting of BMPs to areas most affected by stormwater impacts, using LID and including physical and habitat restoration where feasible to achieve water quality goals	Ongoing	Revised/Updated	Water-2.2: Stormwater Retrofits and Maintenance
1.2.3 Evaluate compliance and effectiveness of existing Phase II MS4 permits; use this information to devise strategies and incentives to improve compliance	Ongoing	Revised/Updated	Water-2.2: Stormwater Retrofits and Maintenance Water-1.2: Land Use and Watershed Planning
1.2.4 Use the Phase 2 stormwater permitting process as a tool to encourage more effective local management of stormwater including adequate maintenance, use of best management practices, and appropriate pre- and post-construction stormwater controls	Ongoing	Obsolete	N/A
1.2.5. Use the joint technical assistance RIDEM/MADEP project in the Blackstone, Ten Mile and other relevant stormwater efforts to pilot an approach for providing technical assistance to municipalities in implementing Phase II stormwater requirements	Obsolete	Obsolete	N/A
1.2.6 Support regional efforts to reduce and manage fertilizer use	Ongoing	Revised/Updated	Public Spaces-1.2: Environmental Health Alerts

Action/Task	Status of activity	2025 CCMP Status	2025 CCMP Action
1.2.7 Ensure that data systems capture information on stormwater BMPs to assess effectiveness and track performance	Ongoing	Revised/Updated	Water-2.2: Stormwater Retrofits and Maintenance
1.2.8 Update soil erosion and sediment control manuals in both Rhode Island and Massachusetts	Completed	Obsolete	Water-2.1: Stormwater Guidance and Education Water-1.2: Land Use and Watershed Planning
1.2.9 State and local governments should work with retail operations to reduce or eliminate the use of single-use, non-biodegradable plastic bags through incentives, bans or other methods to reduce pollution of waterways and protect aquatic life	Completed	Obsolete	N/A
1.2.10 Enhance state DOTs capacity to construct prioritized stormwater retrofits using LID practices as identified in state stormwater manuals	Obsolete	Revised/Updated	Water-2.1: Stormwater Guidance and Education
1.3.1 Complete planned NBC Phase 2 by 2014 and initiate planning for Phase 3 that considers incorporating LID methods; complete CSO abatement projects in Newport (2015) and Fall River (2019)	Ongoing	Revised/Updated	Water-3.1: Centralized Wastewater Infrastructure
1.3.2 Complete assessment of Providence CSO phase 1; report on results and assess effectiveness of other CSO projects as completed	Completed	Obsolete	N/A
1.3.3 Identify and implement LID and urban green infrastructure programs and practices that will optimize the performance of CSO abatement projects	Ongoing	Revised/Updated	Water-2.2: Stormwater Retrofits and Maintenance
1.4.1 Implement scientifically-based water management to restore and protect streamflow and ensure sustainable yields including methodology that accounts for current and future land uses, impacts on aquatic systems and inter-basin transfers	Ongoing	Revised/Updated	Habitat-2.1: Habitat Plans Water-1.2: Land Use and Watershed Planning

Action/Task	Status of activity	2025 CCMP Status	2025 CCMP Action
1.4.2 Fully utilize watershed-based plans, such as stakeholder-based plans, NPS plans, TMDLs, and special area management plans to coordinate prioritized actions to protect, restore and manage the land and water (including groundwater) resources within watersheds (2015)	Ongoing	Revised/Updated	Habitat-2.1: Habitat Plans Water-1.2: Land Use and Watershed Planning
1.4.3 Build and increase capacity of nongovernmental organizations in implementing protection and restoration actions	Ongoing	Revised/Updated	People-3.1: Finance Plan
1.4.4 Rhode Island and Massachusetts should work with EPA to identify nutrient management regimes that identify specific management goals or targets for nutrient levels in both states' waterbodies	Ongoing	Revised/Updated	People-2.3: Indicators People-3.2: Regional Targets
1.4.5 Update and implement state management plans to protect ground water and surface water resources from priority pollutant risks	Ongoing	Revised/Updated	Habitat-2.1: Habitat Plans Water-1.2: Land Use and Watershed Planning
1.5.1 Provide sufficient resources, staffing and operational funds to maintain and fill in gaps in existing monitoring and assessment programs in both Rhode Island and Massachusetts including designated monitoring coordinators in both states	Ongoing	Revised/Updated	People-3.1: Finance Plan Habitat-1.1: Habitat Monitoring Water-1.1: Water Quality Monitoring
1.5.2 Develop new or expand existing funding mechanisms at the state and local level (especially consider utility districts) to meet stormwater/water quality infrastructure needs	Ongoing	Revised/Updated	People-3.1: Finance Plan
1.5.3 Advocate for adequate federal SRF and other federal funding for water and wastewater infrastructure, stormwater treatment, and nonpoint source pollution management and other actions in an approved CCMPs and nonpoint source management plans	Ongoing	Revised/Updated	People-3.1: Finance Plan Water-2.2: Stormwater Retrofits and Maintenance Water-3.1: Centralized Wastewater Infrastructure

Action/Task	Status of activity	2025 CCMP Status	2025 CCMP Action
1.5.4 Support and advocate for environmental bond funds in both states to support water quality and resource goals	Ongoing	Revised/Updated	People-3.1: Finance Plan
1.5.5 Develop mechanism (*e.g.*, regional workgroup) to examine local capacity to implement required environmental programs; examine regional solutions; report on funding issues related to local capacity to implement	Ongoing	Revised/Updated	People-1.1: Engagement Plan People-3.1: Finance Plan
1.5.6 Develop improved state mechanisms that efficiently distribute and manage small grants to partner organizations and facilitate access to grant funding while meeting governmental fiscal management requirements; examine governmental fiscal management requirements for improvements that will advance this action	Completed	Obsolete	N/A
1.5.7 Continue support for the R.I. CSSLP program to encourage cesspool removal and OWTS upgrade; in Massachusetts, consider adopting a funding mechanism similar to the R.I. Community Septic System Loan Program (CSSLP)	Completed	Obsolete	N/A
1.5.8 In non-sewered areas, increase the number of municipalities that participate in R.I.'s CSSLP	Ongoing	Obsolete	Water-3.2: Onsite Wastewater Systems
1.6.1 Effectively manage, analyze, synthesize and make available data to support management decision-making, characterize environmental condition trends linked to ecological indicators, prioritize investments and communicate to the public. Continue development of data driven analytical tools, *e.g.*, predictive models, biological indices, etc.	Ongoing	Revised/Updated	People-2.1: Science Communication Tools People-2.2: Ecosystem Modeling
1.6.2 Ensure public access to water quality and other monitoring data acquired with public funds; where not required, require that permit and grant-funded	Ongoing	Revised/Updated	People-2.1: Science Communication Tools People-2.2: Ecosystem Modeling

Action/Task	Status of activity	2025 CCMP Status	2025 CCMP Action
monitoring data be submitted in an accessible digital format (2014)			
1.6.3 Support and develop volunteer monitoring programs where appropriate, building on existing volunteer monitoring programs; where feasible ensure resulting data helps fill gaps and has adequate quality assurance / quality control parameters to be used for state purposes	Ongoing	Revised/Updated	People-1.1: Engagement Plan Habitat-1.12: Habitat Monitoring Water-1.1: Water Quality Monitoring
1.6.4 Work with universities and federal agencies to improve scientific knowledge of water resource issues and technology including climate change implications and emerging contaminants; integrate new findings into management schemes	Ongoing	Revised/Updated	People-1.2: Research Plan People-2.1: Science Communication Tools People-2.2: Ecosystem Modeling People-2.3: Indicators Habitat-1.1: Habitat Monitoring Water-1.1: Water Quality Monitoring
1.6.5 Measure progress and provide the public with ongoing reports on key water quality implementation progress, *e.g.*, TMDLs, nutrients, stormwater	Ongoing	Revised/Updated	People-2.3: Indicators People-3.2: Regional Targets People-2.1: Science Communication Tools People-2.2: Ecosystem Modeling
2.1.1 Develop and adopt state and local policies, regulations, and ordinances as needed to fully implement low impact development approaches to development and redevelopment	Ongoing	Revised/Updated	Water-1.2: Land Use and Watershed Planning
2.1.2 Provide technical assistance to municipalities to identify and implement green infrastructure and LID techniques; agencies should assign designated staff as point of contact on LID issues (permits, training, technical assistance, etc.)	Ongoing	Revised/Updated	Water-2.1 Stormwater Guidance and Education
2.1.3 Develop and implement incentive programs to provide LID-based treatment to existing impervious	Ongoing	Obsolete	N/A

Action/Task	Status of activity	2025 CCMP Status	2025 CCMP Action
surface areas not covered by current regulatory requirements			
2.2.1 Identify and prioritize areas for acquisition, protection and restoration on an interstate basis; target acquisition of priority areas	Ongoing	Revised/Updated	Water-1.2: Land Use and Watershed Planning
2.2.2 Prioritize and permanently protect open space areas in both states that are now under non-permanent protection status (time-limited development rights, etc.)	Ongoing	Revised/Updated	Water-1.2: Land Use and Watershed Planning Public Spaces-1.1: New Public Access Public Spaces-1.2: Public Access Protection
2.2.3 Provide technical assistance, grants and financial and permitting incentives to expand use of conservation development designs and ordinances	Ongoing	Revised/Updated	Water-1.2: Land Use and Watershed Planning
2.3.1 Direct sustainable growth through targeting grant funds, state investments and incentives for redevelopment, infrastructure improvements and/or added capacity to developed lands including Brownfield sites (in R.I., to state-designated urban service boundary and growth centers)	Ongoing	Revised/Updated	Water-1.2: Land Use and Watershed Planning
2.3.2 Work with municipalities to promote growth within the urban service boundaries by implementing RI Land Use 2025 and similar measures in Massachusetts; for communities outside of urban service boundaries, develop criteria and incentives to properly locate new growth centers	Ongoing	Revised/Updated	Water-1.2: Land Use and Watershed Planning
2.3.3 Enhance existing or develop new mechanisms to provide planning resources to communities	Ongoing	Revised/Updated	People-3.2: Finance Plan
2.3.4 Revamp transportation systems to enable greater intermodal connections and promote alternatives to reliance on individual vehicles	Obsolete	Obsolete	N/A
2.4.1 Increase public access to watershed resources by developing public water and land trail systems that enable a range of user opportunities (2014)	Ongoing	Revised/Updated	Public Spaces-1.1: New Public Access

Action/Task	Status of activity	2025 CCMP Status	2025 CCMP Action
2.4.2 Require public access where feasible in development and redevelopment projects that abut public waterbodies and river shorelines in both states (2015)	Ongoing	Revised/Updated	Public Spaces-1.1: New Public Access Public Spaces-1.3: Public Access Management
2.4.3 Continue to plan and develop public fishing piers, boat ramps and other forms of public access to fresh and salt waters in the Narragansett Bay Region	Ongoing	Revised/Updated	Public Spaces-1.1: New Public Access
2.4.4 Improve, expand and promote coastal rights-of-way designations (assessment, signage, mapping, parking) in both states	Ongoing	Revised/Updated	Public Spaces-1.2: Public Access Protection
2.4.5 Identify and address obstacles that impede public access to freshwater sites in both states	Ongoing	Revised/Updated	Public Spaces-1.2: Public Access Protection
2.5.1 Use communications and outreach efforts to promote important watershed resources and ways in which citizens and governments can protect and restore the value of these resources	Ongoing	Revised/Updated	People-1.1: Engagement Plan
2.5.2 Create a mechanism to assess cumulative impacts of development at regional and bi-state watershed scales	Obsolete	Obsolete	N/A
2.6.1 R.I. and Massachusetts should provide technical planning resources to towns in less developed areas to proactively protect ecological resources and to support implementation of state and federal environmental regulatory requirements (2015)	Ongoing	Revised/Updated	People-3.2: Finance Plan
2.6.2 Provide technical assistance to local NGOs and watershed groups to support local implementation of environmental improvement projects; include structuring state and federal funding opportunities in ways that facilitate participation by those groups	Ongoing	Revised/Updated	People-3.2: Finance Plan
2.6.3 Pass legislation in Massachusetts that addresses the reforms included in the Comprehensive Land Use Reform & Partnership Act	Ongoing	Obsolete	N/A

Action/Task	Status of activity	2025 CCMP Status	2025 CCMP Action
2.6.4 Massachusetts and Rhode Island communities should update community master plans to meet current state requirements	Obsolete	Obsolete	N/A
2.6.5 Massachusetts should broaden municipal participation in adopting the Community Preservation Act	Ongoing	Revised/Updated	Water-1.2: Land Use and Watershed Planning
2.6.6 Support bi-state cooperative work by nongovernmental organizations like the Blackstone River Coalition and the Taunton River Watershed Alliance	Ongoing	Revised/Updated	People-3.2: Finance Plan
2.6.7 Develop training and information programs for conservation commissions to help communities meet planning and regulatory needs; transfer lessons learned from Mass. conservation commissions	Ongoing	Revised/Updated	Water-1.2: Land Use and Watershed Planning
3.1.1 Focus resources and enhance land protection efforts by conservation agencies and organizations on less-developed areas, particularly areas threatened by new sprawl development in both states	Obsolete	Obsolete	N/A
3.1.2 Improve and coordinate both state and federal habitat protection and restoration policies	Ongoing	Revised/Updated	Habitat-2.1: Habitat Plans
3.2.1 Improve river connectivity and habitat by removing dams, upgrading culverts and creating structural fish ways to restore free-flowing rivers and anadromous fish passage; implement state fish passage plans	Ongoing	Revised/Updated	Habitat-2.1: Aquatic Connectivity
3.2.2 Create a coordinated bi-state habitat sustainability strategy with a restoration component and identification of priority projects, comprehensive management principles, and implementation targets for freshwater and saltwater ecosystems (2015)	Obsolete	Obsolete	N/A
3.2.3 Develop a strategy to assess dams comprehensively addressing public safety, ecology, cultural values, and power generation	Ongoing	Revised/Updated	Habitat-3.1: Aquatic Connectivity

Action/Task	Status of activity	2025 CCMP Status	2025 CCMP Action
3.3.1 Manage waterfowl populations to reduce bacterial and nutrient pollution and habitat destruction in waterbodies	Ongoing	Obsolete	N/A
3.3.2 Create and implement a comprehensive shellfish management plan for all R.I. marine waters including Massachusetts marine waters in Narragansett Bay that recognizes shellfish as an ecological as well as an economic resource (2014)	Completed	Revised/Updated	Habitat-2.1: Habitat Plans
3.3.3 Assess and consider for use in Rhode Island the Massachusetts Conservation Assessment and Prioritization System (CAPS) to evaluate the integrity of ecological communities	Ongoing	Ongoing	Habitat-2.1: Habitat Plans
3.3.4 Acquire needed data to revise and implement R.I. and Mass. wildlife plans that address important species and associated habitats identified by the states and The Nature Conservancy	Ongoing	Revised/Updated	Habitat-2.1: Habitat Plans
3.3.5 Develop and sustain wildlife monitoring programs	Ongoing	Revised/Updated	Habitat-1.1: Habitat Monitoring
3.3.6 Educate landowners, resource users and the public regarding habitat and wildlife conservation	Ongoing	Revised/Updated	People-1.1: Engagement Plan
3.3.7 Identify and protect cold water fishery streams/headwater areas using Clean Water Act tools, state, federal, and non-profit land acquisition programs and other strategies	Ongoing	Revised/Updated	Habitat-2.1: Habitat Plans
3.4.1 Update and implement state plans for preventing, controlling and managing terrestrial and aquatic invasive species including improving early detection and rapid response capabilities and educating key constituencies; coordinate R.I. and Mass. programs	Ongoing	Revised/Updated	Habitat-2.1: Habitat Plans

Action/Task	Status of activity	2025 CCMP Status	2025 CCMP Action
3.5.1 Establish a comprehensive set of NBR status and trends indicators for critical habitats to assess habitat changes (working off biological condition gradient), impacts, and conservation and restoration progress (2014)	Completed	Revised/Updated	People-2.3: Indicators
3.5.2 Restore/re-fund Rhode Island Natural Heritage program through a multi-organization partnership	Ongoing	Revised/Updated	People-3.1: Finance Plan Habitat-2.1: Habitat Plans
3.5.3 Continue and enhance ecological approaches to fisheries management including monitoring, applied research, technical training	Ongoing	Obsolete	N/A
3.5.4 Improve fish contamination studies and consumption advisories, particularly as pertains to urban and ethnic communities and populations at risk.	Ongoing	Revised/Updated	Public Spaces- 2.1: Environmental Health Alerts
3.5.5 Examine science and assess need for additional land and water protections, including identifying applied research needs related to habitat and habitat function; provide resources to conduct needed research.	Ongoing	Revised/Updated	People-2.1: Research Plan Habitat-2.1: Habitat Plans
3.5.6 Identify compatibility issues related to hydroelectric power generation and river ecosystems; incorporate into hydropower development strategies	Obsolete	Obsolete	N/A
3.5.7 Develop tools and information on biodiversity and priority habitats and make them available to the public and local and other officials to help with planning and management	Ongoing	Revised/Updated	People-1.1: Engagement Plan
3.5.8 Develop incentives for private property owners to participate in habitat restoration projects	Ongoing	Revised/Updated	People-1.1: Engagement Plan
3.5.9 Working with commercial fishermen and shellfishermen, NBNERR, universities, angler associations and other community and technical stakeholders, examine potential for additional protected areas in Narragansett Bay and other coastal waters.	Ongoing	Revised/Updated	People-1.1: Engagement Plan Habitat-2.1 Habitat Plans

Action/Task	Status of activity	2025 CCMP Status	2025 CCMP Action
3.5.10 Use hydrographic models of the Bay and other methods to assess the relationship between areas closed to shellfishing due to pollution and shellfish harvest areas in terms of effects on shellfish populations and potential use of sanctuary or refuge areas for shellfish	Ongoing	Revised/Updated	People-2.2: Ecosystem Modeling
3.5.11 Develop baseline data on condition and extent of riparian buffer areas	Obsolete	Obsolete	N/A
3.6.1 Create a R.I. Habitat Restoration program, similar to the Mass. Wetlands Restoration Division of Ecological Restoration, with dedicated, full-time staff to support project implementation, work on needed restoration policy, and integrate agency actions	Ongoing	Ongoing	People-3.2: Finance Plan
3.6.2 Develop state policies, plans and practices to improve integration of water quality improvement, stormwater measures and physical restoration	Ongoing	Revised/Updated	Water-2.1: Stormwater Guidance and Education Habitat-2.1: Habitat Plans Habitat-2.2: Habitat Projects
3.6.3 Support and expand R.I. Coastal and Estuarine Habitat Restoration Trust Fund funding, the Mass. Division of Ecological Restoration, NGO-based restoration efforts and federally funded restoration programs (NRCS, USFWS, NBEP, etc.) (2015)	Ongoing	Revised/Updated	People-3.2: Finance Plan
3.6.4 Maintain and expand state-wide and regional mapping of critical watershed and coastal habitats including biodiversity hot spots; use data to support restoration, conservation planning, and enhanced enforcement	Ongoing	Revised/Updated	People-2.2: Ecosystem Modeling
3.6.5 Support the efforts of the R.I. Habitat Restoration Team to improve and coordinate habitat restoration projects, funding and policy	Ongoing	Revised/Updated	People-3.2: Finance Plan
3.6.6 Develop a continuing seagrass mapping program in R.I. and Mass. coastal waters	Ongoing	Revised/Updated	People-1.2: Research plan

Action/Task	Status of activity	2025 CCMP Status	2025 CCMP Action
3.6.7 Create R.I. state lake management program, coordinated with Mass. lakes management that includes requirements for lake management plans that address water quality and invasive species.	Completed	Obsolete	Habitat-2.1: Habitat Plans
4.1.1 Identify, protect and restore watershed and riverine natural resources, *e.g.*, wetlands and riparian areas to ensure their continuance as cost-effective protection	Ongoing	Revised/Updated	Habitat-2.1: Habitat Plans
4.1.2 Remove dams where practicable and beneficial to public safety and/or river ecology; where dams must be retained, ensure that high and moderate hazard dams are fully maintained	Ongoing	Revised/Updated	Habitat-3.1: Aquatic Connectivity
4.1.3 Improve dam condemnation policies to provide more effective mechanisms for dam removal in R.I. and Mass.	Ongoing	Revised/Updated	Habitat-3.1: Aquatic Connectivity
4.1.4 Use state and local permitting processes and adaptive restoration programs (*e.g.*, living shorelines) to protect natural coastal features like salt marshes and beaches as well as coastal shoreline processes so that they can continue to provide cost-effective coastal protection.	Ongoing	Ongoing	Habitat-3.2: Salt Marsh Restoration
4.2.1 Develop strategies and incentives to guide development away from high hazard zones and natural areas that provide storm protection and other benefits (2015)	Ongoing	Revised/Updated	Habitat-3.2: Salt Marsh Restoration
4.2.2 Design stormwater treatment facilities and green stormwater infrastructure to have adequate capacity over the life of the facility for predicted increased, intensified flow resulting from climate change (2017)	Completed	Revised/Updated	Water-1.2: Stormwater Retrofits

Action/Task	Status of activity	2025 CCMP Status	2025 CCMP Action
4.2.3 Develop and implement natural hazard mitigation and adaptation plans for publicly-owned wastewater facilities to reduce potential for pollution impacts from climate related events	Completed	Revised/Updated	Water-2.1: Centralized Wastewater Infrastructure
4.2.4 Improve dam inspection and maintenance requirements and enforcement	Ongoing	Obsolete	N/A
4.2.5 Mandate a regular review of state and local plans and risk assessments to incorporate advancements in coastal hazards science	Ongoing	Revised/Updated	Habitat-2.1: Habitat Plans
4.2.6 Evaluate the projected effects of saltwater intrusion on coastal onsite wastewater treatment systems, drinking water and stormwater infrastructure	Ongoing	Obsolete	N/A
4.3.1 Develop a shoreline change Special Area Management Plan to address coastal erosion and inundation in response to sea level rise and strategies and incentives to guide development away from special flood hazard areas (2015)	Completed	Revised/Updated	People-3.2: Regional Targets
4.3.2 Develop mechanisms to coordinate responses across the range of interests affected by climate change impacts – state and federal agencies, private sector, institutions, and municipalities	Obsolete	Obsolete	N/A
4.3.3 Create coordinated water release and storage strategies to help address problems related to flows (flooding, infrastructure damage, etc.) from intense storm events.	Ongoing	Revised/Updated	Water-3.1: Centralized Wastewater Infrastructure
4.3.4 Assess and identify the most effective adaptation responses; prioritize implementation of these identified activities (2015)	Ongoing	Revised/Updated	Water-2.1: Stormwater Guidance and Education Water-2.2: Stormwater Retrofits and Maintenance Water-1.2: Land Use and Watershed Planning
4.4.1 Develop funding mechanisms for infrastructure retrofits for affected utilities and structures most likely to be affected by a disaster; identify those critical to public health and environmental priorities (2015)	Completed	Revised/Updated	People-3.1: Finance Plan

Action/Task	Status of activity	2025 CCMP Status	2025 CCMP Action
4.4.2 Develop additional funding for prioritized dam inspection, maintenance and removal; identify potential funding mechanisms to create a dam management fund	Ongoing	Revised/Updated	People-3.1: Finance Plan
4.4.3 Develop/leverage funding for acquisition of properties most vulnerable to damage from climate change impacts, targeting those which could provide multiple benefits such as habitat retreat, recharge, open space, recreation, and flood storage	Ongoing	Revised/Updated	Habitat-2.2: Habitat Plans
4.4.4 Modify and enhance state State Revolving Fund programs to encourage communities to address climate change impacts and avoid investment in highly vulnerable areas	Ongoing	Revised/Updated	Water-3.2: Onsite Wastewater Systems
4.4.5 Increase state resources and secure additional federal resources to meet identified science research needs	Ongoing	Ongoing	People-2.1: Research Plan
4.5.1 Continue to improve accuracy of inundation models for coastal and riverine floodplains to support long term planning; apply the results of state pilot projects and NEP Climate Ready Estuaries projects in planning for resilience	Ongoing	Revised/Updated	People-2.2: Ecosystem Modeling Habitat-2.1: Habitat Plans
4.5.2 Identify applied research needs to better assess impacts of climate change on watershed and bay ecosystems	Ongoing	Revised/Updated	People-1.2: Research Plan
4.5.3 Use data generated by regional Light Detection and Ranging (LIDAR) topographic surveys and high-resolution bathymetry databases to support floodplain mapping, sea-level rise and storm surge modeling	Ongoing	Revised/Updated	People-2.2: Ecosystem Modeling
4.6.1 Develop land conservation and adaptation plans for wetland migration to include protection of adjacent upland areas (2015)	Ongoing	Revised/Updated	Habitat-3.2: Salt Marsh Restoration
4.6.2 Assess effectiveness and determine feasibility for use of Living Shorelines programs in the Narragansett Bay Region	Obsolete	Obsolete	N/A

Action/Task	Status of activity	2025 CCMP Status	2025 CCMP Action
4.6.3 Adopt an approach, where possible, that accommodates rather than resists flood waters by restoring floodplain buffers for use as marsh or forest land; Employ resilience design where possible to absorb stormwater in extreme events, particularly in light of projected increased precipitation	Obsolete	Obsolete	N/A